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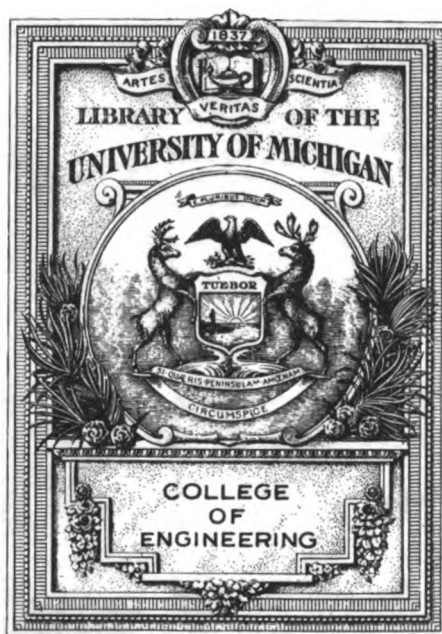
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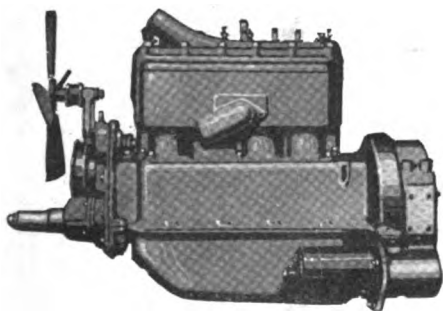


# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

Where

*Is the Largest Group?  
of Automobile Buyers?*



Model "K." Lycoming Motor

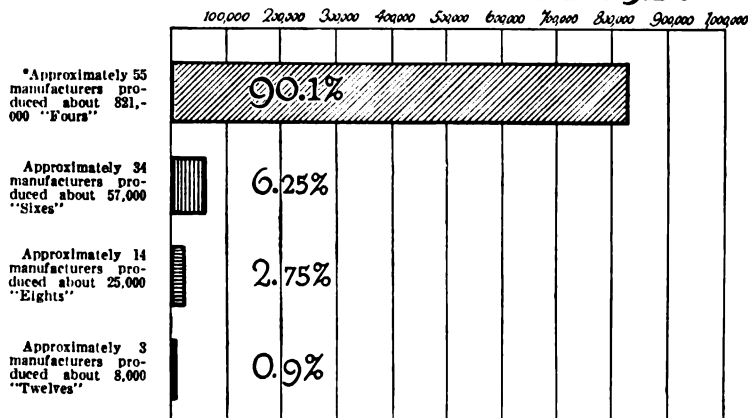
The group which constitutes the biggest market for automobiles is to be found among the more than 3,000,000 people whose incomes range between \$2,000 and \$10,000.

Obviously, price is an important factor of choice with the buyers in this group, as is evident from the chart which shows 90% of all cars sold are "Fours," which type predominates among the low and moderate price cars.

In this big market the Lycoming Motor has a unique place as an equipment asset for both car manufacturer and car owner. A simple, dependable "Four," made in one type and model only, it provides a power plant capable of doing anything that any motor can do and yet leaves a wider margin for balancing body and chassis value to enhance riding comfort and economy, than could be secured under the added expense of more cylinders.

*A booklet describes the Lycoming Motor. Write for it.*

### Number of Cars Sold - 1920



\*Exclusive of Fords.

**Lycoming Motors Corporation**

Williamsport, Pa.





## FEDERAL BEARINGS

### UNIFORMITY

The Babbitt lining in every Federal Bearing shows the same tough, fine-grained, homogeneous structure because every Bearing is chilled immediately after it is lined.

### SOLIDITY

Every Federal Bearing is guaranteed absolutely free from porosity, because the process of manufacturing makes it impossible for the Babbitt to contain air while cooling.

### 100% BOND

Unlike all other methods of manufacturing Bearings, the Babbitt lining and Bronze Back of every Federal Bearing is Bonded UNDER PRESSURE while the adhering alloy is at a constant temperature.

### EXCELLENCE

Every Federal Bearing is manufactured from the highest grade materials, machined accurately and subjected to the most rigid inspection, because "FEDERAL, DETROIT" must be stamped on the back.

EVERY FEDERAL BEARING IS LINED BY  
**CENTRIFUGAL FORCE**

(Process protected by patents)



**FEDERAL BEARING & BUSHING CORPORATION**  
BABBITT-LINED BRONZE-BACK BEARINGS - BRONZE BUSHINGS - BRONZE CASTINGS  
DETROIT - MICHIGAN



**INDEX**  
**TO**  
**VOLUME XLV**  
(July 7 to December 29, 1921)  
**OF**  
**Automotive Industries**

Here is an accurate guide to the authoritative articles and reference data which have appeared in AUTOMOTIVE INDUSTRIES during the last six months. The publication of this index is in line with our constant efforts to make this publication of maximum service to the entire automotive industry.

# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

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# AUTOMOTIVE INDUSTRIES

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## What the New Tariff Bill Means to the Automotive Industry

Authority for Negotiation of Bargaining Tariff Treaties Opens Way for Better Export Conditions and Special Clause in Automotive Section Recognizes Industry as Leader in Foreign Trade. Aluminum Figure a Disappointment.

By Clyde Jennings

**T**HE clauses in the new tariff bill which expressly permit the President to negotiate bargaining tariff treaties promise more for the automotive exporter than he has ever been able to see in any previous legislation of this kind. The fact that one of these clauses is in the automotive section of the bill sets aside all doubt as to whether the members of Congress engaged in drafting this bill had a proper appreciation of the importance of the automotive vehicle as export merchandise.

The bargaining tariff feature will enable the seller of American goods to capitalize the import consumption of this country to lower the price of his wares in a foreign country. We have, in this country, a very large consumption ability for Jamaica bananas. Jamaica has a relative consumption possibility for American automotive vehicles. If Jamaica wants cheap automobiles, then they must permit us to have cheap bananas.

The working of this sort of a tariff situation is illustrated differently in connection with the treaty clause in the automotive section of the bill. The bill sets the import duty at 25 per cent American valuation for foreign cars. France to-day imposes a duty at 45 per cent on American cars. The President is authorized to negotiate a treaty whereby each country will admit the other's automotive vehicles on the

25 per cent basis. In case the other country refuses, the President can increase the import duty on vehicles from that country to a maximum of 50 per cent ad valorem.

The proposal for a reduction of the American import duty from the present 45 per cent to 30 per cent was made by the National Automobile Chamber of Commerce some months ago and created much surprise in Congress, where practically all industries were asking for more protection. Indeed, some congressmen advised the automotive manufacturers that they were making a mistake, that Europe with its cheap labor would be flooding this country with cheap motor cars. The American manufacturers, however, assured Congress that they were unafraid and were ready to meet competition in this country or any part of the world, and with a lower tariff they believed that they would gain more than they would lose.

So the reduction has been written into the bill, the figure being 5 per cent lower than that the industry asked. This, however, is equalized by the change of valuation basis. Formerly the tariff was imposed on the European valuation. Under the present bill it is imposed on the American valuation, which includes freight, insurance and various other expenses which go to make the cost to the sales agent in this country. The result is that the 25 per cent in the Fordney bill



is equal to practically 31 per cent under the law it is proposed that this bill will succeed.

The National Automobile Chamber of Commerce has prepared the following summary of the points in the new tariff bill:

1. The following points of particular interest to the automotive industry are contained in the first committee print of the tariff bill, made public by the Ways and Means Committee of the House, Wednesday.

2. The import duty on all automobiles, bodies, chassis and parts, not including tires, is decreased to 25% of American valuation. The duty under the Underwood Act was based on the lower foreign valuation. When a foreign manufacturing country imposes a higher duty for such imports, duties here may be similarly increased, not to exceed 50% ad valorem.

3. Under special provisions, the President is empowered and directed to meet any import duties levied by other countries which he may deem to be reciprocally unequal and unreasonable, by suspending similar schedules here and levying such additional duties as he may deem necessary to equalize such rates.

4. The duty on aluminum, aluminum scrap, and alloys of any kind in which aluminum is the component part of chief value, is increased from 2 cents per pound to 5 cents. Request of the aluminum producer was for 7 cent tariff.

5. Crude oil and fuel oil are listed for duty of 35 and 25 cents per barrel respectively.

6. Motor vehicles sold for war purposes on which the U. S. internal taxes were not paid, would be subject to a duty equal to those taxes upon reimportation into U. S.

7. Assurance has been given that a resolution will shortly be introduced in the House which may provide duty as high as 300% on reimported war material of American manufacture; such procedure would afford protection at earlier date than tariff.

The disappointment in the bill, as set forth in this statement, is chiefly contained in paragraph 4, regarding the duty on aluminum. The automotive industry opposed by argument and otherwise the increase of this duty, but they did not press the point as strongly as some other industries. The automotive industry has at all times taken the position that it is necessary to have some taxes that will contribute toward the support of the Government,

and aluminum is one of these.

The oil tariff, as set forth in paragraph 5, is higher than the automotive industry would like to have it. The same reasoning that applies in the previous paragraph applies here, with the additional circumstances that the oil industry is an industry of its own and that the various currents of influence in this reach very deeply into politics and finance, so that the automotive industry cannot object to duties that are satisfactory to those chiefly concerned. It was thought that if a tariff was left on oil there might be a less disposition to put domestic taxes on motor fuel.

Paragraphs 6 and 7 refer to the reimportation of automotive vehicles and other materials sold abroad for war purposes and many of which are now being returned to this country by speculators who have purchased them abroad.

In the tariff bill is a clause which would impose upon these goods all of the domestic taxes which they escaped because of being sold for war purposes. This would remove a part of the present unfair competition conditions. It would mean that before a vehicle could be sold as a used vehicle the tax equal to the sales tax on a new vehicle must be paid.

The Graham resolution, which is referred to in paragraph 7, would practically prohibit the return of this material to this country. It would provide an import duty as high as 300 per cent of this merchandise. This resolution is independent of the regular tariff bill and, from present prospects, seems very likely to be passed by both houses.

The favorable action upon the requests of the automotive industry by the congressional committees engaged in the drafting of the tariff would appear to be a subject for congratulation to those who represented the industry before these committees. The chief spokesmen were George M. Graham and C. C. Hanch. Their appearance before the committees was staged by Alfred Reeves of the National Automobile Chamber of Commerce and his staff. It has been the subject of comment in Washington that the automotive industry has made an excellent impression there by its give-and-take attitude and the ingenuity of its appeal.

## Visual Inspection of Combustion

**I**N the development of the internal-combustion engine visual observation of the combustion has played a minor role. To be sure, early investigators did provide apparatus that permitted them to look in the cylinder while the engine was operating, but little has been done in this direction with engines operating at the high speeds of the present day automobile types. Interest has centered in what an engine could do rather than how it did it.

At the present time the cry for fuel conservation has reawakened interest in the nature of the combustion in the cylinder. Glass induction systems have disclosed how unsatisfactorily the fuel has been prepared for combustion. Analyses of the exhaust gases have shown how incompletely the charge has been burned.

This has been accomplished in connection with the study of combustion in the one-cylinder Liberty engine at the Bureau of Standards in the following manner: A spark-plug shell has been adapted to receive a circular section of glass intended to serve as a window in the cylinder. This assembly can be used in place of either spark-plug in the ordinary aviation cylinder, but in this instance an additional boss has been welded to the cylinder in order that conditions might be observed with both plugs firing. Its use was satisfactory in that changes in flame color due to changes in air-fuel ratio were easily discovered. Since

the entire combustion stroke is completed in one-sixteenth of a second at an engine speed of 1800 r.p.m., it is possible to see only the predominant color by this means.

To make it possible to observe the combustion in its various stages a stroboscopic disk was added. Its purpose is to permit the combustion to be observed only a small portion of the stroke. Since there is one power stroke for every two revolutions of the crankshaft, this disk is driven at one-half crankshaft speed. The flame is observed through a slot in the disk, the length of the slot governing the length of the portion of the stroke studied. Provision is made for altering the angular relation of this slot to the crankshaft so that any interval of the cycle and, hence, any stage of combustion can be studied.

Observations made possible by this apparatus have proved of considerable value in research work of the nature described by permitting observations of the duration of luminous flame during the power stroke, the characteristic differences in color and brightness at different phases of combustion and their variation with changes in ignition timing, mixture ratio, compression pressure, etc. One observes, for instance, excessively bright flashes of flame of extremely short duration accompanying the phenomenon known as fuel knock or detonation. The cause for this phenomenon is of course not revealed.

# Kansas Adopts Weight as Motor Vehicle License Basis

Cars are assessed on actual weight of vehicle, trucks on rated useful load capacity—More than 200 makes of vehicles licensed in state and some vehicles out of production for several years are listed in considerable number by State Secretary. 200 cars built by the present owner.

**T**HE new license system for motor cars and trucks is in effect in Kansas. This system is based upon the weight of the car, or the carrying capacity of the truck. Licenses are being issued for the half year and beginning Jan. 1 the licenses will be issued for the full calendar year, bringing this state into line with most other states.

The license fee is \$8 for cars of less than one ton gross weight, with 50 cents added for each 100 pounds above one ton. Cars of the Ford class take the minimum fee. The fee for the Buick five passenger car is \$13. All of the money paid by the motorists for licenses, except 50 cents, goes into the road fund of the county where the car is owned. The 50 cents is taken for the administration of the law.

At the close of the old license year, June 30, there were 287,384 motor cars and trucks in the state, against a registration of 265,396 a year ago. There were 2166 dealers registered separately. This is a loss of 78 dealers from the registrations of the previous year. There were 3398 motorcycles registered and 34 dealers, while a year before there were 4220 motorcycles and 42 dealers.

There were 19,460 trucks registered during the past fiscal year. Heretofore the truck has paid the same license fee as a passenger car. The new license fee for trucks starts at \$15 a year for trucks of less than one ton carrying capacity and gradually increases up to \$100 a year for trucks of five tons or more.

On the basis of the population in March, Kansas has a car for every 6.19 persons in the state.

There are more than 200 makes of cars and trucks operated in the state. The Secretary of State listed 183 makes of cars and trucks and then had 597 cars of nondescript or obsolete manufacture. There are nearly 200 cars operated in Kansas under the name of the owner and builder. These builders have taken parts from several wrecked or fire damaged cars and have constructed themselves a motor car that runs and gets them to where they want to go. The railroads and express companies frequently hold sales of motor parts which are purchased by practical mechanics and built into cars. The speediest car making the Kansas racing circuit this year is built with two motorcycle engines, a Ford chassis and the wire wheels from a Saxon. It is chain driven and the chain was manufactured from pieces of old starter chains. Such cars as this are listed under the name of the owner.

Now the least interesting information in this report is the number of orphan cars in use in this great farming state. It will be noted that a considerable number of the cars made by companies which quit production in the slump of 1912 and 1913 are still in use and in some cases there are more of the old cars than the recent ones of the same class on behalf of which an active sales campaign has been waged. This information is only occasionally available from the official records of the registration bureaus of the states.

The following is a list of makes of cars and trucks prepared by the Secretary of State, one \* indicating a truck, while two \*\* indicate both trucks and passenger cars are included in the figure given:

Abbot Detroit	28	Courier	2	*G. M. C.	340	Lexington	274	**Overland	19,780	*Service	61
*Acme	26	*Dart	21	*Gram Bernstein	36	Liberty	236	*Smith		*Smith	23
Allen	950	Davis	38	**Grant	1,162	Little	28	**Packard	289	Speedwell	14
*American	49	*Denby	35	Great Western	5	Locomobile	26	Paige	1,566	Stafford	60
Anderson	67	Detroit	218			Lozier	27	**Paige Detroit	10	Stanley Steamer	17
Apperson	370	Detroit	44	Halladay	13			*Panhard	71	Stearns Knight	87
*Argo	8	Dodge	15,777	Haynes	792	*Mack	22	Parry	3	Stephens	193
Auburn	649	*Dorris	21	Harroun	138	Maibohm	74	Partin Palmer	17	*Sterling	34
*Avery	13	Dort	2,442	Hercules	9	Marathon	9	Pathfinder	19	Stevens Duryea	47
		*Diamond	63	Herf Brooks	22	Marion	94	Patterson	78	Stewart	35
Baker	14	Dixie Flyer	36	Holmes	18	Marmon	317	*Patriot	37	Stoddard Dayton	16
Beggs	81	*Douglas	30	Hollier	34	Mason	7	*Peerless	143	Studebaker	7,647
*Bethlehem	39			Hudson	3,047	*Master	117	Petrel	1	Stutz	190
Briscoe	1,649	Elcar	371	Hupmobile	1,565	Maxwell	11,175	*Pierce-Arrow	103		
Brush	12	Elco	5			Maytag	4	Pilot	60	Templar	31
**Buick	20,538	Elgin	428	Imperial	55	Mercer	44	Pratt	10	Thomas	4
Bush	38	Elmore	1	*Indiana	181	Metz	266	**Premier	144	*Traffic	154
		Empire	319	*International	977	Meteor	35	Pullman	237	Tulsa	110
Cadillac	1,466	Essex	1,169	Interstate	330	Michigan	27				
Carnation	10	Everett	29			Milburn	39	Rambler	70	*Velle	1,318
Carter	64			Jackson	323	Mitchell	893	Rauch Lang	47	*Vim	76
Case	449	*Federal	25	Jeffrey	211	Moline	25	R. C. H.	28		
Chalmers	1652	Firestone	6	Jones	241	Monroe	187	Regal	345	Wahl	14
Chandler	1,064	*Ford	144,076	Jordan	55	Moon	187	*Reo	5,305	Ward	38
Chevrolet	13,361	Franklin	291	*Jumbo	31	Moore	21	Rock Falls	32	Warren	38
Cleveland	126	*Fulton	48					Republic	1,018	Waverly Electric	8
Cole	371			Kelly	79	*Nash	2,165	R. & V. Knight	13	Wescott	79
Columbia	184			King	172	National	63	Sampson	132	*White	349
*Commerce	135	*Galloway	5	Kissell	207	New Era	19	*Sandow	32	*Wichita	19
Commonwealth	23	Gardner	161	Koehler	3			Sayres & Scovell	64	Wilcox	13
Cunningham	14	*Garford	45	Krit	91	Oakland	4,839	Saxon	1,709	Winton	95
Corliss	28	Gary	38			Ohio	21	Scrapps Booth	369	Woods Electric	21
Cutting	5	Geronimo	42	Lambert	12	Oldsmobile	2,786	*Seldon	32		
Crow Elkhart	407	Glide	52			Olympian	14	Sellers	3	Miscellaneous	597

# Trials of German Carbureters for Using Non-Volatile Fuels

Sixteen makes participate in competitive tests made partly on the road and partly on the laboratory testing stand. Two winning instruments are here described. Both of these are of simple design and easily adjusted.

By Benno R. Dierfeld

SOME time ago a national competition of carbureters for passenger cars and trucks was held in Germany under the auspices of the German Automobile Testing Committee and the largest German automobile club, the Allgemeiner Deutscher Automobil Club. As pointed out in a previous article by the author, fuels and fuel mixtures of very low volatility and generally of very different qualities are being used in Germany, and it was therefore considered a good plan to hold a contest to determine which carbureters were able to use these heavy fuels with the least trouble and in the most economical manner. With a good carbureter there should be little or no smoke at the exhaust, even with the heaviest fuels; the engine should start readily, should be flexible in operation and should give sufficient power. Furthermore, the carbureter should permit of changing from one fuel to another, as from a gasoline-alcohol to a benzol-kerosene mixture, without trouble and without requiring any great amount of adjustment. The results of the competition have just been published, and the winning carbureters undoubtedly come nearest meeting the present requirements, at least with the fuels available in Germany.

Sixteen different makes of carbureter participated in the competition, which was divided into three parts, a road test, a bench test and rating of the merits of design by the jury. The road test was held on a rather hilly course near Berlin and extended over a period of one week. The carbureters under test were fitted to 4½-

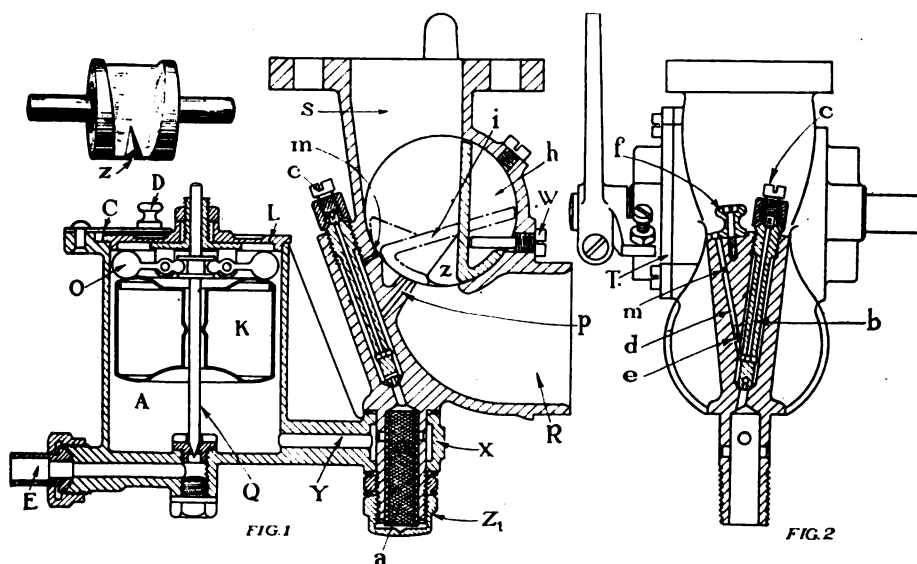
ton trucks with 45 hp. engines. During the first two days a mixture of benzol and heavy oil was used for fuel; on the next two days a benzol-kerosene mixture and on the final day, for the sake of comparison, benzol alone. The heavy oil was gas oil, a product of petroleum distillation, with an end point of 680 deg. Fahr. The kerosene was not the ordinary lamp oil, but a heavier product obtained by the distillation of the heavy oil above mentioned.

A great deal of importance was attached to the road test, because the spark plugs were regularly examined as to fouling and the exhaust observed as regards smokiness, hence it was possible to check the character of the combustion. Emphasis should be laid on the fact that all the trucks ran with a practically clean exhaust. The engines were idled with the trucks standing and they were started up under different conditions, and all observations were noted. It was also observed whether or not it was necessary to change nozzles in the course of the contest, and if no exchange was made this was set down to the credit of the carbureter. The road test ended with a run up a 5 per cent incline  $\frac{5}{8}$  of a mile in length to test the pulling power of the engine.

Bench tests were made at the automobile laboratory of the Dresden Technical University, under the direction of two professors. Owing to difficulties with the fuel supply, it was impossible to obtain the different grades of fuel which it had been intended to use for these tests, and a mixture of 30 per cent benzol and 70 per cent kerosene was used, the conclusion being

reached that this poor fuel, in conjunction with the different fuels used during the road tests, would permit of fairly judging the qualities of the carbureters. Entrants were required to furnish one carbureter for each bench test of the series, and the carbureters were fitted in the presence of a representative of the entrant. No changes in the carbureters were permitted after delivery to the contest authorities, except replacements of venturi tubes and fuel nozzles during the preliminary tests.

The brake tests were made on a Daimler valve-in-head four-cylinder 4.14 x 5.90 in. truck engine developing 35 hp. at 1,000 r.p.m., and on an Audi L-head four-cylinder 2.95 x 4.65 in. passenger car engine, developing a maximum output of 22 hp. at 2200 r.p.m. A water brake was provided for the truck engine and an



Sectional views of the Homa carburetor, one of the winners in the German carbureter trials.



adjustable fan brake for the passenger car engine. The brake tests were divided into preliminary and main tests, and during each of these tests exhaust samples for analysis were taken and the spark plugs were examined. The preliminary tests served only to obtain the best possible adjustment of the carburetor and did not count in the results of the contest. The main tests included determination of the fuel consumption per horsepower-hour under wide open throttle condition at different engine speeds, determination of the fuel consumption per horsepower-hour at constant engine speed with gradually increasing load, determination of the lowest idling speed without change of carburetor nozzle, determination of the fuel consumption under these conditions and determination of the acceleration of the passenger car engine. Every test run had a duration of 10 minutes; then an exhaust gas sample was taken.

In the rating of design, points were allowed for different features, including special equipment, simplicity of design, low idling speed, lightness, accessibility of nozzle, etc. The preliminary work in connection with this part of the competition was done by experts selected by the jury. The jury consisted of ten members, including the leading carburetor experts of Germany. In making the awards, the results of the bench tests were given double weight as compared with the more practical road tests, one reason for this procedure being that in the bench test each carburetor was tested on two different engines. The result of the contest was a tie for first place between the Homa carburetor manufactured by the Homa Co. of Berlin-Halensee, and the Einhorn carburetor manufactured by the firm of Dehle & Severin, Gütersloh, Westphalia. The result was somewhat of a surprise, for the reason that the Einhorn carburetor was a newcomer and had been heard of very little before the trial.

Figs. 1 and 2 are two sectional views of the Homa carburetor, a make well known in Germany and widely used. Fuel enters the float chamber through tube E and the interchangeable seat of the float valve Q. Within the float chamber is located the conventional brass float K with balance levers O. The cover L of the float chamber is fixed in position by the knob D and flat spring C.

From the float chamber the fuel flows through passage Y to a hub X, by means of which the float chamber can be swung around into the most favorable position with respect to the engine. The lower part of the carburetor contains the fuel strainer a, which can be detached and cleaned after removing nut Z. The fuel from the float chamber passes through the single fuel nozzle b. This nozzle, which is rather long, has the fuel metering opening at its lower end and the calibrated correcting air nozzle c at its upper end.

The fuel enters the annular space between fuel nozzle b and the carburetor case, and fills up the main nozzle opening p leading to the throttle chamber. At the same time, however, the idling passage d (Fig. 2) provided with the calibrated bushing e, is filled with fuel up to a predetermined level. The throttle valve h with stop screw W is arranged in the usual manner and can be removed by detaching the cover plate T, but the throttle valve is of peculiar shape, having a nose Z on the regulating edge.

If the throttle is only slightly opened, as indicated in dotted lines in Fig. 1, then the main nozzle p is covered

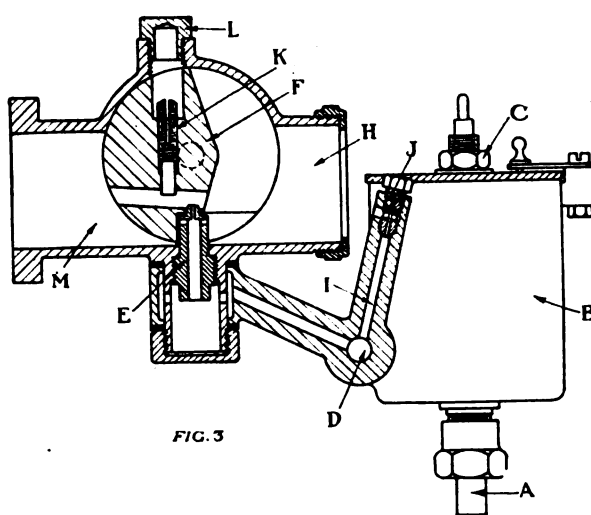


FIG. 3

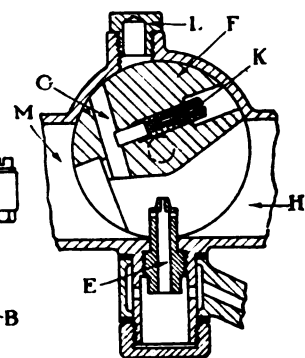


FIG. 4

Two sectional views of the Einhorn carburetor which tied with the Homa in winning the German carburetor trials.

up, and during the suction stroke of the engine fuel is emitted only from the idling nozzle m, connecting the idling passage d with the throttle chamber, mixing with the high velocity air stream entering through the main air inlet R, thus producing a very rich mixture. Of course this fuel supply lasts only a short time. Thereafter air enters through the correcting air nozzle and no more pure fuel but a fuel fog consisting of little fuel and much air is sprayed through the idling nozzle m; in this manner the mixture is automatically weakened, while at the same time the fuel is thoroughly atomized at idling speeds. In the same measure as the throttle valve is opened, the main air entrance R and the main fuel nozzle are opened and regular operation begins.

The other prize-winning device, the Einhorn carburetor, is shown in the sectional views, Figs. 3 and 4, with the throttle valve in two different positions. Fuel passes through tube A to float chamber B, the fuel level of which is regulated by balance weights and a needle valve in the ordinary manner. The fuel level can be easily adjusted after removing nut C. The lid of the float chamber can be quickly detached in the same manner as in the Homa carburetor. From the float chamber the fuel flows to the calibrated nozzle D, and then to the atomizer E, detachable from below, provided at the top with one axial and several radial openings.

When idling, the throttle valve F occupies the position shown in Fig. 3. The top part of the atomizer E then projects into the passage G of the throttle valve F and fuel is drawn only through the axial opening of the atomizer. This fuel mixes in the passage G with the high-velocity air entering through main air inlet H, thus forming a rich mixture. After a short time the fuel in the idling passage I is exhausted and additional air enters through the correcting air nozzle J, whereupon a fuel fog is sprayed from the central opening of the atomizer E. In this manner the mixture is automatically weakened for normal operation, and yet the fuel is thoroughly atomized when running idle. The idle running screw K in the throttle valve F, accessible after removing the cap screw L, serves for the low-speed adjustment and is screwed in further if the mixture is too rich, and out if the mixture is too lean, a corresponding addition in the air being made by adjusting the stop screw of the throttle valve. If the throttle valve F is opened wide, then all radial openings of the atomizer E are uncovered in proportion to the area of the passage from the main air inlet H to the outlet opening M.

# New British Chassis Incorporates Many Novelties

Leyland chassis has eight-cylinder-in-line engine possessing some unusual features. All chassis parts are lubricated from one central point. Other departures from conventional practice include vacuum-operated foot brake, twin bevel drive in rear axle and peculiar spring suspension.

By M. W. Bourdon

**I**N the number of its departures from standard practice it would be difficult to imagine any more pronounced than the new eight-cylinder-in-line Leyland, which is the product of the well-known British truck makers. Ignoring the arrangement of its cylinders, which are cast as a block with the top half of the crankcase, the overhead camshaft drive is an innovation. By skew gearing from the rear end of the crankshaft is driven a short longitudinal half-time shaft bearing three narrow eccentrics, and by means of three connecting rods, 16 in. long, coupled to these, and three similar eccentric disks at the rear end of the camshaft, the latter is rotated; the units of each group of three eccentrics are, of course, set at 120 deg. relative to each other. A costly job, but in that respect resembling many other features of this chassis, which is offered at approximately \$12,000, with an output of eighteen planned for 1921 and 200 for 1922.

The overhead valves are operated by roller-end rockers and are held up to their seatings by flat steel laminated springs, each of the latter serving for the two valves of a cylinder and the longest leaves having slotted ends applying under T-headed studs screwing over the threaded valve stems. Each spring has 11 leaves, varying in length from one to six inches.

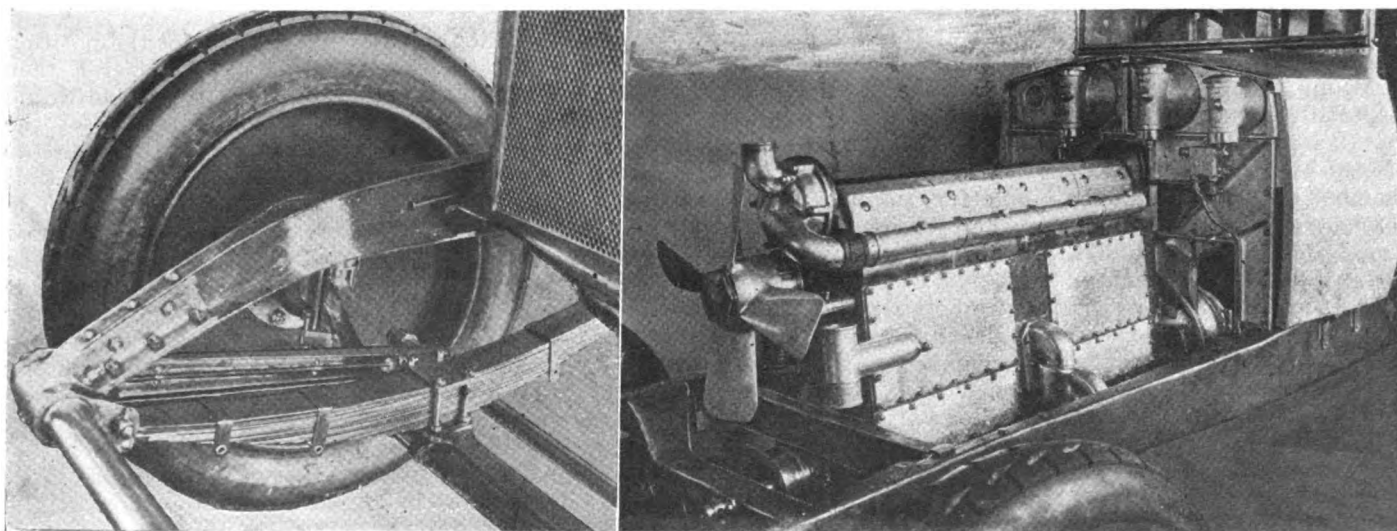
A dry sump system of engine lubrication is used, but the oil is picked up by the flywheel instead of by a sec-

ond pump to return it to the rectangular aluminum tank at the side of the top half of the crankcase. A pump in the tank delivers the oil under pressure to the hollow crankshaft and to all parts of the chassis—following the lead of the Ferguson in the latter respect. A spare oil tank on the dashboard maintains a constant level in the engine tank, while another replenishes the gear-set. Alongside these is a 4-gallon vacuum tank usable for gravity feed with direct replenishment in emergency.

Water is circulated by pump with thermostatic control between radiator and engine—a feature of note being that the fan behind the honeycomb radiator is driven through a clutch which is thrown out of action at small throttle openings.

The steering column, with an excessive rake, finishes at the dashboard, to which the gear housing is attached; thence a vertical shaft with the steering lever at its lower end conveys the motion to the drag link. A single disk clutch and a flexible coupling carry the drive to the gear-set, the casing of which has a trunnion bearing at each end in U-glands, with square section leather packing, formed in the holes of two deep cross members. Except that the box is prevented from turning by two dowels or keys, it is free to "float" to accord with or counteract the effects of frame distortion.

The propeller shaft is divided, the front half being open and having two laminated steel joints, rectangular



Right—New eight-cylinder-in-line Leyland engine. Overhead camshaft is driven by eccentrics. Fan clutch is disengaged automatically at low throttles. Four gallon gasoline tank and reserve oil tanks are set in dash.  
Left—Front spring suspension on new Leyland, showing radius member which is keyed to front cross-shaft enclosed by concentric tube. This shaft acts as a torsional spring and is intended to check rolling

plates connecting the star pieces instead of disks. The torque tube inclosing the rear half of the shaft is supported in a spherical housing in a cross-frame member.

A twin bevel drive occurs in the back axle, the differential being on the rear end of the propeller shaft. Straight-toothed bevels are used, while the driving shafts and the wheels are splayed.

Both brakes apply within the rear wheel drums, but the pedal-operated shoes are actuated by a vacuum device. Movement of the pedal allows engine suction to take effect upon a piston in a cylinder below the pedal, the latter having 5 in. of travel before the full braking effect occurs.

The suspension is distinctly out of the ordinary, for an endeavor has been made to prevent rolling by linking up the pairs of springs by torsion shafts. Thus at the front, where semi-elliptics are used, the spring ends are free to slide in brackets fore and aft. A steel drop forging of H-section forms a radius member at each side, extending from front extremity of frame to the axle. The fore ends of both links are keyed to a cross shaft inclosed by a concentric tube; thus when one

spring is deflected, or when one is deflected more than the other, the cross coupling shaft is submitted to a torsional stress and yields to it, but acts as a flexible check. The shaft is approximately 1 in. (25 mm.) in diameter and is not intended, like the Wolseley Six cantilever rear spring coupling tube, to resist torsional stress and compel the opposite spring to check the one deflected.

At the back the Leyland has quarter-elliptic springs, to which the same principle is applied, but in this case the torsion shaft is secured to the butt ends, which have a trunnion bearing in a frame bracket.

The foregoing gives a general idea of the scheme for improving spring suspension; there are what the designer terms refinements, which do not affect the principle, but which cannot be described in a few words without drawings. Frankly, the writer must admit he is not impressed as to the advantages derivable. They may exist, but not, he suggests, to a degree which warrants the somewhat involved departure from normal practice. For example, one of the "refinements" referred to limits the total deflection of the springs, but, it would seem, to no better effect than a simple rubber buffer.

## Detachable Fairleads for Aircraft

A FAIRLEAD, in aircraft construction, is a guide and support for the control cables connecting the pilot's levers with the flying control surfaces, or engine spark and throttle levers. Ordinarily these are metal tubes, brazed or soldered to a sheet metal clip for attachment to the aircraft structure, and threaded over the control cable. As such, the fairlead serves to hold the cable in line between pulleys, or to offset the lead to avoid interference with other parts, where the offset is insufficient to render a pulley advisable.

The Williams detachable fairlead, in addition to fulfilling the above functions, permits the cable to be removed or replaced at will. A single fairlead is shown in Fig. 1. It will be noted that the fairlead comprises a split composition guide held in a metal base, and locked in place by a wire. The method of operation is clearly shown.

Expansion of the number of guides held in a single base is readily possible, with retention of the detachable feature. A compound base, used for spark and throttle controls on a tandem engine installation is illustrated in Fig. 2. Following are the advantages claimed for this type of fairlead:

1—Control cables can be made up in production prior to the attachment of fairleads, and the fairleads attached to the aircraft structure during construction. 2—The composition guide presents a slow wearing, non-corrosive

surface with inherent lubricating qualities to the control cables. Control cable wear is reduced, and in event of wear to the guides, replacement is readily accomplished. 3—Replacement of control cables is facilitated, and erection or tearing down the aircraft can be accomplished with a minimum of work. Replacement cables can be made up complete in the shop, thus avoiding leaving one end open to be made up at the field on assembly. 4—Light weight, standardization and low cost.

According to the inventor, S. T. Williams, of Philadelphia, in one installation where the detachable fairlead replaced an ordinary fairlead, cable life was increased from 18 hours flying time to over one hundred.

In a laboratory test, a fairlead was set up with a 6 in. cable offset in 3 ft., and under a 100 pound pull on a 7 in. stroke, 70 strokes per minute, ran for 75 hours without noticeable cable wear. No lubricant was used. The test was discontinued only because the cable was fraying where it passed over a pulley before going onto the fairlead. Though the fairlead was deeply grooved, it was still in condition for many more hours of service.

Ordinarily only two sizes of fairleads are required—one for flying control cables, and one for engine and accessory controls. These have been standardized for the single base mounting. When compound mountings are required, standardized guides are used.

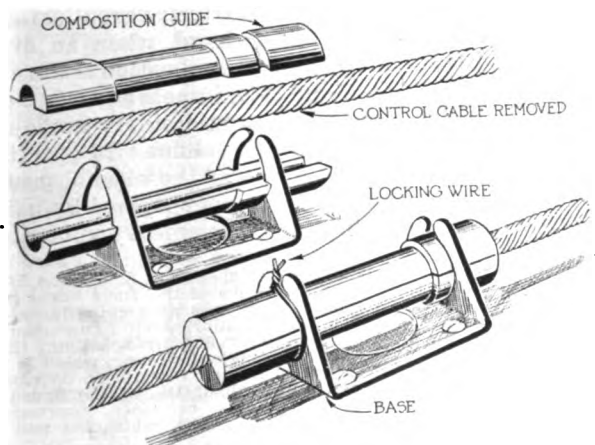


Fig. 1—Single Detachable Fairlead

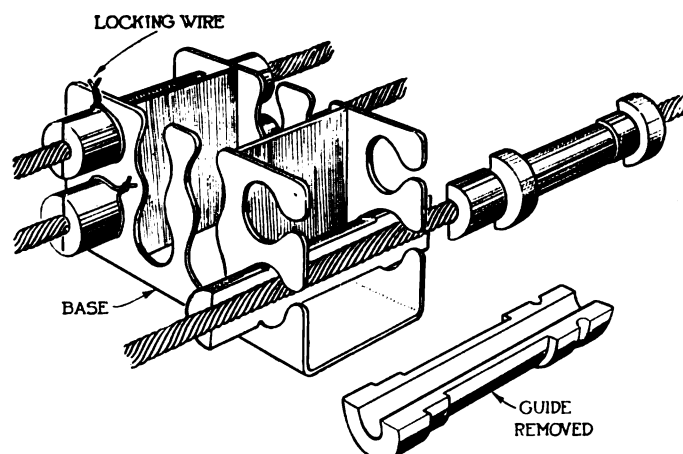


Fig. 2—Compound Detachable Fairlead

# Influence of Various Fuels on Engine Performance

## Part IV

When all fuels are used with same compression ratio power output is proportional to energy content of charge, but fuels which can be used with higher compression ratios without detonation are capable of developing higher maximum power than those which detonate at lower pressures.

By H. R. Ricardo\*

**T**HE power output obtainable from different fuels must be regarded from two points of view:

(1) When all fuels are used with the same compression ratio.

(2) When the compression is adjusted to suit each fuel, the ratio of compression being the highest consistent with freedom from detonations under any normal circumstances.

We will deal first with the results obtained at a constant compression ratio. Under these conditions, provided that each fuel is burned at the same efficiency (and it will be shown later that this is the case), the power output will clearly be proportional to the energy content of the fuel-air mixture. This energy content will be equal to the product of the heat of combustion of the fuel, when burnt with the requisite quantity of air, and the change in specific volume. By change in specific volume is meant the increase or decrease of the number of molecules in the working fluid during combustion. It is clearly necessary to take account of this in calculating the total internal energy of the burnt fuel-air mixture, since at the same temperature the pressure will be proportional to the number of molecules.

### Heat of Combustion of a Fuel-Air Mixture

This is probably best expressed in terms of foot-pounds of heat energy liberated by the combustion of 1 cu. in. of a mixture of fuel and air measured at standard temperature and pressure, the mixture being in all cases of such proportions that all the oxygen in the air is combined.

As pointed out previously, the heat of combustion of a fuel-air mixture as defined above has no direct relation to the calorific value of the fuel.

Table VII gives the specific gravity, the calorific value in terms of weight and volume, also the heat of combustion of a number of different hydrocarbons, which form the principal ingredients of nearly all the available volatile hydrocarbon fuels and some other combustible substances.

From this table the heat of combustion of almost any volatile liquid fuel can be arrived at once its chemical composition has been determined.

The change in specific volume varies, of course, with the composition of the fuel; it varies also with the mixture strength. In the case of all fuels belonging to the

general group known as petrol, the specific volume after combustion is substantially greater than before, thus giving a net increase in the total internal energy. In the case of benzol and other members of the aromatic group there is only a slight increase in specific volume, while in the case of hydrogen, carbon disulphide, acetylene, etc., there is a substantial decrease.

Table VII gives values for the following:

Column E.—The change in specific volume after combustion of a mixture of fuel and air in such proportion as to give complete combustion without excess of air.

Column F gives the total energy liberated by combustion in terms of foot-pounds per cubic inch, taking into account the change of specific volume, and again assuming that the proportions of the mixture are such as to give complete combustion. Column C of Table VIII may therefore be taken as an expression of the power output obtainable from each fuel, assuming:

(1) That the mixture strength is that giving complete combustion.

(2) That the fuel is completely vaporized before entering the cylinder.\*

(3) That the temperature of the mixture after complete evaporation is the same for each fuel.

When an over-rich mixture is used, and the fuel is only partially burnt, the heat of combustion of the mixture will be no greater, but the increase in specific volume will in most cases be larger, and therefore the total internal energy will be somewhat greater on this score; therefore a slight increase in power might be expected in the case of those fuels having a relatively large increase in specific volume. On the other hand, when an over-rich mixture is used the products of combustion so formed have a higher specific heat, and this, in nearly every case, counteracts the advantage which would otherwise be obtained from the increase in specific volume. In practice, with, perhaps, the single exception of the alcohol group, very little, if any, increase in power is obtained by using a mixture richer than required for complete combustion.

\*NOTE.—This will only be true, strictly speaking, if Column D of Table VII is calculated using calorific values of the fuels burnt in a state of vapor. Bomb calorimeter experiments give calorific values from a liquid state, therefore to the usual calorimetric figures should be added the latent heats of evaporation. Strictly speaking, there should be added only the latent heat at constant volume, which is the usual latent heat (at constant pressure) less  $p_v$  (expansion on vaporization). This latent heat is apparently about  $\frac{1}{45}$  of the figure at constant pressure. Latent heats are almost certainly observed at atmospheric pressure, so that the amount to be subtracted will be simply  $\frac{14.7 \times 144}{778}$  (specific volume of vapor at normal B.P.).

\*From a preliminary report on research work conducted by the author and other investigators for the Asiatic Petroleum Co. and published in *The Automobile Engineer*.

An examination of Column F of Table VII reveals the very interesting fact confirmed by numberless experiments that the power output available from all known volatile hydrocarbon fuels is the same to within narrow limits provided (1) that they are all tested at a compression ratio at which full ignition advance can be used without detonation, and (2) that the losses due to change in specific heat and to dissociation at high temperatures are the same in all cases. In this connection Messrs. Tizard and Pye's investigations prove that there is very little to choose in this respect between the combustion mixtures of any of the available fuels.

The experimental results, a résumé of which will be given later, and which cover a very large number of independent tests, have completely borne out the conclusions arrived at from Messrs. Tizard and Pye's theoretical investigations of the chemical properties of the fuels and of the process of combustion. All the experiments have proved conclusively that, so long as the fuel is completely evaporated, the maximum power obtainable from samples of each of the groups given in the above tables, or from any combination of them, is proportional to the energy content, and, excepting only the alcohol group, is the same to within less than 3 per cent. The differences in the losses due to dissociation and to change of specific heat that do exist are such as to minimize the differences between the heats of combustion of the different types of fuels (paraffins, naphthenes, aromatics, etc.), and to place them still more nearly on a par.

There is, however, one variable factor which has been mentioned previously, and which, so far as the writer is aware, has not been taken into consideration by other experimenters, namely, the influence of the latent heat of evaporation upon volumetric efficiency. This factor was found, in the case of alcohol and the other members of this group, to have a very powerful influence on the maximum power output obtainable.

The conclusions given so far are based on the assumption that the whole of the fuel is evaporated before its entry to the cylinder—in practice this is seldom, if ever, the case. It is, of course, clear that the weight of charge taken into the cylinder will depend upon and be inversely proportional to its absolute temperature at the moment when the inlet valve closes. There is definite evidence from experimental results that, with the exception of alcohol and the other members of its group, all fuels boiling below 200 deg. C. (392 deg. Fahr.) are completely evaporated before the commencement of the compression stroke by contact with the hot walls and admixture with the highly heated residual exhaust products in the cylinder excepting only a very small proportion which may enter the cylinder in coarse drops, and so not only escape evaporation, but even to a large extent combustion also. This proportion is, however, quite insignificant, and has no influence so far as power output is concerned.

The absolute temperature, therefore, at the commencement of the compression stroke is dependent upon (a) the amount of external heating applied, and (b) the latent heat of evaporation. It is almost independent of the temperature of the charge during its entry to the cylinder. In fact, the final absolute temperature, and, therefore, the weight of the charge taken into the cylinder is dependent upon the quantity and latent heat of the fuel, and upon the amount of heat added to it, external to the cylinder—it is substantially independent, either of the volatility of the fuel, or its entering temperature.

For example, a highly volatile fuel entering the cylinder at 0 deg. C., (32 deg. Fahr.), and a heavy fuel of low-vapor tension entering at 30 deg. C. (86 deg. Fahr.), will both have the same final absolute temperature at the commencement of compression, if the latent heat of both is

the same, and if both charges received the same amount of pre-heating. In the former case most of the evaporation has taken place outside the cylinder, and the added heat has been absorbed by the latent heat of the vapor, in the latter case little or no evaporation has taken place outside the cylinder, and the added heat has therefore raised the temperature of the air and the still liquid fuel. In both cases contact and admixture with the highly heated exhaust products in the cylinder will complete evaporation, and in both cases the final temperature will be the same, hence the weight of working fluid (which is inversely proportional to the absolute temperature), and therefore the power output, will be the same in both cases.

From the above considerations it will be seen that, with any given amount of pre-heating (provided it is not excessive), the volumetric efficiency, and therefore the power output, will vary directly with the latent heat of the fuel.

The writer has deemed it advisable to emphasize this point very strongly, because he was at first misled into supposing that the final suction temperature was proportional to the inlet temperature, as it would be in the case of a gas engine. The above conclusions may be summed up as follows:

(1) The power output is inversely proportional to the absolute temperature of the working fluid at the end of the suction stroke—since it is the temperature at this point which controls the weight of charge, and therefore the volumetric efficiency.

(2) Other things being equal, the final suction temperature is controlled by the amount of external heating, on the one hand, and the latent heat of the fuel on the other; it is nearly independent of the temperature of the entering charge or its volatility.

Starting with a mixture of fuel and air at atmospheric temperature, heat is added by (a) contact with the inlet valve and hot walls of the cylinder, (b) admixture with the residual exhaust gases in the combustion chamber, and by (c) external heating of the carburetor or induction system. Heat is abstracted by (d) the latent heat of evaporation of the fuel; (a) and (b) may be regarded as constant, and, for the purpose of the present argument, may be ignored. For any given fuel, therefore, the power output obtainable is controlled primarily by the amount of heat added to the working fluid before it enters the cylinder, and, so far as power output is concerned, it is immaterial whether the heat so added is devoted to raising the temperature of the mixture or to evaporating the fuel at low temperature. Conversely with any given amount of pre-heating, the power output obtainable is dependent upon the latent heat of evaporation of the fuel.

Apart from the alcohol group, the variation in latent heat is not very large, and does not exercise any appreciable influence. It is interesting to note, however, that in cases where the total internal energy is lower, the latent heat is generally slightly higher; consequently a slightly greater weight of charge is taken into the cylinder, sufficient in most cases to compensate for the lower internal energy, and thus bring the actual power output to substantially the same in all cases. This point is well illustrated by the instance of benzol, as will be seen at once by reference to Table VII. The energy liberated by combustion of a cubic inch (at standard temperature and pressure) of benzene-air mixture is appreciably lower than that of the hydrocarbons forming the greater proportion of gasolines. On the other hand, the latent heat of benzol is considerably greater, and as the result the power output obtainable from benzol is the same as that from gasoline to within less than half of 1 per cent.

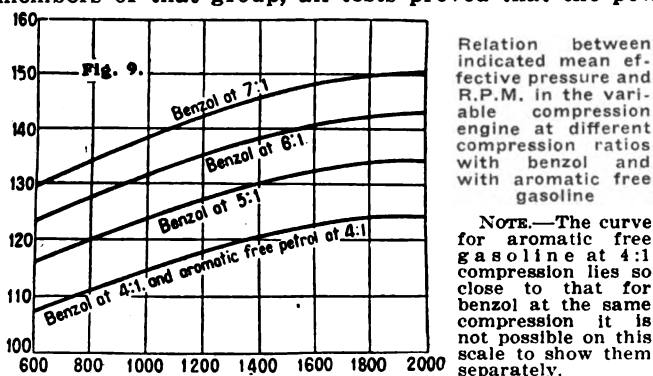
Table VII gives the latent heat of evaporation of a num-



ber of hydrocarbons and other substances enumerated in the previous tables. The air-to-fuel ratio by weight, also the drop in temperature of the mixture due to evaporation of the liquid, is shown for each fuel. The calculations are made for mixtures giving complete combustion, but without excess of air.

In the case of alcohol, owing to the very much higher latent heat and to the fact that the proportion of fuel to air is also much greater, the latent heat of evaporation plays a supremely important part, and results in a really marked increase in power as compared with other fuels, although its total internal energy is lower than that of either gasoline or benzol. Moreover, there is introduced a feature which is not observed to any marked extent with other fuels—namely, that the power output increases very considerably when an over-rich mixture is used, because more fuel is then evaporated, the temperature of the charge is lowered, and the gain in weight of charge or volumetric efficiency considerably more than outweighs the loss due to the greater specific heat of the products of combustion.

Apart from the variations due to the differences in the latent heat of evaporation of fuels, which only assumes important proportions in the case of alcohol and the other members of that group, all tests proved that the power



output obtainable was, in fact, directly proportional to the total internal energy of the fuel, and this was further confirmed by the fact that the thermal efficiency at any given compression ratio was found to be the same with all fuels boiling below 200 deg. C. (392 deg. Fahr.), except the alcohol group. That is to say, it was found that each fuel was burnt at the same efficiency, and, therefore, the same proportion of its internal energy was converted into power. In the case of the alcohol group the efficiency was found to be slightly higher, and a further increase in power output was obtained thereby.

There was clear evidence that in the case of the alcohols, owing to the very high latent heat, evaporation continued throughout the compression stroke also, with the result that the compression was nearly isothermal. As a result the temperature of the cycle was lowered, the losses due to conduction and to change of specific heat were reduced, and the efficiency was slightly increased thereby. This feature became particularly prominent in the case of methyl alcohol, which has the highest latent heat of any of the fuels tested, and since it has also the lowest calorific value it follows that the weight of fuel per cycle is greater than with any of the others. Both the power output and efficiency obtainable with methyl alcohol were considerably greater than with any other fuel examined.

In referring to alcohol and allied substances as fuels it should perhaps here be explained that though these fuels give a considerably greater maximum power output, and, furthermore, can be used with a higher thermodynamic efficiency than either gasoline or benzol, the

heat value of the alcohols per unit of weight or per unit of volume of the liquid is so much lower than that of gasoline or benzol that the rate of consumption for equal power output is nevertheless greater. The exact amount of this larger fuel consumption with alcohol, as compared with gasoline or benzol, will be examined later when dealing with the subject of efficiency.

In Table VII is given (Column J) values for relative power output calculated directly from the foregoing tables and in accordance with the argument adduced above in arriving at the conditions governing power output. As will be seen by a glance at this table, the greatest difference among the paraffins, aromatics and naphthenes is hardly more than  $\pm \frac{1}{2}$  per cent. This deduction, as will be seen later, is corroborated almost exactly by the experimental results.

With a view to determining definitely the power output obtainable from each fuel at the same compression ratio, several hundreds of tests were run both on the variable-compression engine and on the supercharging engine. In all cases the procedure adopted was as follows:

A suitable compression ratio was chosen at which it was known that none of the fuels to be tested would detonate under any conditions of mixture strength or ignition advance. The engine was first started up either on the specially prepared aromatic free gasoline, or on pure benzol, which was adopted as the standard fuel for high-compression work. It was then run with wide-open throttle at a speed of 1,500 r.p.m. until the temperature of the jacket water, carbureter, lubricating oil, and induction pipe had settled down to constant values.

The best ignition setting and mixture strength for the development of maximum power on the fuel were, of course, well known from previous experience, but no readings were recorded unless or until the torque was within  $\pm 0.3$  per cent of that known to be obtainable with the standard fuel (after correction for barometer).

So soon as the running conditions were considered to be in every respect normal, and the engine was found to be developing standard power with standard settings, the fuel was changed over to the sample to be tested; the correct mixture strength and ignition setting for the development of maximum power with the new fuel were found, and readings of torque were taken. In some cases the torque curve over a wide range of speed, generally from 800 r.p.m. to 1800 r.p.m., was explored, but this practice was discontinued later after it had been found from repeated experiments that the characteristic of the torque curve over the whole available range of speed was the same for every fuel tested (provided, of course, that the correct mixture strength and ignition setting was used for each speed).

The maximum power output obtainable from each sample of fuel was determined in this manner, the time taken to find the best settings and secure steady and reliable readings being about half an hour in each case.

During the whole period of such a series of tests the throttle remained wide open, and great care was taken to prevent any variation in temperature either of the circulating water or the heat input to the carbureter.

After completing a series of such tests on a number of different samples, a final test was always made on the standard fuel, when, with the same temperatures throughout, and the original adjustments for this fuel, the power output had to return to within less than 0.5 per cent of the initial reading, or the tests were discarded as unreliable. In such tests only one variable remained, namely, the temperature of the lubricating oil, which always rose slightly during a prolonged run of the nature just described. In the case of the variable-compression engine, owing to the extensive use of ball bearings and

other precautions, the oil temperature had no appreciable influence on the performance of the engine, but in the case of the supercharging engine the friction losses diminished perceptibly as the oil temperature rose, and a small correction seldom exceeding 0.4 per cent had to be made for this factor. Great care was, of course, taken to ensure against any variation in the character of the oil supplied. A large stock of lubricating oil was prepared and set aside for the purpose of these tests in order to ensure uniformity throughout.

At the conclusion of each series of tests the engine was motored by means of the balanced electric dynamometer in order to check the mechanical losses.

For the sake of uniformity all figures are given in terms of indicated horsepower, indicated thermal efficiency, etc. This was found desirable because of the differences in mechanical efficiency between the several engines upon which the tests were carried out. The mechanical losses of the engines used were ascertained very carefully by both direct and indirect measurements, and, once determined, and variation could be detected at once by the motoring test. In the case of the variable-compression engine no measurable change occurred after the first thirty or forty hours' running, but in the case of the supercharging engine slight variations in friction were noted from time to time, due probably to slight distortion or lack of rigidity in the structure of the engine.

The power tests at constant compression were run under three different conditions, namely:

(1) With no heat supplied to the carbureter.

(2) With a constant heat supply of 65 B.t.u. per minute when running at 1500 r.p.m., or 0.0433 B.t.u. per

minute per revolution per minute when running at speeds other than 1500 r.p.m.

(3) With the heat supply varied to maintain the entering gases at a constant temperature of 15 deg. C. (59 deg. Fahr.) as measured\* by a thermometer in the induction pipe and close to the inlet valve.

In Table VIII is given the mean results of a very large number of tests taken on the variable-compression engine, with the different temperature conditions referred to above.

Since in this table are given actual experimental results, the fuels enumerated are of necessity only those of which fairly large quantities could be obtained—very few chemically-pure hydrocarbons are obtainable in any quantity. The substances given here are the same as those included in Table II.

In view of the fact that in most engines the heat supply to the carbureter may be regarded as more or less constant, the results obtained under the conditions shown in Columns F and H are the most important and the most nearly allied to practice. The results shown in Columns G, I and K are interesting in that they give an indication of the volatility of the fuels.

In this table, Columns B, C and D show the approxi-

\*The figures given for the temperature of the working fluid as it enters the cylinder must be regarded as a first approximation, and are only strictly accurate when the whole of the fuel is evaporated before it reaches the thermometer bulb. There can be little doubt that when unevaporated fuel is present the thermometer acts as a "wet bulb" thermometer, and therefore gives readings which are below the true value. No means have yet been found for measuring accurately the temperature of the working fluid when a portion of the fuel is unevaporated. As explained previously, the actual temperature of the working fluid during its entry to the cylinder is relatively unimportant, for it is the total heat input which controls the volumetric efficiency, and therefore the power developed.

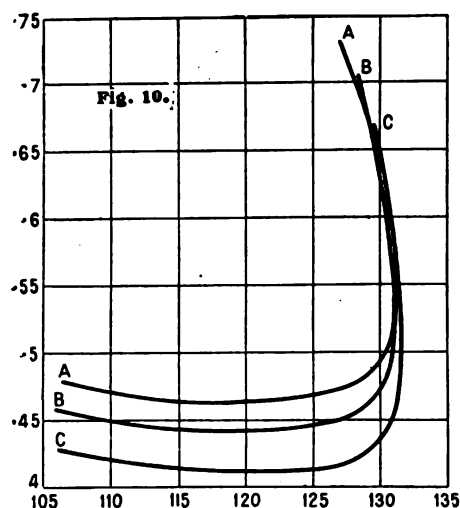
TABLE VII

Name of Fuel	A	B	C	D	E	F	G	H	I	J
	Specific Gravity at 15° C. (59 Deg. Fahr.)	Caloric Values (Lower Values, Not Including Latent Heat of Evaporation)		Heat of Combustion in Ft. Lb. per Std. Cu. In. of Mixture Giving Complete Combustion	Change in Specific Volume, i.e., Sp. Vol. after Combustion + Sp. Vol. before Combustion	Total Energy Liberated by Combustion, Ft. Lb. per Std. Cu. In.	Latent Heat of Evaporation B.t.u. per Lb.	Air to Fuel Ratio (by Weight) for just Complete Combustion	Fall in Temperature of Mixture Due to Latent Heat of Evaporation, Deg. C.	Relative Power Output Allowing for Increase in Density Due to Evaporation Octane = 100
		B.t.u. per Lb.	B.t.u. per U. S. Gal.							
Paraffin Series.										
Hexane.....	0.670	19,410	108,300	45.9	1.053	48.33	156	15.2	21.0	100.2
Heptane.....	0.688	19,300	110,700	46.06	1.056	48.64	133	15.1	18.0	100.1
Octane.....	0.704	19,210	112,700	46.06	1.058	48.73	128	15.05	17.0	100.0
Nonane.....	0.710	19,135	113,200	46.06	1.059	48.78	...	15.0	...	...
Decane.....	0.757	19,060	120,300	46.06	1.060	48.82	108	15.0	14.5	99.4
Aromatic Series.										
Benzol.....	0.884	{17,330 17,302 17,500 17,522}	{127,700 127,400 127,500 127,100}	46.9	1.013	47.51	172	13.2	26.0	100.1
Toluene.....	0.870	{17,540 17,522 17,500}	{127,500 127,100 127,000}	46.2	1.023	47.93	151	13.4	22.5	100.0
Xylene.....	0.866	17,810	128,600	46.85	1.029	48.26	148	13.6	22.0	100.6
Naphthene Series.										
Cyclohexane.....	0.780	18,880	122,800	46.04	1.045	48.11	...	14.7	21.5	100.0
Hexahydrotoluene.....	0.77	18,830	120,800	46.06	1.049	48.32	...	14.7	19.0	99.8
Hexahydroxylene.....	0.756	18,790	118,300	46.1	1.052	48.49	...	14.7	18.0	99.8
Olefine Series.										
Heptylene.....	0.70	19,170	111,700	46.8	1.049	49.1	...	14.7	23.0	102.5
Decylene.....	0.76	19,170	121,300(app.)	47.0 (app.)	.....	.....	...	14.7	.....	.....
Alcohol Group										
Ethyl Alcohol.....	0.794	{11,620 11,548 8,495 8,476}	{76,800 77,000 56,300 56,200}	44.5	1.065	47.4	...	8.95	83.0	120.0
Methyl Alcohol.....	0.796	{8,495 8,476}	{56,300 56,200}	42.46	1.061	45.05	...	6.44	140.0	143.0
Miscellaneous										
Ether.....	0.719	14,670	88,000	46.8	1.068	49.98	158	11.14	27.5	107.0
Carbon Disulph.....	1.27	5,840	61,800	36.9	0.935	34.5	153	9.35	31.0	74.0
Acetylene.....	Gas	21,010	per std. cu. ft., 1,542	53.9	0.962	51.85	Gas	13.2	.....	101.0
Carbon Monox.....	Gas	4,372	341	46.1	0.852	39.28	Gas	2.45	.....	77.0
Hydrogen.....	Gas	52,830	296.4	39.8	0.852	33.9	Gas	34.3	...	66.0

Note.—Experimental observations of the calorific values of liquid fuels are made in a "bomb-calorimeter" in which the fuel before combustion is liquid and the products of combustion are cooled down to room temperature. The observed heat, therefore, includes the heat of condensation of the steam formed during combustion, the subtraction of this gives the "lower" values tabulated above. If the fuel before combustion had been in a state of vapor, the observed calorific values would be greater than those given, by the heat needed to vaporise the fuel in the bomb.

Note.—The above values columns E and F are calculated for an Air-Fuel mixture just giving complete combustion, at a temperature of 0° C. and absolute pressure of 29.92 in. of mercury.

Column I is calculated assuming specific heat of the fuel vapor is constant for all at 0.5.



Relation between I.M.E.P. and fuel consumption for different fuels at the same compression ratio which is sufficiently low to permit of each being used under the most economical conditions for that compression. Curve (A) is with aromatic free gasoline (S.G. .718). Curve (B) is with "A" gasoline (S.G. .782). Curve (C) is with benzol (S.G. .880). It will be seen that while the minimum consumptions vary widely, depending (at this low compression) solely on the heat values of the respective fuels, the maximum I.M.E.P., and therefore also the power output, is

practically the same for each of these very different fuels

mate composition of each of the fuels on which power output was observed. From the composition of each fuel has been calculated (Column E) a figure of merit for power output which is exactly comparable with the values given for relative power output (Column J of Table VII) deduced for the pure substances in manner described. It will be seen that it is only for fuels (such as the alcohols) with unusually high latent heat that the observed power output (Columns H or F given in terms of indicated mean effective pressures) fall short of the calculated figures of merit (Column E). Column M gives the observed power output in terms of indicated mean pressure for each of the fuels under equal conditions of heating, but after full advantage has been taken of increasing the compression ratio up to the limit set by detonation or by pre-ignition for that particular fuel.

From the tables given above and from numerous other experiments of a similar nature to those recorded here, certain definite conclusions may be drawn.

With the exception of ethyl alcohol and methyl alcohol, which, on account both of their high latent heat and relatively large increase in specific volume, behave somewhat differently, and require special consideration, the following facts may be considered as having been established past all doubt. Mostly, they were arrived at first by purely theoretical reasoning, and have since been confirmed by actual tests carried out under conditions which ensure a very high degree of accuracy.

(1) That within very narrow limits the power output obtainable from any volatile hydrocarbon fuel or from any combination of such fuels is substantially the same when used with the same compression ratio provided that the compression ratio is sufficiently low to permit of each fuel being used to its full advantage for that compression.

(2) That so long as the ignition timing is adjusted to suit the normal rate of burning of the fuel the relative power output is the same at all speeds, i.e., there is no evidence to show that certain fuels giving more power relatively to another at low speeds, do not also give more power at high speed. This is shown in Fig. 9.

(3) That maximum power is always developed when the mixture strength is at or near that giving complete combustion. (See Fig. 10.)

(4) The power output obtainable from any fuel or combination of fuels when the heat supply is constant, or, more strictly, when it is proportional to the latent heat of evaporation of the fuel, is directly proportional to the energy content of the combustible mixture from which it would appear that the efficiency with which all fuels are

burnt is the same. It will be shown later, when dealing with efficiency, that within narrow limits this was found to be the case.

In the case of alcohol and the other members of its group these conclusions require certain modification on account of their high latent heat.

In the case of the alcohol group the conclusions may be stated as follows:

(1) Owing to their low boiling-point it is unnecessary to provide much external heating; consequently the bulk of the fuel enters the cylinder in a liquid state, with the result that the temperature of the charge is lower, and the power output obtainable is considerably greater than from other fuels, although their total energy (see Table VII, Col. F) is actually somewhat lower.

(2) There is no evidence to show that their low rate of burning has any adverse influence on the power obtainable at very high speeds or very low compression ratios.

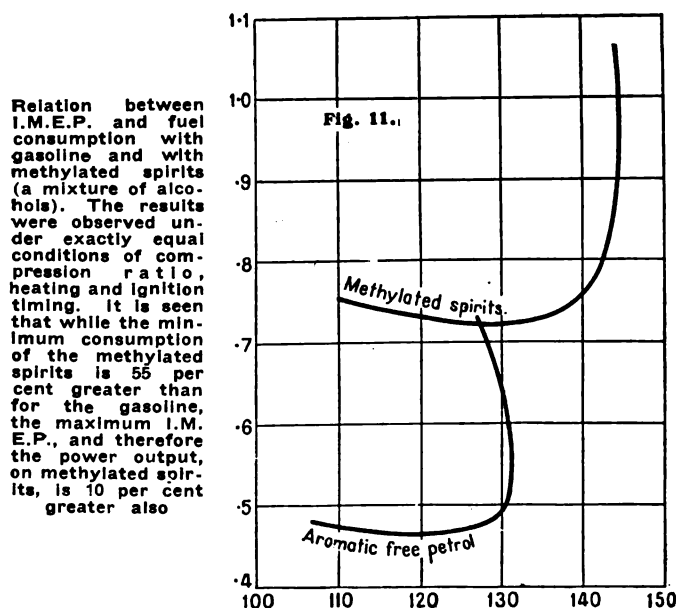
(3) Again, owing to the high latent heat and relatively large increase in specific volume, the power output obtainable increases as the mixture is enriched, and continues so to increase until the mixture strength is at least 20 per cent more than that required for complete combustion. (See Fig. 11.)

(4) Owing to the fact that in the case of this group, and this group only, an appreciable proportion of the fuel evaporates during the compression stroke, compression is more nearly isothermal, the temperature of the cycle, as a whole, is lower, and the efficiency is raised thereby. The power output is therefore increased somewhat, since a slightly greater proportion of the total internal energy available is converted into useful work.

#### Tests With Variable Compression

So far only the power output obtainable from different fuels when used with the same compression ratio has been considered. It is clear, however, that to obtain full advantage of the lower rate of burning of certain fuels each fuel should be run at the highest compression ratio it will stand without risk of detonation. For the purpose of these tests the variable compression engine proved invaluable, for the compression ratio could be varied to suit each sample within the space of a few seconds, and that without reducing either the speed or the load, or affecting any of the temperature conditions.

Although a very large number of tests were carried out extending over many months, the results obtained



Relation between I.M.E.P. and fuel consumption with gasoline and with methylated spirits (a mixture of alcohols). The results were observed under exactly equal conditions of compression ratio, heating and ignition timing. It is seen that while the minimum consumption of the methylated spirits is 55 per cent greater than for the gasoline, the maximum I.M.E.P., and therefore the power output, on methylated spirits, is 10 per cent greater also



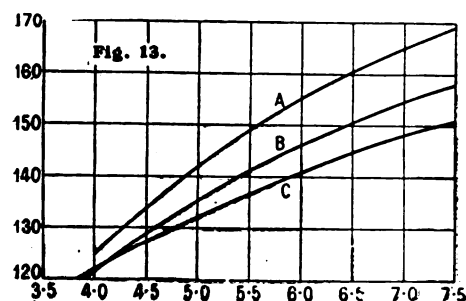
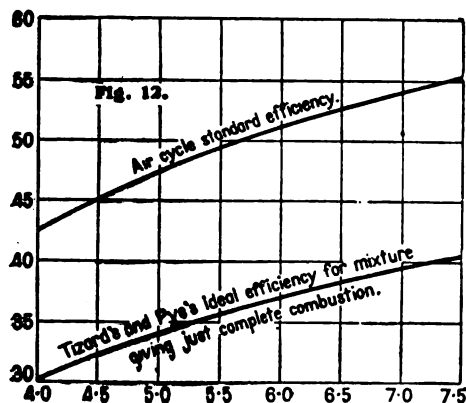
TABLE VIII

Fuel	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.
	S.G. at 15° C. 59° Fahr.	Approximate Composition of Fuel			Calculated Figure of Merit for Power Output, Octane=100	With no Heat to Carburetor. Room Temperature 15° C. Compression Ratio 5:1		With 65 B.t.u. per Minute added. Room Temperature 15° C. Compression Ratio 5:1		With constant re-corded Temperature of 15° C. Inlet Housing. Room Temperature 15° C. Comp. 5:1		With Highest Useful Compression Ratio for added Heat of 65 B.t.u. per Min.	
		Paraffins, % by wt.	Aromatics, % by wt.	Naphthenes, % by wt.		Indicated Mean Pressure lb. per sq. in.	Temperature °C. recorded in Inlet Valve Housing	Indicated Mean Pressure, lb. per sq. in.	Temperature deg. C. Inlet Housing	Indicated Mean Pressure, lb. per sq. in.	Added Heat required, B.t.u. per Min.	Ratio	Indicated Mean Pressure, lb. per sq. in.
Aromatic free gasoline.....	0.718	63	1.7	35.0	100.0	139.5*	10.0	131.3*	25.0	136.5*	24.7	4.85	130.0
"A" gasoline.....	0.782	26	39.0	35.0	99.9	139.6	11.0	131.2	26.0	137.2	17.3	6.0	140.1
"B".....	0.723	62	14.9	23.0	99.7	139.8	7.0	131.5	18.0	133.9	46.0	5.7	137.5
"C".....	0.727	61	8.5	30.5	99.7	139.5	8.5	131.0	22.0	135.0	31.2	5.25	133.9
"D".....	0.760	38	14.6	47.0	99.9	139.7	10.5	131.2	26.0	137.1	17.3	5.35	134.9
"E".....	0.719	68	11.3	20.0	99.7	139.5*	11.0	131.0*	25.5	136.3*	22.5	4.7	128.6
"F".....	0.704	80	4.3	15.2	100.3	139.9	8.0	131.8	20.3	135.2	37.0	5.05	132.7
"G".....	0.750	..	7.5	..	..	139.6*	15.0	131.5*	33.0	139.5*	..	4.55	127.4
"H".....	0.767	10	4.8	85.0	99.7	139.4	11.5	131.0	27.0	137.2	14.3	5.9	139.5
Heavy Aromatics.....	0.885	..	71.5	..	100.1	..	..	131.1	43.0	..	..	6.5	142.5
Kerosene.....	0.813	..	..	..	99.5	..	..	130.7*	46.0	..	..	4.2	123.0
<b>Paraffin Series</b>													
Hexane.....	0.685	77	2.7	20.0(app.)	100.3	140.1	Minus 2.5	132.3	15.0	132.3	65.9	5.1	133.1
Heptane.....	0.691	100 (to within 0.2%)	..	..	99.9	139.5*	8.5	131.2*	20.5	135.5*	34.7	<3.8	119.5 at 3.8:1
<b>Aromatic Series</b>													
Benzol, 98%.....	0.884	Negligible	98.0	Negligible	100.1	139.8	..	131.6	7.7	123.7	130.0	7.5†	150.0
Toluene, 99%.....	0.870	Negligible	99.0	Negligible	100.0	139.5	11.0	131.5	23.0	137.1	21.7	7.5†	149.6
Xylene, 91%.....	0.862	..	91.0	..	100.3	139.3	17.0	131.5	33.0	..	..	7.5†	149.2
<b>Naphthene Series</b>													
Cyclohexane, 93%.....	0.786	..	4.6	93.0	100.0	139.6	Minus 1.0	131.3	12.0	129.5	80.0	5.9	139.0
Hexahydrotoluene, 78%.....	0.780	..	10.0	78.0	99.7	139.5	5.5	131.0	18.0	132.8	49.0	5.85	138.4
Hexahydroxylene, 60%.....	0.744	..	..	60.0	99.7	139.0*	13.0	130.8*	28.5	138.0*	7.8	..	..
<b>Olefine Series</b>													
Cracked spirit.....	0.757	Olefines 53	10.0	Paraffin and Naphthene 37.0	101.5	139.8	13.0	131.6	25.5	138.0	13.0	5.55	136.0
<b>Alcohol Group</b>													
Ethyl Alcohol.....	0.796	Water 1.5 to 2	..	..	120.8	145.2	9.5	137.8	16.5	139.3	52.0	>7.0	153.8 at 7.0:1
Methyl Alcohol (Purified Wood)	0.829	Not fully analysed	..	..	..	151.7	Minus 1.0	144.8	6.5	135.5	182.0	5.2†	146.6
Methylated Spirits.....	0.821	7 (approx.)	..	..	132.6	151.3	6.5	144.5	14.0	143.2	76.0	6.5†	155.5
<b>Miscellaneous</b>													
Ether, 50%.....	0.727	..	..	Aromatic free petrol by vol. 50.0	103.2	144.3*	4.0	136.0*	16.0	136.5*	60.0	3.9	125.0
Carbon Disulph., 50%.....	0.994	..	..	50.0	83.2	135.0	Minus 4.0	124.5	8.0	..	..	5.15†	125.7

Notes.—\* Indicates that owing to detonation occurring at a compression ratio 5:1 the value given is calculated from the observation made when running at the highest usable compression.  
† Indicates that pre-ignition and not detonation precluded the use of a higher compression ratio, the sparking plug employed being K.L.G. type F 12.

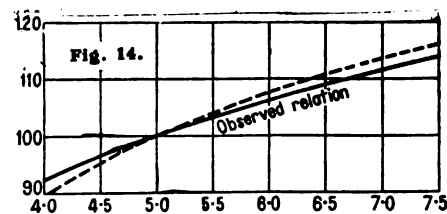
may be stated very briefly, for it was found that the relation between power output and compression ratio was precisely the same in the case of every fuel tested.

In all cases it was observed that fuels capable of



NOTE—It will be shown later that the observed thermal efficiency follows Tizard and Pye's ideal curve very closely. That the observed mean pressure does not do so, can only be accounted for by a change in the volumetric efficiency.

The full line shows the observed increase or decrease of maximum I.M.E.P., and therefore of power output when compression is varied, as compared with that obtainable at a compression ratio of 5:1. The dotted line shows what would be this relation if it were proportional to the air cycle standard—that is, if relative thermal efficiency and volumetric efficiency were constant with varying compression. It appears that both are variable, but that with increasing compression the fall in volumetric efficiency more than balances the slight rise in relative thermal efficiency.



standing high compressions give relatively to each other the same power output at lower compressions. At varying speeds up to the limit at present obtainable the relative power output of different fuels is the same.

At first sight one would naturally expect that when the compression is varied without involving any change, either thermal or mechanical, the mean effective pressure would be proportional at all times to the air-cycle efficiency corresponding to the compression ratio used. In Fig. 12 the upper curve shows the air-cycle efficiency over the range of compression from 4:1 up to 7.5:1. The lower curve shows Tizard and Pye's ideal efficiency for any fuel when the mixture strength is that corresponding to complete combustion. This latter curve takes into account the losses due to change in specific heat and to dissociation at high temperatures, but it does not take into account the direct heat loss to the cylinder walls, which is always more or less a variable quantity depending upon the form of the combustion

(Continued on page 17)

# Combination Roof Construction for Enclosed Bodies

The so-called combination roof is not really a new development, except as regards certain specific characteristics. The savings made possible by the use of this construction are discussed here, together with the practical design of such a roof. Suggestive diagrams are presented.

By George J. Mercer

ALL solid roofs on enclosed automobile bodies, whether made of three-ply wood, agisoté, or metal, are liable to generate a bell or drumming sound. This is due to the synchronizing of the sounds generated by the car in motion, or rather by such parts of these sounds as is carried to the body framing and to the resistance stresses that the large unbroken roof panel offers against the distortion of the body.

The ability of the solid roof panel to absorb shock with the minimum of complaint as registered in the drumming is proportionate to the increase in the arch and size of the top. If the roof has considerable camber, for instance, and the body is long enough to provide seven-passenger seating, a metal roof with a deadener of cotton wadding between the top sheet and the bows will give entire satisfaction. But there are many more five than seven-passenger bodies, while the coupes must also be taken into account. These latter are still shorter, while the tendency at present is to give them thin, flat roofs. Consequently, users of enclosed bodies to-day are frequently disappointed at the performance rendered.

Unfortunately, there is no established rules by which body builders can be certain that a specified roof camber and size of body, used with a specified solid roof material, will be soundproof. This is partly due to variations in the performance of different makes of chassis. A chassis that is flexible or that has a frame which undergoes excessive distortion, for instance, presents a very difficult problem to the body builder. Especially is this true when the spring action is snappy. When the foundation for the body has steadiness and ease of spring movement, however, the task of the body builder is less arduous. The so-called soft roof has been brought into use because of these conditions. It is new only in the sense that imitation leather is the covering used, while the foundation is generally wood slate 5/16 in. thick and 2 in. wide. These are set on top of the bows with a space of about  $\frac{3}{8}$  in. between them.

Leather roofs have been used by many high-grade custom body builders from the beginning of the art. The difference between the new practice and that of the past lying chiefly in the fact that formerly the foundation was cane work with a cotton cloth back for the lower layer, when the inside was skeleton finish or woven wire between layers of cotton cloth. When the inside is

trimmed it has been customary to use wadding.

The high cost of leather, however, has rendered it adaptable only to very high class work, while the substitution of imitation leather increases the scope of the possible use of this construction. The cost of leather at sixty-five cents a square foot as against that of imitation leather at \$1.80 a square yard, means a saving of about \$25 on the material for a five-passenger sedan. The difference in construction cost is not only in the prices of the materials, but also in the fact that there is no waste in cutting imitation leather.

A saving of \$25 can be made by the use of imitation leather as compared with an all-metal roof for a five-passenger sedan; compared with agisote or a built-up wood roof, the saving would be about half as much. These cost comparisons are based on the customary method of applying imitation leather; that is, by continuing the drip moulding around the back and fasten-

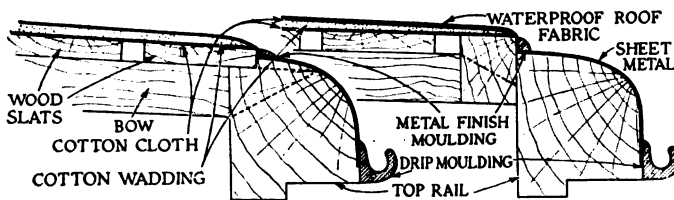


Fig. 1  
Fig. 2  
Sectional views showing two methods of constructing roofs for closed cars.

ing the imitation leather to it. The comparisons would not apply in the case of the accompanying diagram, since a combination of metal and fabric is presented there. The saving possible by the substitution of imitation leather in this case would be about \$5.

The illustrations show sections of the roof of a sedan. Two methods of improving the appearance of the soft roof are indicated. By this means the combination roof is given the high-class appearance of the metal roof without the disadvantage of noise which accompanies the latter. At the same time a leak-proof roof is insured.

The less pleasing appearance of the soft roof arises from the fact that the fabric is brought over the rounded corner of the roof rail and fastened at the drip moulding. It is, therefore, made to contrast with the lustre paint finish of the panels and, as the sun, rain and dust quickly take their toll from the fabric, the contrast, which at the first was disproportionate, is constantly emphasized more strongly.

The illustration shows one way of getting the advantage of the soft roof without the shabby side line and without taking any chance of the rain leaking through. Ordinarily when the leather or fabric is stopped on the flat of the roof, a half oval moulding is used to cover the joint. Such a moulding, however, is above the level and will, therefore, prevent a natural drainage. Thus the water held back will in time seep through.

The design shown in Fig. 1 is best for economy and ease in production. The bows are assembled in the regulation way, the slat rests in a shallow roofrail rabbet and projects above sufficiently to form the necessary step for making the water shed. The illustration is self-explanatory to a large extent. The top or outer fabric is drawn over and tacked to the perpendicular edge of the slat, meeting the sheet metal at the corner. The metal finish moulding is set in lead or thick primer,

is jammed tight and is fastened with screws or barbed nails to the hardwood of the roofrail. Lead silled moulding with set-in nails will work well, however, in certain cases. It can be readily seen that no obstructions are in the way of the natural flow of the water from the top to the drip moulding.

Fig. 2 simply shows a way to carry the dividing line further back on the roof; such construction is very much more expensive in the wood shop.

## New Self-Lubricating Bearing Material

**D**EVELOPMENT of a new bearing material which is a mixture of bronze and graphite, having self-lubricating qualities has recently been announced by the General Electric Co., following successful tests under service conditions. The commercial stage was attained by this material after research extending over a period of several years.

The new material, known as Genelite, contains graphite amounting to 40 per cent by volume of the whole mass. Tests have shown a high degree of porosity, the metal being able to absorb as much as 2½ per cent by weight of oil. Fig. 1 is a piece of apparatus set up to show this feature of the material. Oil from the upper beaker is siphoned into the lower through the rod of Genelite and the woolen wick by capillary attraction in both. This characteristic is made use of in high speed applications where oil is applied to the outside of the bushing and carried through to the bearing surface by capillary attraction. Another characteristic is said to be that the bearing never seizes or freezes, or, the metals of the shaft and the bearing never flow or weld together. If a bearing sticks, owing to too close a fit, all that is necessary is to reassemble it with the proper fit, no damage being done to the shaft or bearing.

Among the self-lubricating uses for the new bearing are brake rod bushings, clutch centering bushings, throttle control, fan and pump shaft bushings, where such material saves much trouble and expense of overhauling and repair. Genelite has proved useful also for

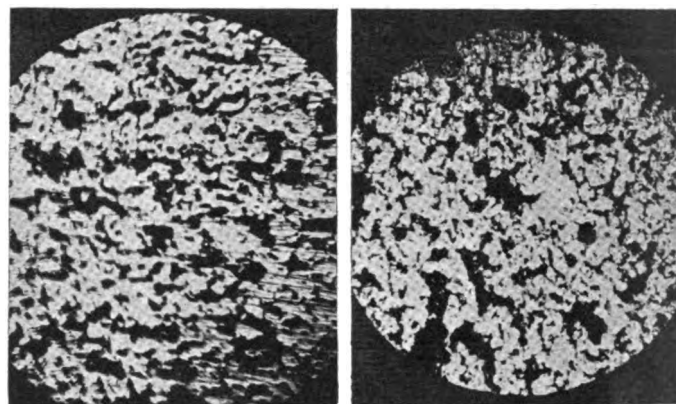
engine main bearings, crank pin bearings and piston pin bushings which are supposed to be well lubricated at all times, but where water is likely to be excessive due to the oil losing its lubricating value from dilution by unconsumed fuel, or insufficient oil.

Genelite is made from the oxides of tin, lead and copper, composing a high-grade bronze, plus graphite, all the materials being in a finely divided state. Graphite is added in sufficient excess quantity to reduce the oxides to the metals and leave the required graphite content in the finished material. The oxides are partially reduced by heating the mixture.

The mixture, still in powdered form, is then pressed as nearly as possible to the required shape in massive metal molds. In this pressed form it will not stand much rough handling, so it is given a final bake, which sinters the metals together into a homogeneous bronze, holding the graphite uniformly distributed throughout its mass.

Figs. 2 and 3 are microphotographs of cross sections of the same piece taken on two planes intersecting at 90 deg., and show the even distribution of the graphite particles. The white spots are the bronze and the black ones the graphite. The baking serves to clamp the graphite particles securely within the mass of bronze, so they cannot be washed out or detached save by dissolving away the surrounding metal with acids.

The material has the general appearance and body of bronze, but the characteristics are different. It does not machine readily by the ordinary methods, but can easily be ground, which has been found to be the best



Figs. 2 and 3—Cross and flat sections of genelite, former showing uniform distribution of graphite. Magnified 100 times.

method of handling it in quantity. Neither has it the physical characteristics of bronze, having very low tensile strength, but withstanding high compressive strains.

When considering the relative performance of bearings, great care should be taken that all the factors entering should be given due consideration. A self-lubricating bearing should never be compared with a lubricated one, for no bearing will give as good results unlubricated as a similar bearing properly lubricated. But it is sometimes necessary, due to inaccessibility of parts or neglect on the part of the user, to install bearings that are self-lubricated.

**A** GLOSSARY of Aeronautical Terms prepared by the Technical Terms Committee of the Royal Aeronautical Society and approved by the Engineering Standards Association has been issued by direction of the Air Council, and copies can be had from H. M. Stationary Office, London. The publication embodies a schedule of aerodynamical symbols approved by the Advisory Committee for Aeronautics. Translated and adapted to the French by Flight Lieutenant Leonard F. Plugge, the Glossary forms Air Publication No. 822. This is probably the most complete and up-to-date French-English glossary of aeronautical terms published.

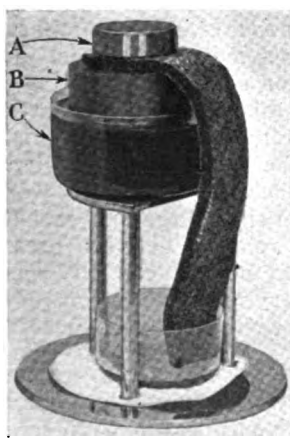


Fig. 1—Test to demonstrate porosity of genelite.

# Investigation Into Properties of Lubricating Oils

Report of tests made by British committee covers measurement of co-efficient of friction at various temperatures and with oils of various viscosities. Comparisons of vegetable, animal and mineral oils with and without addition of refined or deflocculated graphite are included.

A COMMITTEE on Lubricants and Lubrication appointed in March, 1917, by the British Advisory Council of the Department of Scientific and Industrial Research, has issued a lengthy report on the results of its inquiries. It was found that the work assigned to the committee could not be accomplished solely by inquiry, and permission was sought and granted to make certain experiments.

The worm gear testing machine designed by F. W. Lanchester, and presented to the National Physical Laboratory by the Daimler Motor Co. was used to determine the lubricating properties of various mineral, animal and vegetable oils. This machine can measure the efficiency with which power is transmitted through it with an accuracy of 0.2 per cent. The method employed is the direct measurement of the ratio of the torque in the worm wheel shaft to the torque in the worm shaft. The loss of power is thus directly measured, and is not deduced as the difference of two large observed quantities. Means are provided for testing an oil on the machine over a range of temperature. It was found that for all the mineral oils tested a certain critical temperature existed beyond which the running of the gear became unsteady, and the rate of fall of efficiency with rise of temperature showed a marked increase. Animal and vegetable oils did not exhibit a critical temperature at least up to 75 deg. C. (167 deg. Fahr.) Castor oil gave the highest efficiency under the particular load employed during the tests, namely, 95.6 per cent. The efficiency of the gear with castor oil as the lubricant remained constant at this value at all temperatures from 30 deg. C. (86 deg. Fahr.) upward. Rape and trotter oil came next in order of merit to castor oil, the efficiency being practically constant at 95 per cent for both these oils. Sperm oil at normal temperatures gave an efficiency as high as any of the other oils tested, but as the temperature was raised the efficiency with this oil decreased gradually. The critical temperature shown by all the mineral oils tested was raised by the addition of rape oil, but the addition resulted in very little improvement in the efficiency figure. It was noted that the beneficial effect on the critical temperature could be produced by the addition of 2½ per cent of rape oil, and that any farther increase up to 20 per cent was without effect.

The addition of colloidal graphite to the oils under test was examined for effect. In the case of animal and vegetable oils, colloidal graphite—"Oildag," to give it its trade name—had a beneficial effect, but the improvement, according to the report, "was so small as to be hardly appreciable." With mineral oils, beneficial results were found in four out of five samples. The fifth sample showed no benefit from the addition of col-

loidal graphite. The addition of natural flaked graphite of great purity was also examined. Animal oils showed an appreciable improvement in the efficiency, no change was detected in vegetable oils, while for mineral oils two samples were improved and two left unaffected. In no case did the addition result in a reduction of efficiency, but there was evidence that the wear on the gear was increased by the presence of the flaked graphite.

The Lanchester gear tests, combined with the results of viscosity tests for the oils used, failed to provide any evidence for the assumption that the frictional resistance of the gear is dependent solely on the viscosity of the oil. Thus the viscosity of castor oil at 40 deg. C. (104 deg. Fahr.) is about six times as great as that of trotter oil, yet the frictional resistance of the gear was roughly the same in both cases.

## Viscosity and Pressure

As no tests appeared to have been carried out to determine how the viscosity of oil varied as the pressure was increased, special apparatus was designed to permit the viscosity to be measured at all pressures ranging from atmospheric up to 10 tons per square inch. It was found that at high pressures all the oils showed a very large increase in the co-efficient of viscosity. Thus at a pressure of 6.5 tons per square inch one mineral oil showed a co-efficient twenty-five times as great as that found for it under atmospheric pressure. This increase was the maximum noted. At the same pressure the increase in the co-efficient for castor and trotter oils was only 4 to 1. In general, mineral oils revealed a greater susceptibility to pressure than animal or vegetable oils. The viscosity determined was the kinematic viscosity, that is, the ratio of viscosity to density. Apparatus was designed to determine how the density of the oils varied under pressure, so that the true relation between pressure and ordinary viscosity might be deduced. It was found that the correction for varying density was not large, and that the conclusions previously reached held good.

## The Deeley Oil-Testing Apparatus

A machine designed by R. M. Deeley was constructed to enable the static and low-speed kinetic friction between flat metallic surfaces to be measured when the surfaces were dry or partially or fully lubricated with various lubricants and under various loads. Preliminary tests only have so far been carried out with this machine. It has been found that the static co-efficient of friction differs when the two surfaces are of different metals, although the lubricant is the same and also when the surfaces are the same and the lubricant is different. The results are held to indicate that "oiliness"

is a surface effect produced by the lubricant upon the metallic surface with which it is in contact. A consideration of the latest results obtained with the machine suggests, the report says, that there is a possibility of obtaining satisfactory lubrication between plain parallel surfaces without the use of tilting devices as in the Michell blocks.

Three oils were tested for the Air Ministry in the Lancaster worm gear. The first, "Mobiloil A," showed an efficiency of 95.5 per cent practically constant at temperatures up to 50 deg. C. (122 deg. Fahr.). Thereafter the efficiency fell off rapidly as the temperature was raised. The second, "Mobiloil B B," gave a constant efficiency of 94.8 per cent at temperatures below 60 deg. C. (140 deg. Fahr.), while at higher temperatures the efficiency fell off at the same rate as for the first oil. The third oil was castor oil, according to the report. In this case the efficiency fell off gradually as the temperature rose, being 96.5 per cent at 31 deg. C. (88 deg. Fahr.), 96 per cent at 35 deg. and 95.5 per cent at 100 deg. C. (212 deg. Fahr.). In a previous section of the report, as we have recorded, it is stated that castor oil showed a constant efficiency of 95.6 per cent at all temperatures from 30 deg. upward. The discordance of these two sets of results may perhaps be explained on the supposition that a misprint has occurred in the report, "castor oil" in the case of the third oil tested for the Air Ministry having been printed instead of the somewhat similar name of a well-known proprietary brand of lubricating oil.

#### Cavitation in Oil Films

At a Royal Institution lecture by S. Skinner on experiments in the liquid state, experiments were performed showing the formation of cavities in oil films when the oil was introduced between a pair of lenses or between a lens and a plane and when the lenses were rolled or rocked above a certain critical speed. These results were brought to the committee's notice, and were farther investigated at the National Physical Laboratory by means of a half-bearing of glass carrying a load and supported on a steel shaft  $1\frac{3}{4}$  in. in diameter. In this way it was possible to study the flow of oil over a simple journal bearing both during the first

revolution of the shaft and subsequently. The results obtained are believed to afford "a reliable indication of the general action of a lubricant in a bearing." The film was found to be ruptured on both sides of the line of nearest approach, and in general the facts observed confirm Mr. Skinner's observations.

#### "Oildag" in Aero-Engines

The results of some tests carried out by the Air Ministry on the degree of benefit to be derived from adding "oildag" to the lubricating oil used in aero-engines were communicated to the committee, and are published in its report. In one case, evidence was obtained that the use of "oildag" may lead to reduced oil and fuel consumption per brake horsepower hour. In two trials, however, it was made clear that greater carbonization in the cylinders was to be expected when "oildag" was used. In one instance, the consumption obtained with "oildag" was above rather than below the normal consumption without "oildag." The results generally, it is added, were not conclusive, and it was considered that farther trials were needed in order to make it possible to say with certainty whether the differences in oil and fuel consumption with and without "oildag" were due to engine design or to the type of lubricant.

Some tests were carried out at the National Physical Laboratory with the object of determining the frictional coefficient of a shaft bearing using oil with and without "oildag." The apparatus used consisted of two self-oiling plunger blocks, in which a shaft was rotated by an electric motor, the plunger blocks being attached to a frame work which could be loaded and the coefficient of friction determined by torque measurement. Two kinds of oil were tested with and without "oildag." With the first oil the addition of "oildag" resulted in a reduction of about 11 per cent in the coefficient of friction at 60 deg. C. (140 deg. Fahr.). With the second—a thinner—oil, the coefficient "was actually higher with the addition of 'oildag' than without it." This test, the report adds, was carefully repeated, and confirmed at a subsequent date.

Copies of the Report of the Lubricants and Lubrication Inquiry committee may be had from H. M. Stationary Office, Kingsway, W. C., 2, London.

## Influence of Various Fuels on Engine Performance

(Continued from page 13)

chamber, the speed and many other variables.

In Fig. 13 curve (A) shows the variation in mean pressure with compression which might be expected if the efficiency relative to the air cycle remained constant at all compressions. Curve (B) shows the mean pressure which would be obtained if the efficiency bore a constant relation to Tizard and Pye's ideal efficiency.

Curve (C) shows the relation between the mean pressure and compression ratio actually observed.

This relation, which could be obtained with a high degree of accuracy, did not vary measurably as between numerous tests on any one fuel or on several different fuels.

That the mean pressure developed does not follow either the air-cycle standard or Tizard and Pye's calculated values is explained by the fact that the volumetric efficiency falls as the compression ratio is increased. Why it should fall still remains a mystery. Many theories have been advanced, some of which, no doubt, go some way toward explaining the change in volumetric efficiency, but none can, in the writer's opinion, explain the existence of so large a variation.

It will be shown later, when dealing with the question

of efficiency, that the actual observed efficiency rose in relation to the air cycle, while the mean pressure fell in relation to it—a somewhat surprising phenomenon, in view of the fact that, so far as any change in the efficiency of the combustion chamber was concerned, it must have decreased with increase of compression, though every endeavor was made to reduce this variable to the lowest possible limit.

Fig. 14 shows in full line the observed percentage increase or decrease in mean effective pressure, taking as basis a compression ratio of 5:1. The dotted line shows what would be this relation if the i.m.e.p. were proportional to the air-cycle standard. The full-line curve may be taken as applicable to all fuels or combinations of fuels without distinction or qualification. To apply it, it is necessary only to refer to Table VIII, Column L, which gives the highest safe compression ratio at which the fuel may be used, and to add or subtract the necessary percentage observed. Table VIII, Column M, shows the mean effective pressure actually observed with each fuel at 1500 r.p.m. when run at the highest compression ratio consistent with freedom from detonation.



# Hand Work Important Factor of Storage Battery Manufacture

Engineers are interested in the production methods used in plants from which they order equipment. This article describes the chief features of storage battery manufacture in a typical plant. Economy of movement is an important feature of the process discussed here. Over 100 operations are performed every hour throughout the production system.

By J. Edward Schipper

**T**HE manufacture of storage batteries in a plant having a capacity of 1000 per day offers an excellent opportunity for motion study. The nature of the work is such that machinery is used to only a limited amount, the majority of the work being bench work or hand work of various kinds.

The Ray Battery Co., which has recently moved to Ypsilanti, has increased its production from 300 batteries a day to 1000 a day, and has found that in the production of this quantity it is necessary to make a very close study of economy of movement in the men employed in order to bring the unit cost per battery down to the proper basis. The plant operates on a 9-hr. day, which means that throughout the entire production system a capacity of somewhat over 100 completed operations per hour must be reached.

## Casting Lead Grids

The primary operation is the casting of the lead grids. This, as well as all of the operations throughout the plant in which it is practicable, is a piecework operation. The plant equipment consists of nine molds of the type shown in Fig. 1. A good operator can mold 200 of these lead grids per hour, and, as will be noticed from the illustration, the movements of the operator's hands are very limited, indeed, in order to fulfill his work. The molten lead is adjacent to his right hand, and with the left hand he operates the mold, which is a special design worked out by the Ray battery production men. A movement of the right hand scoops up sufficient lead in the measuring ladle to just fill the mold. This is poured and practically instantaneously the lead is cooled sufficiently to be hard. The mold is then opened and the finished grids taken out and placed upon the pile at the operator's left hand.

The interesting feature of this operation is the small amount of movement necessary to do the work. Practically no body movement at all is required, simply action by the left and right hands and arms. Following the operation of casting the grid, it is necessary to clean it up and trim it. This is done on a Michigan press, which shears off the excess metal, as shown in Fig. 2. This is an ordinary type of punch press, and the work of trimming these grids is also a piecework operation.

After the punch press operation, the grids are ready to receive the paste, which issues from a bin through an opening in the wall of the secret mixing chamber. As a great deal of the efficiency of the Ray battery is wrapped up in the use of the particular paste formula

employed, every effort has been made to keep the knowledge of the ingredients of this paste confined to one or two members of the Ray battery staff. An unusual feature of the battery is that the same paste exactly is used for both negative and positive plates.

The operation of pasting up the grid is similar to any other grid pasting operation with other batteries. It is done by means of a putty knife, and skillful operators will average 175 grids per hour. There is no distinction between the negative and positive plates on this filling operation. The grids are then dried, an operation which takes about 12 hr. at 120 deg. Fahr. The grids are inserted in drying racks, as shown in Fig. 4, preparatory to being placed in the oven, where the drying temperature is maintained. This operation follows directly after the hand pasting described.

After the plates have been withdrawn from the drying oven they are put through a chemical forming process, which differs materially from usual manufacture and by nature of which the time required for the manufacture of the battery is materially shortened. The usual time for battery manufacture is 14 days. By the chemical forming process employed by the Ray Battery Co. this time has been shortened to 8 days, which, of course, considerably decreases the amount of work in process at any given period and consequently makes the operation of battery manufacture that much more economical. The ability to use the chemical process is claimed by the Ray company to be due to the use of the Lavere paste formula employed in the plates.

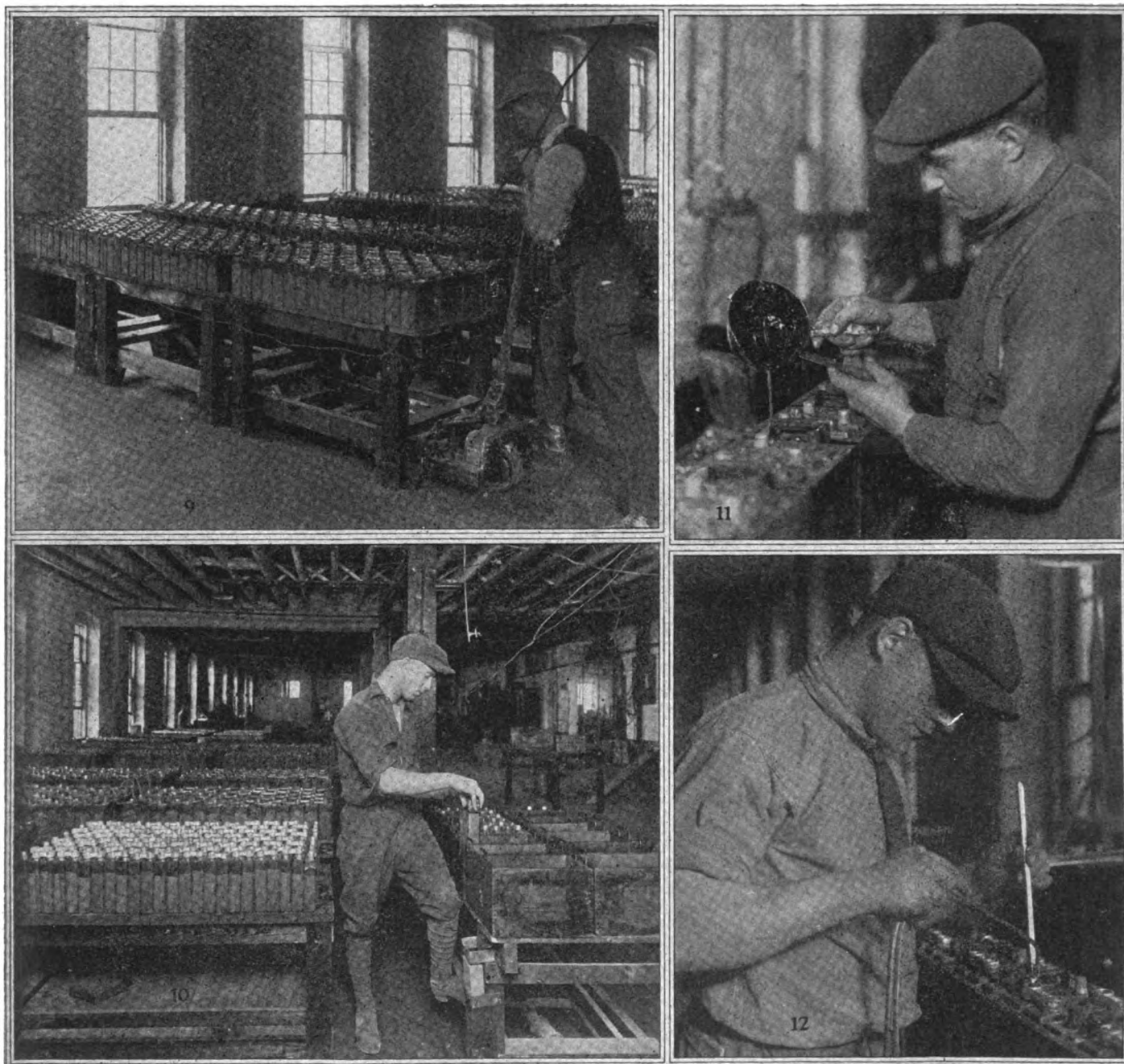
## Trimming Lugs

After this chemical forming step is completed, the lugs are trimmed off the plates and they are then mounted in assembly racks. The plates are assembled in groups, as shown in Fig. 6. This is done in special racks which permit of fitting and burning in the same rack. Fig. 7 shows the operation of burning straps onto the plates. After the soldering is completed, the plates are matched in negative and positive groups and the separators inserted. This is also a hand operation, as shown in Fig. 8. The plate group is then ready for insertion in the jar, where it gets its bath of electrolyte and is put on the first cycle of charge.

These jars or cells are carried by trucks to the charging stands, where the batteries are placed on charge, being put through the several cycles. The charging racks call for 60 batteries in a row, and the trucks are so matched up with the platforms upon which the cells



1—Moulding lead grids. A piece-work operation which averages 200 per hr. from each mould. 2—Trimming of grids in ordinary punch press. A piece-work operation. 3—The paste comes out of the mixing room in periodical batches through the trap door shown. From here a distributor carries it to the pasters. 4—Filling grids with paste. A hand operation on a piece-work basis which averages 175 per hr. per man. 5—Inserting plates in drying racks preparatory to furnace drying at a temperature of 110 deg. This operation follows directly upon the hand pasting. 6—Assembly of straps and plates done in special racks which permit of fitting and burning in the same rack. 7—Burning straps onto plates. 8—Male and female plate assemblies are joined and separators inserted as shown here. The group is then ready for insertion in the jar, where it gets its bath of electrolyte and is put on the first cycle of charge



9—Method of handling groups of cells in the various processes of charge. 10—After cells have gone through their various charging cycles they are dropped into the boxes and trucked to the compound department. 11—Burning on connectors. From here the battery goes to final inspection and paint dress-up, thence to the shipping-room. 12—Compound is poured, after which the battery progresses down the bench to the connector burning process.

rest that they can readily remove a group of cells and place them in the desired position with a minimum of effort. This truck operation is shown in Fig. 9. The method of raising the platform of the truck to carry the cells is shown.

The cells are lifted from the charging stands directly into the boxes which are on a platform on the same level as the cells, so that the operator has no carrying of any consequence to do. He simply reaches over to the charging stand and lifts up the jar from one side and places it on the other side in the boxes. After the cells have been dropped into the boxes, they are taken by the trucks to the sealing department, where tar is poured around the jars, thus sealing the batteries in the battery boxes. The connectors are then burned on and the batteries are finished, painted, inspected and the plugs put in.

**T**O eliminate entirely the question of "feel" in micrometering, Rudge-Whitworth have patented a combination of an ordinary micrometer with a spring balance. The latter has a dial gage, similar to those used for weighing letters, and the micrometer is mounted in the place of the usual scale pan. The micrometer having been set, the article to be measured is passed downward between the measuring faces, and the friction of its passage is indicated on the dial of the spring balance. A difference in size of only one hundred-thousandth of an inch is detectable by this method. For the measurement of gages the "Millimike," as the device is called, should be particularly useful. For setting the micrometer to known dimensions, hardened steel balls up to  $1\frac{1}{4}$ -inch diameter are supplied, which are certified accurate to size within the limits of possible measurement.

# Factors of Territorial Analysis

Marketing has not undergone the close analysis to which production has been subjected. Its problems are less tangible and many human and psychological factors are involved. Analysis must determine the unknown factors and their relation to each other. This article discusses one phase of the problem which is important to practically every sales department.

By Norman G. Shidle

**T**HE shotgun method of selling cars has had its day. Scattering fire of sales effort cannot stand up under the close scrutiny of expenses which must now be directed by the management on every part of the business. The problem of correlating production with sales has become a live one for the first time in years.

Conditions and ideas will differ in various plants. One automobile manufacturer who has been specially successful in selling during this period of business depression takes the attitude that the production department is supreme, and that it is the function of the sales department to sell the cars necessary to keep the production facilities operating efficiently at all times.

In other plants the sales department is the dominating factor. The sales manager determines to the best of his ability how many cars he can dispose of during a coming period, and the production department is expected to adjust itself to the conditions imposed by the sales department. Just at present it is not difficult for the production department in any plant to accomplish this, but conditions were very different a year ago. In any case, the relationship between the production and selling departments and the proper correlation of the activities of the two constitutes an important problem; a problem which is found to be solved differently in different plants.

The necessity has arisen for some sort of accurate territorial analysis, some reasonable standards upon which to judge performance and some fairly accurate method of predicting future performance.

The purpose of such an analysis may be for the purpose of determining the capacity of a plant about to be built, or for determining where the capacity of an existing plant may be sold. The latter is the commonest purpose, but in either case the methods of analysis may proceed along similar lines.

To establish a quota for any given territory is easy; to establish a fair and accurate one is very difficult. An inaccurate quota is worse, of course, than no quota at all. Inaccurate standards of performance simply warp the entire view of the performance itself.

In discussing quota and territorial analysis, the term quota needs to be defined. In some cases quota is considered as being the share of plant capacity which shall

go to a given unit. This relation is relative, however, and to be determined accurately must rest upon a more fundamental analysis. It is the result of such an analysis that constitutes the true quota, as the term is used in this article. Quota is the number of cars that a given territory is capable of absorbing. In other words, a territorial analysis aims at determining the maximum market for cars in a given territory. Once this has been done, it is simple to adjust the relative values in apportioning factory output or in setting actual performance quotas for dealers in such a way that they are suitable for practical use. The analysis on an absolute basis is the scientific foundation, however, for the other type and constitutes the basis of the present discussion.

A few companies have recognized the necessity for effort of this kind and have done considerable work along this line. These efforts have already paid for themselves and have greatly aided in selling through the present difficult period. It is interesting to note that at least two companies which have done the most work in regard to territorial analysis and the establishment of accurate quotas have weathered the recent industrial storm better than most others and, with increased ef-

forts, have made their 1921 sales equal or surpass those of 1920 for corresponding months.

## Two Main Phases

There are two phases of sales analysis from the standpoint of the manufacturer. The factors to be considered must first be determined. Then their relative importance in relation to one another must be established in order to properly evaluate any given territory. To accomplish both of these things to the highest degree of mathematical accuracy is manifestly impossible. To accomplish them to a greater extent than has heretofore been done is not only possible, but necessary. The more careful the analysis and the more intelligent the study, the more accurate and valuable will be final results.

This article proposes to discuss these two phases in a purely qualitative way, with the idea of indicating the various factors involved and the things which affect their relative importance in a study.

The first factor of territorial analysis for passenger cars is likely to be population. Population may be said to indicate the total number of persons who might ride

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**B**EFORE a territory can be analyzed a proper territory must be defined. A sales territory cannot be intelligently designated by simply using a map. Spheres of city influence, newspaper circulation, arterial roads, local buying habits and other factors enter into determining "when a territory is not a territory" and vice versa. This is a preliminary to the factors discussed in this article.

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in cars. It does not indicate directly, of course, the actual market for cars. Indirectly, it has a definite bearing, however, since, other things being equal, the place with the largest population offers the largest market. Since other things are not always equal, however, the market in two territories will not necessarily be in direct proportion to the population.

It may be said, then, that population is a factor in every sales analysis, but that it must be correlated with other special factors in any given case in order to be accorded its proper significance.

Closely allied with the actual population factor is the number of persons per car. Under present conditions the importance given to this factor should be carefully considered. In many states it is impossible to get this figure with any degree of accuracy, because car and truck registrations are not segregated. Moreover, the conditions of territories in various parts of the country differ so greatly as to render this factor of varying importance in different places.

The total car registration for the territory constitutes another factor. Here, again, difficulty is experienced when cars and trucks are not segregated. In addition to the total registration, however, other more detailed factors must be considered. The number of Sennett cars in the territory should comprise a factor in an analysis made by the Sennett factory. One factory, for instance, has already in operation a system by means of which they can determine by reference to a factory file the territory and ownership of every one of its cars.

Then the number of competitive cars in the territory should be taken into account. The data can be obtained by some expenditure of money for lists. This factor is equally as important as that of the number of Sennett cars. It indicates not only the sales performance of the Sennett dealer and the competitive dealers, but also the possible market in an indirect way.

The model as well as the number of Sennett and competitive cars in a territory should be known. With this data the approximate number of replacements can be calculated each year. This will also have some bearing upon the used-car market and the relation which it bears to sales resistance. In this connection, the replacement possibilities in cars of a class lower than the Sennett might be considered. For this purpose the same data should be available on cars of this lower class as for Sennett and competitive cars.

#### Financial Factors

The factors having to do with actual buying power are of supreme importance. To determine them accurately and to correlate them properly constitutes probably the most difficult part of the sales analysis task.

Income tax returns offer one obvious source of data. Certain information can undoubtedly be obtained from this source. Men in certain income classes may be considered prospects for Sennett cars. This factor should be considered as exclusive, however, rather than inclusive. Suppose, for instance, that persons with an income between \$2500 and \$5000 are considered as Sennett prospects. All those showing such incomes on the income tax returns can be properly considered as prospects. But that number is by no means the limit of the number of prospects in that territory.

There is a farmer up in New York State who earns about \$500 a year. He is employed by the owner of the farm and has no outside resources or income. He has a wife and three children. This man will never appear in the income tax returns. Yet he has owned a car for over three years. And this case is not exceptional. The income tax returns do indicate certain things about

sales markets, but they must be considered in relation to other factors or they give false impressions. The vast number of persons who must own a car for business purposes, regardless of their status as regards income taxes, give another excellent example of the fault of laying too much importance upon this single factor by itself.

Property values constitute another possible factor. These, too, must be carefully considered in their relation to other factors. Property values are, in a sense, a measure of the community wealth, yet they may be a very false measure. It is the distribution of property that counts in automobile sales, not the total value. There is a small manufacturing town in Pennsylvania, for instance, where nearly the whole town is owned by the head of the one large factory. There are few high-salaried men in the town. The market for cars is comparatively small, yet the property values would show a considerable total.

It must be remembered that high property values usually reflect high rents, which in turn act as an increased sales resistant. The distribution of the property, the number of persons who own their own homes, as against the number who pay rent, these are the factors of importance, rather than mere property value.

Financial ratings are also a factor in selling cars, especially for business purposes. They are not as large a factor, however, as in selling trucks. Factory wages, as well as income tax returns, might form a factor in certain instances.

#### Economic and Local Factors

There are certain local economic factors which will influence the market in any given territory. The matter of garage facilities is one. Here, again, the limitations of the income tax factor are illustrated. In a territory where most car owners have to pay from \$20 to \$35 a month for housing their car, the sales resistance will be very much greater than one in which most users can house their vehicle in a private garage for a very small sum.

Local topographical conditions may influence the sale of a particular car in certain localities, while current business and economic conditions are certain to have an effect. Whether the territory is urban, suburban or rural is a factor in making or reducing sales resistance and, consequently, is a factor in properly evaluating a given territory.

These factors are intangible, and, unlike most of the others mentioned, can be reduced to a place in a formula only with considerable difficulty. Since they are present factors, however, they should be taken into consideration along with the rest of the problem.

#### The Human Side

The human and psychological factors which enter into the value of a given territory are also of immense importance. So little is known about this phase of the question at present, however, that it can be discussed only briefly in a short article. The community likes and dislikes, the intangible whims of the public in a given area, the psychological factors which enter into merchandising, all these things must have a part in the ultimate determination of accurate territorial valuation.

Why do people in New York prefer white eggs, while Boston housewives are willing to pay a higher price for brown eggs? Such a question as this cannot be answered on the basis of economics. It has to do with the psychological phase of merchandising. Discussing this point in his book, "The New Business," Harry Tipper says:



"That the older methods of marketing and the older methods of doing business are inadequate to the present-day situation is obvious, both from the history of commerce and a study of present friction and unrest.

"What changes will be effected it is difficult to say, and much investigation and analysis are necessary before any direct statement as to changes would be of value. Certainly not until analysis has determined a good deal more effectually the unknown factors which enter into marketing would it be other than absurd to talk of much change.

"As the analysis, however, develops some of these factors, it is probable that the new spirit of marketing will become a factor in business in the same way that the new methods of production have dominated the manufacturing."

The factors mentioned comprise the chief things to be considered when attempting to thoroughly analyze a territory from the manufacturer's viewpoint. For greater clearness they may be listed in tabular form:

1. Population.
2. Number of persons per car.
3. Total registrations.
4. Number of Sennett cars in territory.
5. Number of competitive cars in territory.
6. Number of next lower price class in territory; in case of some cars, number of people who own more expensive cars in territory.
7. Model (year) of Sennett cars in territory.
8. Model (year) of competitive cars in territory.
9. Model (year) of next lower price class in territory.
10. Income tax returns.
11. Property values.
12. Distribution of property.
13. Financial ratings.
14. Current factory wages.
15. Local economic conditions.
16. Local business conditions.
17. Local topographical conditions.
18. Human and psychological factors.
19. Factory production capacity.

The importance of each of these factors will be different in the case of each different type of car. Some of the factors will be practically negligible in connection

with certain makes and important in connection with certain others.

To determine the relative importance of each factor, to determine the relation of each factor to each other factor; to correlate the data obtained concerning each of the factors—this is the second phase of territorial analysis. It is the most difficult phase. Perhaps sufficient data are not available on the basis of present records to successfully complete the second part of the task. Perhaps more study and analysis of the various factors will be necessary before definite progress can be made in this direction.

It is altogether likely that this is the case. One automobile company, which has gone into this matter more extensively than most others, has devised a formula for territory valuation which it is using at the present time. This formula is different than the one used six months ago, and is likely to be changed again within the next six months.

The factors outlined here merely present a basis upon which territorial analysis for car sales may proceed. The problem of the individual sales manager is to build his own analysis on the basis of these factors and to determine for his particular car the relationship between the various units involved. Some progress can be made immediately in most cases. The field has been little studied, and experimental data is comparatively meager.

It is perfectly possible that experience will show that it is not feasible to establish a standard quota formula which will be good forever, even for a particular car. The relative importance of the various factors may be found to vary from year to year and from territory to territory. It may be necessary to constantly adjust the territory valuation. But if this is found to be necessary, the sales manager of the future will be able to make that adjustment upon the basis of accurate data and intelligent analysis. The factor of error will be reduced to a minimum.

It is not likely that the description of the working out of the second part of this analysis task can be written in the near future. But experiments can be made which will furnish quantitative data upon which to base further progress. This is the present problem of the merchandising departments.

## Output of Single and Multi-Cylinder Engines

A TEST was recently conducted at McCook Field on a single Liberty cylinder mounted on a universal base to determine the power, friction losses, temperature and heat transfer characteristics. This performance was compared with the average of eight standard 12 cylinder Liberty engines in order to obtain a factor which would indicate relation of its performance as a unit of a multi-cylinder engine. This factor was desired in order to make it possible to predict the performance of new multi-cylinder engines from single cylinder tests.

A low mechanical efficiency was obtained, probably due to the fact that two magnetos, regular oil and water pumps, regular cam-shaft drive, and a heavy flywheel were driven by this cylinder. The power required to drive these accessories is usually distributed among a multiplicity of cylinders. However, the effect of low mechanical efficiency on the power output was apparently balanced by an increase in the volumetric efficiency due to the single intake pipe, since the indicated power output was considerably greater than one-twelfth of that which is usually

obtained from a 12-cylinder Liberty engine. Due probably to the increase in volumetric efficiency, the brake mean effective pressure curves do not drop off so fast, and the power curve peaks at a higher engine speed than with the standard Liberty engine.

Apparently an accurate estimate of the power of a multi-cylinder engine can be made by taking the brake horsepower developed by a single cylinder on the universal engine as the average performance of similar cylinders in a multi-cylinder engine.

TECHNICAL Note No. 48, dealing with Airplane Superchargers, a translation of an article by W. G. Noack in the Zeitschrift des Vereines deutscher Ingenieure has been issued by the National Advisory Committee for Aeronautics. The note is in multigraph form, and we believe that the Committee, whose address is Washington, D. C., have a few copies for distribution to interested parties.

# When the Factory Assumes the Service Burden

The reputation of a vehicle depends largely upon the way in which it is serviced. Few service stations have been free of criticism during recent years. A factory service executive, who has had troubles in the past, tells how difficulties have been overcome by his organization.

By H. N. Davock\*

IT is probably safe to say that at least half the reputation of a motor car or truck rests upon the repair service that maintains and insures its good condition for continued use. No matter how perfect the design and workmanship of a vehicle, it cannot and will not stand up long unless it is kept in first class condition by systematic inspection and adjustment. But even a very second rate vehicle can be kept going a long time beyond its normal life if well serviced. Moreover, owners of high-grade vehicles will quickly become dissatisfied, and quite justly so, if they find difficulty, delay, or excessive cost in keeping their cars or trucks in smooth running order while conversely a good running Ford hitting in all four will make its owner far happier than a noisy, rough and poorly conditioned car of higher grade which limps along with a cylinder missing.

The automobile industry as a whole has been too slow in recognizing this situation and I must include our own company in the indictment in spite of the fact that it has from the first paid very considerable attention to the matter of service. Far too often owners of vehicles have felt that neither their treatment at the service station, the work that was done there, nor the price that was charged for it were fair and businesslike. Mostly this has been due to the practices of fly-by-night service stations and garages that sprang up all over the country. They charged all the traffic would bear and they operated by methods little less than sheer robbery.

But in the unsettled condition of the automobile industry in the last few years there have been few service stations indeed that have been free from criticism. As a result there were complaints from customers that added very materially to the difficulty of making new sales. Not all of these complaints were justified, but their effect was the same whether they were fair or not.

Because of this situation the Packard Motor Car Co. about three years ago undertook a very careful study of its service stations and of the complaints that were made there. As a result it has evolved a system that has not only very materially reduced the number and volume of complaints, but has also proved of distinct service in insuring reasonable charges on repair operations in these stations. Incidentally, in many cases it has put losing stations on a profitable basis.

As the foundation for our study we worked out a list of complaints in the order of their number and importance and by careful consideration set down for each one the methods of correction which have been undertaken.

These two lists are as follows:

## Customers' Complaints and Their Correction

<i>Complaint</i>	<i>Correction</i>
1—Work not done on time.	1—Definite scheduling system in the shop. Definite knowledge of actual time required for proposed job. Close co-operation between service office and shop regarding deliveries.
2—Work not done as desired.	2—Analysis of customers' complaints. Definite explanation by service salesmen. Definite instructions to shop for work. Definite inspection system. Supplementary orders to be issued when required.
3—Work not done properly.	3—All work on definite schedule. Inspection system in the shop to insure correct work. Education of mechanics. Special tools and time study. Thorough final inspection.
4—Charge for work more than expected.	4—Work estimated in advance. Customers sold on the necessity of all repair orders and supplementaries. Customers supplied copy of repair orders, showing estimate.
5—Charge for work excessive.	5—Customer given to understand exact nature of work. Definite estimates of expense available at all times. Equitable system of setting labor rates. Elimination of red tape, and economy throughout establishment.
6—Charge for work which should be no charge policy.	6—Service salesmen and inspectors thoroughly familiar with Packard warranty and service policies. Definite explanation to customer with regard to charge in advance. Good service salesmanship.
7—Error or delay in billing.	7—Continuous summarizing of time and material during progress of the repair. Careful check-up on completion of work. Safeguards on time and requisitions summary.
8—Discourteous, dilatory or delayed attention to customers.	8—Spirit of Packard service instilled into every employee. Morale maintained by adequate compensation, discipline and organization. Proper facilities for entertaining customers. Proper scheduling of repair jobs.

\*Manager Technical Service Department, Packard Motor Car Co.

It will be seen from these lists that the complaints and their corrections occur at three distinct stages of the customers' relations with the service employees. The first is in the matter of personal relations in the approach and understanding between employees and the customers. The second is over delay or failure to live up to definite promises. The third, often a natural consequence of the other two, has to do with the feeling that the cost of the work has been excessive. Of course, all three interlock and it is often found that a reform aimed at any one of these difficulties improves the situation in regard to the other two.

The most important factor in working out the answer to this problem was standardizing the system of handling service work, but there have been some general measures in our service work that are proving of great value. The first of these and the most vital has to do with the personnel of the organization. It was evident that a very large proportion of the complaints occurred because the customer had not been properly sold either on the need of the repair work that was done or on the fairness of the charge for the work. To faulty personnel also could be traced all complaints of discourtesy and many of the complaints of delay. The successful repair or adjustment of the vehicle is only half of the job of the service department, the other half is in keeping the customer's mental attitude right. It is entirely possible to send a customer away dissatisfied even though the actual repair work has been done promptly, properly and at a reasonable cost.

### Selling Service

The job of the salesman is to sell service, but he is also to make sure that the customer departs with that mental satisfaction which we consider standard equipment with all of our vehicles.

Of course, satisfaction cannot be sold. It has to be earned. The service salesman's job is to see that the service station does earn that satisfaction, and that the customer knows that the service is so fair and business-like as to entitle the station to his good will. For this reason the service salesman must be an exceptional man, of good appearance, speech and all the other qualities of first class salesmanship; he must also be thoroughly familiar with Packard service policies and routine and he must not be so clever that anyone will have a doubt of his absolute squareness. Most important of all he must be the type of man who quickly makes a good impression that is lasting. He will be in touch with the owner of a vehicle throughout its life, whereas the car or truck salesman will be in touch with the man only during the brief time required in consummating the sale.

One of his particular duties is to educate the customer

in regard to the cost of maintenance and repairs. Very few people have any idea of what it is actually worth to make any standard repair on a vehicle. We make it a matter of policy to see that our owners are conducted through the service stations and are given an opportunity to learn just how and why the charges are fixed on any given job. We have found that this was one of the most important of all measures in cultivating a customer's satisfaction.

### Adequate Parts Supplies

The second general matter, which has to do chiefly with efficiency and speed, is in insuring an adequate supply of parts for repairs at all times, in all places, and for all vehicles that Packard has ever manufactured. This is a very considerable task, inasmuch as there are Packard vehicles well over 15 years old which are still in service and quite naturally these vehicles are likely to be among those that most frequently come in for repair.

The system of providing adequate parts supply begins at the factory. We have what we believe is the only separate factory in the country devoted to manufacturing service parts. In it we have every jig, tool and fixture necessary for turning out any part of any vehicle that we have ever manufactured. We make it a point, also, to keep on hand at the service factory complete inventories of all these parts and it is our boast that we are able to fill 98 per cent of all orders on the day they are received.

In furtherance of this policy of insuring adequate supply of parts, depots have been established at various points in the country, where full inventories of all parts commonly demanded are kept. So distributors and branches who run short or have unexpected demands need not wait to get their supplies

from the factory in Detroit.

Every Packard distributor is under contract to keep on hand an assortment of replacement parts varying in size from \$1000 for very small sub-stations to \$300,000 for our metropolitan plants in the larger cities. The Technical Service Department at the factory furnishes an accurately proportioned selection of repair parts for all the organizations. The extent to which this is carried was illustrated by a recent test made in the case of the Montreal distributor. Without notice a demand was suddenly made on his stock room for a total of 599 different service parts. The stock clerk was able to supply 598 parts.

### Prices

The third general policy has to do with prices. We spent some time in trying a flat rate system of charges, but found it generally unsatisfactory, and for about

Monthly or 1000 miles. ORIGINAL—Service File 1

### VEHICLE SERVICE INSPECTION REPORT

DATE \_\_\_\_\_ 19\_\_

Owner \_\_\_\_\_ Address \_\_\_\_\_ Phone \_\_\_\_\_

Driver \_\_\_\_\_ Where Inspected \_\_\_\_\_

Model \_\_\_\_\_ Body type \_\_\_\_\_ Motor No. \_\_\_\_\_ Mileage \_\_\_\_\_ Owner's vehicle No. \_\_\_\_\_

Motor should be warmed up and a sufficient road test made to report intelligently on the following points:

DATE of last inspection \_\_\_\_\_ 19\_\_

AG—ATTENTION GIVEN					AR—ATTENTION REQUIRED					SN—SHOWS NEGLECT				
OK	AG	AR	SN		OK	AG	AR	SN		OK	AG	AR	SN	
<b>1. LUBRICATION</b> (See short on check.) Oil type and quantity _____ Grease type and quantity _____														
<b>2. WASH AND POLISH</b> Washed _____ Polished _____														
<b>3. MOTOR</b> Oil level _____ Should oil be changed _____ Normal power _____ Compression Good _____ Bad cylinder _____ Carbon and valves _____ Push rods and adjustment _____ Tie-rod ends or gears _____ Cylinder head nuts _____ Crankshaft to frame bolts _____ Water leakage _____ Water pump _____														
<b>4. CLUTCH &amp; TRANS.</b> Clutch action _____ - brake adjustment _____ - pedal clearance _____ - shifter bearing _____ TRANSMISSION oil level _____ - oil level _____ - shifter, all speeds _____ Universal joints _____														
<b>5. RUNNING GEAR</b> Frame brackets and hanger _____ Pivots and running boards _____ Springs, bolts and bushings _____ Bushings _____ Taper and connections _____ Radius rod and connections _____														
<b>6. REAR AXLE, all leads</b> - tube and flange nuts _____ - worm thrust _____ - carrier hold-down nuts _____														
<b>DIFFERENTIAL, all leads</b> - oil level _____ Wheel, alignment _____ - rear beam on shaft _____ - bearings adjust _____ Tires _____ Front brakes _____ Rear brakes _____														
<b>7. ELECT. SYSTEM</b> Battery and connections _____ Test gravity _____ 1. _____ 2. _____ 3. _____ Generator and regulator _____ Voltage, both positions switch _____ Starter motor and clutch _____ Switches _____ Lights _____ Horn _____ Ignition wiring _____ - timing _____ - breaker points _____ - distributor brushes _____ Spark plugs _____														
<b>8. EQUIPMENT</b> Clutch _____ Speedometer or odometer _____														
<b>9. BODY</b> Body bolts _____ Upholstery _____ Condition of top _____ Condition of paint _____ Doors _____														

Items checked AR (attention required) are detailed on reverse side.

Items checked under SN (shows neglect) are items for which we consider your driver responsible.

The following points show wear from lack of lubrication.

Signed \_\_\_\_\_ Official Capacity \_\_\_\_\_  
(Over)

Form 10-10 1921 with 10-11 General Pkg. No.

2

REPAIR ORDER

SHOP OFFICE COPY

SHEET No. OF SHEETS SUPPLEMENTARY R. O. To A. B. C. D. E. F. G.	Customer's Name  Street Address  City State  Phone No.  Delivery Instructions  Terms Terms approved by	R. O.  Customer's Order No.  Received 19 A. M. P. M. Est'd Delivery 19 A. M. P. M. Completed 19 A. M. P. M. Delivered 19 A. M. P. M.
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*Packard*

Licence Number	Model—Series	Motor No.	Date—Original Delivery 19...	Total Mileage
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Item Operation Date OPERATION—BE SPECIFIC

1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Billing price to be amount of actual labor and material used but not to exceed \$

Signed

Service Manager

Service Salesman

- 1 If while above work is being performed additional work is found to be required, this Company will endeavor to secure customer's approval for extra expense and time involved.
- 2 This company is not liable for loss or damage to vehicle by fire, theft, casualty or accident and the vehicle is held at owner's risk.
- 3 Except as noted herein parts removed for renewal will be scrapped at once.
- 4 Storage will be charged at \$..... per day, beginning 48 hours after notice of completion of order.
- 5 All estimates are subject to immediate acceptance.
- 6 No claims will be considered unless presented within 60 (10) days.

I hereby authorize above order and agree to terms specified.

Signed

Customer

By

(Self  
Chauffeur  
Agent  
Packard Emp.)

If signed by Packard EMPLOYEE—of what authority

{ Phone  
Letter  
Telegram }

Date

19....

—OVER—

D-104 1936 9-22 MC

[illegible]

two years now have been using a system of maximum estimates. According to this method the customer receives a maximum estimate on the work to be done, with the assurance that the price will not run beyond this estimate. As the job passes through the shops careful cost accounting is done on both labor and material. If the figure thus arrived at is less than the estimate quoted, the customer is billed for the actual cost. If the work is more than estimated the customer is billed for the amount estimated and the service station stands the difference, the deficit being charged to overhead.

This system has created a feeling of confidence among customers that is very pleasing. It frequently results in a bill that is lower than the estimate given, which naturally has an excellent effect on the customer. As time goes on the margin of variation is being narrowed down by standardizing repair operations and equipment and there are many of the most common jobs on which we are now in a position to quote flat rates that are really equitable.

## Checking Trucks

Finally, we have carried our salesmanship service outside the service stations, especially in regard to trucks. The truck owner usually knows nothing about his truck except what is reported to him by the driver and the driver may or may not take the time and trouble necessary to keep the truck in good running condition. If he does not, the first thing that the owner knows his truck will be laid up for major repairs which would often have been unnecessary if service had been attended to at the proper time and which will certainly cause serious interruption in his business.

To meet this we have established the policy of checking up closely on our trucks, especially during the first few months after they are put in service. During this period a service field inspector is frequently sent out

by the service salesman to hop up beside the driver of a truck, sometimes take the wheel himself and make certain that the vehicle is in good condition.

## Inspection Form

A complete report of each unit is made out in our standardized service inspection form, Fig. 1, which is in duplicate. The original is for the use of the service salesman, while the copy goes to the owner. A column headed "AG," meaning "attention given," indicates the minor adjustments made by the inspector. The column "AR"—"attention required"—carries the most important data, and that about which the owner is most likely to be ignorant. A letter or a telephone message from the service salesman to him tells him just how serious the trouble is, the time necessary for repairs and the maximum cost. Arrangements can then be made for having the service given with the least possible trouble to this owner.

In this way we catch trouble in its earliest stages, keep down the total repair bills and greatly increase the satisfaction that owners feel in their vehicles. Thus the inspection service gives mutual benefits, protecting truck owners against wrong usage of their property by careless drivers and protecting our own organization against repair claims by unscrupulous drivers. In addition the company has the benefit of the customer's satisfaction which results.

The system we have worked out for handling service begins the moment the car appears in the service station. We have urged that there should be a different place for handling cars and trucks and that the two be kept separate. There is a distinct difference in the personality, the needs and the attitude of car and truck users and each can most efficiently be handled in its own way.

When a vehicle arrives the customer is waited on immediately by a service salesman and taken into a neat

3

SERVICE INSPECTION AND ESTIMATE REPORT

Richard

Customer's Name  
Street Address  
City State  
Phone No.  
Delivery Instructions  
Terms Terms Approved by

R. O. No.  
Customer's Order No.  
Received 19\_\_\_\_ A. M.  
P. M.  
Est. Delivery 19\_\_\_\_ A. M.  
P. M.  
Completed 19\_\_\_\_ A. M.  
P. M.  
Delivered 19\_\_\_\_ A. M.  
P. M.

License No.  
Model-Series  
Motor No.  
Date Original Delivery 19\_\_\_\_  
Total Mileage

CUSTOMER'S INSTRUCTIONS

NOTE: Did customer request a complete inspection. YES NO

INSPECTION REPORT

GAS PRESSURE	Lbs.	OIL PRESSURE	Lbs.	AMMETER @ 15 M.P.H.	AMPS
I T E M S					
Opn. No.					
Work Recommended (Be Specific)					
Est. Hrs.					
Estimated Price					
Charge No Charge					
Inspection and Test					
1. LUBRICATION					
Renew Oil					
Oil & Grease					
2. WASH & POLISH					
3. MOTOR					
Motor Turn-up					
Carbon & Valves					
Valve Tappets					
Timing Chain or Gears					
Cylinders, Pistons & Pins					
Rays, Conn. Rod & Main					
Cooling System					
Radiator					
Fan & Belt					
Pump & Governor					
Thermostat					
Hose					
Gasoline System					
Carburetor					
Pump & Gauge					
Gas. Lines & Ch. Valves					
Gasoline Tank					
Lubrication System					
Pump & Gauge					
Screws					
Ignition (see electrical)					
(Over) Amount Fwd					

WORK ORDERED

I T E M S	Opn. No.	Work Recommended (Be Specific)	Est. Hrs.	Charge	No Charge
4. CLUTCH					
Plates					
Bearings					
Shifter & Brake					
TRANSMISSION					
Gears					
Bearings					
Shifter					
Universal Joints & Shaft					
Joints & Covers					
Shaft					
5. RUNNING GEAR					
Frame & Tire Carrier					
Fenders & Splashers					
Springs & Bolts					
Bushes & Shock Absorbers					
Taper Arm & Radius Rods					
Rear Axle					
Axle Sprockets & Bearings					
Differential					
Wheels & Tires					
Brakes					
Foot Brakes					
Hand Brakes					
6. FRONT AXLE					
Steering					
Crosses, Thrusts On & Aft					
7. ELECTRICAL SYSTEM					
Battery					
Generator & Regulator					
Starter Motor & Switch					
Lights					
Horn					
Wiring					
Automator					
Ignition					
8. EQUIPMENT					
Sprockets or Chains					
Clock					
Bumper					
9. BODY					
Upolatory					
Top					
Curtains					
Windshield					
Painting & Finishing					
MISCELLANEOUS					
Total					

3

Inspector

Service Salesman

and quiet office calculated to give the proper impression of the standards of the company. The salesman learns as much as possible of the customer's wishes. He is in intimate touch with the shop and advises the customer about how long the work will take and when it is the best time to bring the car in. He endeavors to make a definite promise on delivery of a job whenever circumstances permit.

If the work is of such a minor nature that it is possible to write up complete shop instructions at once and at the same time give the maximum estimate to the customer without going into details, the repair order, Fig. 2, is filled in by the service salesman. The customer signs this as a definite order for the work and receives a copy.

If it appears that some study is necessary either to determine the amount of work to be done or to fix the maximum estimate, another form, Fig. 3, is used. In a case of this kind the job is turned over to the inspector for road test and detailed inspection to ascertain just what is needed. The inspector reports back to the salesman, submitting this form filled out and the salesman then explains to the customer exactly what work is required and why it is necessary. The customer can then approve or disapprove of the order as filled out. In this manner we make certain that no work is done except on the definite order from the customer and also make certain that if necessary work is not done the customer will know that it was by his own instructions that it was omitted. Thus we eliminate two of the frequent causes of complaint; the customer will get exactly what he asks for and neither more nor less.

This form, Fig. 3, has five main functions. It is the report of the service salesman to the service inspector stating the general complaints of the owner on the vehicle; it is the inspector's report of the work he recom-

mends to be done; it is used for compiling the maximum estimate recommended by the inspector; when approved it contains all the information used in typing up the repair order; and it is filed to serve as a permanent record of negotiations and the condition of the vehicle. As already explained this form is used only when the work is extensive enough to require either a detailed inspection or estimate.

The salesman is required to have a definite understanding with the customer in regard to the terms of payment. If credit is to be given, it must be definitely understood and approval recorded on the form. Careful attention to this with tact saves a great deal of money without any loss in the customer's satisfaction.

## Delivery Promises

The salesman is not permitted to give a definite promise of the time of delivery of the car when extensive repairs are to be made, but he does estimate a time and every effort is made to meet this estimate. In making the estimate he has to consider what parts are to be used and the probable length of time required to obtain any which are not in stock, the amount of work in the shop and the general difficulty of the job. Customers can frequently be persuaded to bring their cars in for small jobs when the shop is not rushed or late in the week for work requiring several days. This matter, if handled with wisdom goes far toward keeping an even run of work through the shop with a very considerable saving of idle time.

Throughout all this part of the negotiation the salesman and inspector are particularly warned to avoid recommending any unnecessary repairs. They are instructed to show the difference between "serviceable condition" and "standard operating condition." For example, a noisy or squeaky spring is not in standard oper-



ating condition, but it is in serviceable condition. To tell an owner that a car with such a minor defect should be put in the shop for repairs would reflect on the salesman's judgment and give the customer a bad opinion of the service he is receiving from his car.

After being filled out by the inspector, the form shown in Fig. 3 is turned over to the estimating clerk for prices. This is not done in the presence of the customer, but he receives a copy of his signed order.

The cost of repair operations varies considerably in different service stations due to the variable factors, such as rent, labor costs, and so forth, and each station is urged to make up its own maximum cost estimates from its own records. Until these are available the Technical Service Department at the factory supplies tentative estimates. Where operations are not covered by the estimate book, the best judgment must be used, adding 20 or 25 per cent as a factor of safety. This is no hardship on the customer since if the work actually costs less than the estimate, he receives the full benefit of the saving.

If the order has been properly sold to the customer, the repair order, Fig. 2, a copy of which is given to the customer, is made out in triplicate. Fig. 3 is then held by the service salesman pending completion of the work.

When the repair order is filled out and the job started through the shop, a disposition tag, Fig. 4, is attached. This has three parts. The bottom part is a receipt given to the customer and when signed by him gives authority for the delivery of the vehicle to his representative. The "released" portion is turned in to the accounting department when the job is ready for delivery and it gives notice that the billing should be completed immediately. The completed portion gives information to the Service Department that the mechanical part of the transaction has been finished and the vehicle is ready for delivery. The use of tags of different colors is a silent method of informing the Service Department of the customer's financial rating; special rush jobs or other matters of that kind.

When the vehicle leaves the shop the gate man removes the completed tag, checks it with the coupon which the customer has given and returns both to the service sales office, where they are filed.

Owners frequently request that accessories and loose equipment be stored by the service salesman while the vehicle is in the shop to prevent loss. To meet this requirement we have devised form shown in Fig. 1, which lists all the equipment of the vehicle and serves as a checkout when the work is completed. It eliminates practically all disputes in regard to equipment or missing parts of the car.

When the car goes to the shop the shop-office copy of the repair order, Fig. 2, goes with it to the shop office. On the reverse of the shop office copy are found the time and requisition summaries which are filled out during the time the car is undergoing repairs. The successful operation of the system depends upon the correct use of this record.

1. It shows all time and material used on each item as the work proceeds, indicating at all times the state of completion of the job.
2. It shows whether the estimated time has been exceeded on any item and by how much. It shows what work has been completed and the amount of time and material required.

3. It provides the basis on which the cost and the charge to the customer are computed.
4. It is a detailed record of the time and material to be used in billing the job.

The form may also be used as a job setting sheet. The foremen assign men to the work in advance by the use of time slips so there need never be any time lost in transferring from one operation to another. Material is requisitioned in advance and is ready for use when needed. A standardized repair job envelope is part of the system to keep all data together as it accumulates in the shop office.

#### Procedure

Whether the job is completed in the shop and has passed final inspection, the shop office copy of the repair order is examined by the shop clerk to make sure there is no omission of time or material and is sent to the service sales office to be audited and billed.

Another copy of the repair order form, the work instruction copy, is placed in a celluloid faced envelope attached to the car and goes with it through the shop. When the repair order covers more than one sheet an envelope should be provided for each sheet. When a workman has completed a particular item on the repair order he reports to the foreman, who inspects the finished work and indicates that this job is completed by a punch mark on the item number. If there is any special information which should be brought to the attention of the service salesman on the completion of the job, the item is marked with some approved sign instead of being punched and a complete written explanation is made by the foreman in the blank space on the back.

When a job has been completed in the shop it is turned over to a final inspector who checks the work and tests the vehicle. If any work is not satisfactory he should mark "rejected" on the back of the work instructions copy with notations and instructions. If he finds work is necessary which is not covered by the original, a supplementary order is issued by the Service Sales Department. It should be noted that in no case is it permitted to bill the customer for such work unless his authorization has been secured for it.

This system is outlined here only as it affects the customer. It is backed up, of course, by a complete system of time slips, stock requisitions, requests for credit and all the usual forms to insure prompt and accurate handling of the work.

When the work on the car has been finished the inspector signs in the blank "Cleared for Delivery" on the work instruction copy of the repair order and notifies the shop office clerk who checks over the accounting on the job carefully, forwarding it to the service salesman, who again checks it. The car is delivered to the service floor and a "completed tag" is attached. If the car is to be washed and polished, this is done and the car is then set in the space provided for vehicles ready for delivery, where it will be protected from damage. The service salesman holds the necessary sheets until the customer comes to take delivery.

When the customer arrives, the service salesman makes sure that the car is ready for delivery with equipment the same as when it was brought in for repairs. The customer either pays or makes necessary arrangements at the cashier's window for the release of the car while it is being brought up. When the car is driven

**4**

**WORK AND INSPECTION COMPLETED**

CUSTOMER

MOTOR NO. \_\_\_\_\_ R.O. \_\_\_\_\_

RELEASED BY \_\_\_\_\_ DATE \_\_\_\_\_ 19\_\_

PASSED GATEMAN \_\_\_\_\_ DATE \_\_\_\_\_ 19\_\_

**RELEASED**

READY FOR DELIVERY

CUSTOMER

MOTOR NO. \_\_\_\_\_ R.O. \_\_\_\_\_

RELEASED BY \_\_\_\_\_ DATE \_\_\_\_\_ 19\_\_

PASSED GATEMAN \_\_\_\_\_ DATE \_\_\_\_\_ 19\_\_

**CUSTOMER'S RECEIPT.**

I acknowledge receipt of vehicle in satisfactory condition.

MOTOR NO. \_\_\_\_\_ R.O. \_\_\_\_\_

EST'D DATE READY FOR DEL. \_\_\_\_\_ 19\_\_

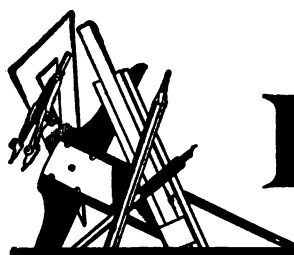
SIGNED \_\_\_\_\_ OWNER \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_ 19\_\_

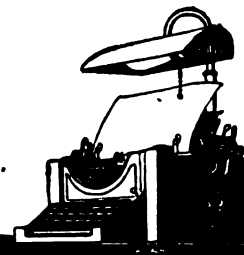
NOTE: Present this coupon when taking delivery.

Form 7 (10-A-122) 1-19

[illegible]



# The FORUM



## In Defense of the Air-Cooled Aircraft Engine

Editor, AUTOMOTIVE INDUSTRIES:

In view of the many broad statements regarding air-cooled aircraft motors at present finding utterance in this country, it would seem that investigation of the present state of knowledge of the many personal opinions that are bluntly put forth as facts is justified.

The writer is frankly biased in favor of the air-cooled motor, but nevertheless is not so prejudiced as to be unable to grant that water-cooling has its advantages, or that air-cooling has reached the pitch of development of its water-cooled rival.

In particular at the S. A. E. Summer meeting positive statements regarding air-cooled engines were made as follows:

By L. E. Pierce and G. J. Mead—

(1) That the parasitic resistance of the air-cooled motor is considerably higher than that of the water-cooled motor.

(2) That the reduced vulnerability of the air-cooled motor is of little practical military advantage.

(3) That air-cooling at present allowed of only relatively low mean effective pressures.

(4) That air-cooling does not allow of easy temperature control.

(5) That the weight comparison of the two types is not favorable to the air-cooled motor.

By Col. J. G. Vincent—

(6) That air-cooled engines were made in the radial form for cooling reasons rather than aircraft requirements.

It is proposed to reply to these statements.

(1) Little evidence regarding relative resistance of air and water cooled units seems to exist; if it does it is by no means widely known. These notes will have achieved something if they result in bringing before airplane designers generally definite comparisons between various types of engines cooled by both systems. The only figures the writer has been able to obtain are as follows:

(a) Engine and body resistance of RE-8 with 150-hp. R.A.F.-4A engine (12-cylinder air-cooled Vee with scoop cowl)—53 lb.

(b) RE-8A with 200-hp. Hispano engine (exactly as RE-8 except for engine, engine fairing and cooling system)—66 lb.

Both of the above are from a Royal Aircraft Factory Report and are at 100 ft. per sec. and tests on one-fifth scale models.

It has been stated on good authority that model tests have shown that the resistance of an air-cooled radial engine has a somewhat higher resistance than a water-cooled eight-cylinder Vee, but on the other hand full scale tests on the Sopwith "Snipe" and Nieuport "Night-hawk" have shown over 140 m.p.h. level flying speed at 10,000 ft., this performance in the case of the former being obtained with an engine that was not giving more than 280 hp. on the ground and probably less, which would seem to indicate that the resistance cannot be much

in excess of that of a water-cooled engine of similar power.

Further it may be pointed out that the A. B. C. "Dragon-fly" engine has a relatively high resistance for the power given and that an engine of similar size and resistance with high efficiency cylinders could be built to give 400 b.hp. at sea level.

It would be of considerable interest if Messrs. Pierce and Mead would produce figures and their authority for their statements regarding relative resistance.

In view of the fact that the air-cooled motor has a considerably higher mean temperature difference between the cooling surfaces and cooling air than for the water-cooled motor (between 220 and 280 deg. Fahr. mean temperature above air is an average figure for an air-cooled cylinder running with a blast velocity giving maximum power, the mean temperature depending upon cylinder size and the blast velocity varying from about 60 m.p.h. for a 65 cu. in. cylinder to 85 m.p.h. for a 150 cu. in. cylinder) and will therefore require less air to dissipate a similar amount of heat, it would seem that there is a fair expectation that the resistance will therefore not greatly exceed that of a water-cooled motor faired with equal skill.

(2) Then with reference to the statement that the "lesser vulnerability to shot and shell is of little importance as most planes that fall come down in flames." This does not agree with the views of many pilots who flew on the Western Front; many cases are on record of machines being brought down by a single shot through the radiator or water jackets (for instance, the engine from which the first official British published data on the 160 hp. Mercedes was obtained, was put out of action by a single shot through a water jacket). Further, the connection between shots through the cooling system and going down in flames seems somewhat remote.

The British, who used the stationary air-cooled engine to a greater extent than any other belligerent in the late war, had a great respect for this type of motor on the score of reduced vulnerability.

(3) With reference to mean effective pressure, a cylinder of  $5\frac{7}{8}$  in. bore by 6 in. stroke, and of American design and manufacture, has given 120 lb. per sq. in. brake mean effective pressure (29.9 in. barometer and 60 deg. Fahr. air temperature) at 1800 r.p.m., the said cylinder being as yet relatively undeveloped. It would seem in view of the fact few water-cooled engines of such size greatly exceed the above mentioned performance at such speed, that fairly high mean effective pressures are not only a matter of report.

As enthusiasm is a primary necessity for success in most mechanical fields of investigation, it would appear unfortunate that Messrs. Mead and Pierce have no real belief in the type they criticize.

(4) With reference to temperature control, there is a good deal of doubt as to whether any real difficulty exists, provided the supply of heat to the induction system be such as to maintain reasonably constant carburetion and distribution. It is the writer's experience on air-cooled engines generally, not alone the aircraft motor, that it is possible to operate over a range of as much as 350 deg.

Fahr. variation in maximum cylinder temperature without any relatively large variation in motor performance.

(5) With regard to weight comparisons, while the writer hesitates to express views on this matter, as insufficient experience is to hand to make any sound comparison, it does not seem fair to make comparisons between air-cooled engines operating on normal fuel and compression ratio and a special water-cooled motor using a compression ratio in excess of 6 to 1 and doped fuel, and further leaving the weight of water and radiator out of account (where 1.45 lbs. per hp. is quoted).

(6) Colonel Vincent's statement to the effect that "the radial form of engine was adopted on account of cooling difficulties" is in the nature of a personal opinion not borne out by investigation.

One twelve-cylinder air-cooled Vee type, giving 220 hp., produced by the British in 1917 and subjected to severe experimental test in the dynamometer and in the air, cooled as satisfactorily as any radial yet seen by the writer and incidentally a good deal better than most water-cooled engines of similar power.

The main disadvantage of the air-cooled Vee engine lies in the necessarily greater length compared to the water-cooled unit, due to the space required between cylinders on an air-cooled engine.

Experience in Europe has shown that the large Vee engine with 40 hp. cylinders has by no means unsurmountable cooling difficulties.

The writer's view of the general situation of the air-cooled aircraft motor is as follows:

Little work comparatively has yet been done on the nine-cylinder single row 300-400 hp. air-cooled radial engine; as no really satisfactory motor of such type has yet been produced, the mechanical difficulties of such a motor are by no means easy of solution and will need much careful work before the standard of maintenance and reliability set by the best water-cooled line or Vee engines is equaled.

An engine of such power will have an approximate minimum overall diameter of 48 in., and the question of cowl-ing and fairing for minimum resistance with good cooling will call for a deal of careful design and investigation.

When experience is obtained by airplane and power plant designers and test staffs, a considerable improvement on present fairing methods will no doubt be rapidly obtained. The problem can hardly be said to have begun to exist, as large air-cooled radial engines have not been used other than experimentally and in small numbers.

By enclosing and streamlining as far as possible the valve gear and springs it is probable that a considerable reduction in head resistance can be obtained; up to the present this feature has had little or no attention.

In the light of present day knowledge it would seem that if the air-cooled motor for military work is to compete with the water-cooled engine in the 400-hp. class, the only hope lies in the high efficiency cylinder developing a mean effective pressure in excess of 130 lbs. per sq. in. and using high compression. Experience has shown that up to the present high mean effective pressure is necessary owing to the fact that the successful air-cooled cylinder has proven to be fairly heavy on a basis of weight per cu. in. volume swept. To design a cylinder of 150 cu. in. swept volume to weigh .65 lbs. per b.hp. requires considerable finesse.

The use of high compression has been shown to improve air-cooled performance, not only as regards power and fuel consumption, but cooling efficiency as well, and in this connection the use of fuel dopes allowing of compression ratios in excess of 6 to 1 gives promise of further improvement.

On single cylinder test engines, brake mean effective pressures of 135 lbs. per sq. in. have been regularly main-

tained, this with blast velocities lower than obtained under almost any flying condition in a pursuit machine. Such performance has up to the present only been produced under favorable conditions that would not exist on a multi-cylinder engine under service conditions, but this is likely to be balanced by the improved fuels for high compression and eradication of faults which were shown up on the cylinders while giving the above mentioned performance.

High performance from air-cooled cylinders is not obtained by the first casual idea produced on the drawing board, nor during the first run on the test block, but is the product of long and exacting test and design work.

Owing to the wide variation in climatic conditions existing between the Mexican Border and Alaska it would appear that the air-cooled has many advantages for military use in this country. It would be unfortunate if the possibilities of the air-cooled be left untried owing to an attitude of mind that condemns without investigation, and because all the problems have not already been solved. What would be the present state of aviation had the pioneers thought on such lines?

S. D. HERON,

Power Plant Section, McCook Field.

## Air Operated Brakes

Editor, AUTOMOTIVE INDUSTRIES:

Permit me to congratulate you on the engineering issue of AUTOMOTIVE INDUSTRIES. I was especially interested in the article written by Bradley and Gerster, on "Four-Wheel Brakes."

To my mind, there is no question that the front-wheel brake is bound to come, although it may be confined to the better class car. The most serious objection to the front-wheel brake design is the large number of parts and universal joints which are necessary to insure correct operation at all wheel angles and spring deflections. Another handicap is the necessity of perfectly equalizing all four brakes. I may add that I believe in applying all four brakes simultaneously.

But these difficulties all disappear if a leaf is taken from the history of railroad engineering: by using compressed air as operative force on the brake shoes. Such a design eliminates all levers, joints, rods, brake equalizers, etc.; in fact, all parts which clutter up a chassis and are apt to produce rattles.

Most automobiles are equipped with a power tire pump, which would only have to be redesigned for permanent operation, and an air tank would have to be added for storage purposes. A few simple pipe lines and flexible metal hose connections would complete the layout. The brakes would be operated by opening a valve from the air pressure tank by means of a pedal or hand lever on the steering post. I have been working on such a design for the past three years, in my spare time, and have finally arrived at a practical solution of the problem. My standpoint on this question seems to be confirmed by the brake design of the Hispano-Suiza, where the car itself supplies the power for applying the brake shoes.

It seems to me that a discussion by the engineering fraternity on air-operated brake design would be of benefit to the automobile industry.

E. H. DELLING, Chief Engineer,  
STANLEY MOTOR CARRIAGE CO.

A MEETING of the Executive Committee of the American Engineering Standards Committee was held at Washington some time ago to discuss the possibility of securing government support for the valuable work which this committee has in hand. Representatives of engineering societies and Government Departments attended.

# Knowledge Is the Beginning of Understanding

It is necessary for the manufacturer to have knowledge of the workers' viewpoint if understanding is to be reached. He should welcome good suggestions regardless of their source. Mr. Tipper discusses a speech recently made by a labor leader and recommends it for examination.

By Harry Tipper

**I**N the Editorial Section of the New York *World*, Sunday, June 19, there was a speech by John H. Donlin of the American Federation of Labor, which contained many interesting statements. A good many of these statements would agree almost in their entirety with remarks made by many of the industrial leaders.

On the question of production, for example, Mr. Donlin very definitely agrees with the necessity for more production and for greater efficiency in production:

"Wealth cannot be distributed until it is produced, and the more we produce, and the more efficiently we produce, the richer we will be, the more our dollar will buy; the less we produce, the dearer it will be and the less we can buy."

On the question of production and the necessity for foreign commerce, Mr. Donlin's statement is equally interesting:

"Labor, capital and management must co-operate, must recognize mutual responsibility. To keep everybody working, upon which hinges the well-being of the masses, we must keep our factories running at full blast. We must export merchandise which can only be sold in foreign markets in competition with native products. The thing that recommends the purchase of our goods is the price, and if the American standard of wages will prevail, a standard of efficiency must prevail in accordance."

Perhaps the most interesting statement which he makes, because of its unusual source, is the statement regarding strikes—jurisdictional strikes, which are very frequent in the building trade and which are hampering that industry very seriously:

"My experience in this movement at least has taught me one thing—that jurisdictional strikes generally are the result of demagogues and aspirants for office, or they emanate from a class of workers which it is impossible to satisfy, or for reasons that will not stand for the magnifying glass. When it is all summed up, we can attribute it all to selfishness and absence of justice, equity and fairness. Only those organizations will endure which correct abuses, make reforms, eliminate contentions, create amity, mutualism, a feeling of mutual dependence among men."

This speech, printed by the *World*, reached a great many people, but it is questionable whether it was read by anyone not in sympathy with the labor union movement, outside of a few students who are willing to read material on the subject from any source.

Unfortunately, it is still true that we approach the human question in industry pretty much in the same way

that we approach the question of our political party. Very few Republicans I know read Democratic newspapers and documents, and only a small number of my Democratic friends have anything to do with Republican information. It is quite unusual to find a man in industry, with the responsibility of management, who will read the prepared definitions of the labor leader or who will approach his reading of them with a desire for information.

Several years ago, when I first started active work in the analysis of the human difficulties in industry, I made a number of addresses before groups of manufacturers. Very frequently many of them were there simply to find out the weak spots in my argument and to tear down, if possible, the structure I was building up. They were not in sympathy with the discussion of the matter, and they did not want to have any new ideas interjected into their beliefs.

We have come a considerable distance since that time and there are many matters openly and generally discussed that were avoided in those days, although that is only a few years ago. We are not yet at the point, however, where manufacturers on the one hand and the labor leaders on the other are willing to read what may be written or said upon this subject without regard to its source and its probable affiliations.

This tends to slow up the whole movement toward a better understanding of the factors involved in the difficulty; it perpetuates the errors and the prejudices; it lends strength to traditions which have nothing more than custom to justify them.

Here is an important leader of labor in a trade which has been heavily involved in strikes and interruptions, where graft has been rampant between the labor leader, the supply man and the contractor, and where the extortion has been generally suspected, if not openly admitted. The terms in which this leader speaks indicate that he is endeavoring to draw the building trade unions into a more sensible, normal and just method of dealing with the problems. Unless his words are utterly at variance with his actions, he believes the present situation is due just as much to the iniquities of labor as it is to the iniquities of the employer.

Under such circumstances the statements of this leader should be welcomed by the leaders of the manufacturers' organizations in the field, the agreement in their viewpoint should be publicly admitted, the extent of their agreement should be publicly emphasized, and, on the basis of that public commitment, a program of constructive development should be erected.



This has not happened. No encouragement visible to the observer has been given to the constructive address delivered by Mr. Donlin before the American Federation in its convention. On the other hand, this address has undoubtedly stirred up the radicals within his own organization, and they will find in it plenty of text to prove that Donlin is deserting the cause of labor to some extent and compromising with capital.

Some manufacturers have lost an opportunity at this time to start the machinery for the solution of problems that are very severe and that have worked to the detriment of the whole building trades movement.

No man who is charged with the responsibility of an investment of millions of dollars and the government of thousands of workmen is fulfilling that responsibility if he neglects to keep himself informed on the best ideas in labor and the tendency of the most constructive thoughts in labor circles.

Because the American Federation of Labor represents the largest body of organized development in skilled labor circles it is to be expected that some of the leaders in that movement are thinking constructively of its future and its future necessities.

I may not believe in labor unions *per se*, but the character of my belief in that matter does not affect the

necessity for my understanding of the labor union, its tendencies and the development of its best thought.

Constructive and logical suggestions do not appeal to the majority at any time. The labor leader who offers constructive and advanced ideas is not likely to be followed by the rank and file of his union. He must fight for these constructive ideas within his own organization and fight a discouraging battle for every future move. The same thing is true in manufacturers' organizations.

When the men of most constructive character and thought in the management of industry and the organization of labor approach each other so closely in their understanding of the necessities, the agreement should be emphasized. The foundation of common understanding should be seized upon to provide a basis on which the constructive development can be erected.

In the last paragraph of Mr. Donlin's speech, which is the third paragraph quoted in this article, he is very illuminating, and few executives in the management of industry but will agree with his description of the trouble and the solution.

I recommend this document as interesting material for the man who has at heart the solution of the present human difficulties interrupting the progress of industry.

## Thirty Years' Constant Service from One Car!

**T**HIRTY years' constant service is the record of the twin-cylinder Panhard-Levassor car with which Abbe Gavois, a village priest at Rainneville, near Amiens, entered Paris recently amid the plaudits of an enthusiastic crowd.

In December, 1891, this high-wheeled, tiller-steering, 3-hp. automobile came out of the Panhard-Levassor factory, bearing serial number 8. It was purchased by the mayor of Troyes, who, after a couple of years' service, sold it to Abbe Gavois, its present owner. For nearly twenty-eight years the ancient Panhard has been used by the priest for visiting distant parts of his parish, and during that time it is estimated that it has covered 100,000 miles without ever going more than 100 miles from home, and without ever having attained a speed of 15 miles an hour.

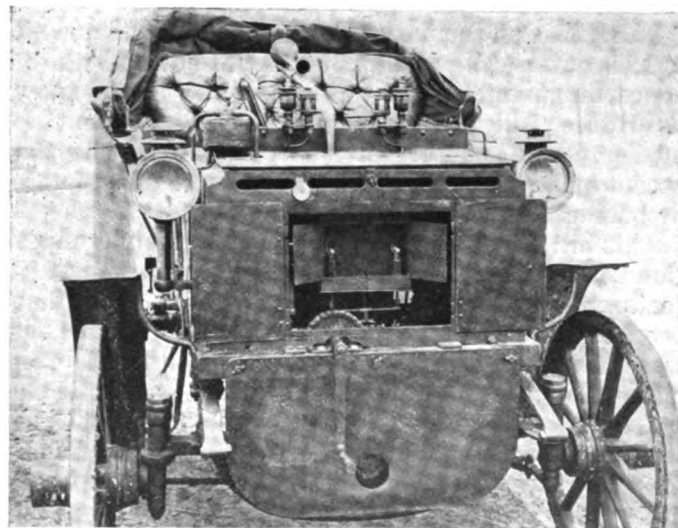
During the war the old car remained on the battle-front and was used by the priest for his journeys among the troops and to visit the few parishioners who had refused to move to the rear. The German troops took possession of the village in 1914, but were not interested in the relic or its owner. When they fell back from their rush on Paris the car was put on the road again by special permission of the general commanding the British troops holding this section of the front.

The end of the war found the old Panhard and its sturdy owner in excellent condition, in strong contrast to the devastated country around them. After having refused several pre-war offers to sell "the ancestor of the automobile industry," Abbe Gavois resolved, a few weeks ago, that he would part with his almost lifelong friend and give the proceeds to a fund for the relief of the war-stricken inhabitants of his parish.

The offer of the Panhard-Levassor Company to bring the old car to Paris on an automobile truck was indignantly refused by the priest. After lighting the hot tubes, the ecclesiastical motorist climbed up behind the steering tiller and at 4 a. m. set out on the last journey to Paris, 95 miles away. He slept just outside the city that night, and the following morning made a triumphal

entry through the gates of the capital, paused for an instant in front of the monument erected to the memory of Emile Levassor, the builder of the car, then rolled down the Avenue de la Grande Armee and the aristocratic Champs-Élysées to the showrooms of the Panhard-Levassor Company, where the car was placed on exhibition prior to being offered for sale by auction.

The veteran has two cylinders of 70 by 110 mm. bore and stroke, automatic inlet valves, hot tube ignition and wick carbureter. Its timing gears and its change speed gears are exposed, its clutch is of the now obsolete brush type, and final drive to the steel-shod wheels is by a single chain, the tension of which is regulated by moving the axle and springs. In 1912 the car was completely overhauled by the Panhard-Levassor Company, without being modernized in any way.



Panhard-Levassor car reported to have seen 30 years' continuous service. Is thought to have traveled 100,000 miles without exceeding speed of 15 m.p.h. Has two-cylinder, 3-hp. engine with hot tube ignition and wick type carburetor



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## Commercial Bribery

A BILL is on the national legislative calendar which is interesting to all commercial enterprises, but concerning which little has been said. It is known as House Bill 5632. It provides punishment for any employee, partner or officer of a firm who shall accept bribes or gratuities unbeknown to his employer or business associates.

This bill has been promoted by the Unfair Competition Bureau of the Paint and Varnish Industries. The facts on which the need of this bill are based have been known to many industries for a long time, but were written into records by the Federal Trade Commission. It has been shown in hearings that it was a frequent occurrence for varnish and paint firms to pay certain employees of customer firms a definite amount per gallon of material purchased. The better firms have objected to this practice, and at present practically all firms in this industry have signed the fair dealing code. It is also told that certain oil companies have maintained card indexes of employees of customer firms and the price they demanded for

recommending the various oils sold by this firm.

The automotive industry is a heavy purchaser of varnish and oils and this industry may well be interested in this pending legislation.

## Lubrication of Chassis Parts

THERE are evidences that more attention is being given to ways and means for providing better lubrication of chassis parts, or what is more to the point, decreasing to an absolute minimum the number of parts which require hand lubrication. Experiments are being made, for example, with flexible members for use in place of spring shackles, and many manufacturers are investigating various types of oil-less bushings which appear promising.

There seems to be a quite general agreement that the grease cup will in time disappear from the passenger car chassis. It is at best a messy job to fill a grease cup, and too often the grease is not forced to the surface it is intended to lubricate. As a result, rapid wear with consequent rattle takes place and the parts affected require early renewal. Those systems which force grease under considerable pressure to points where it is required are a considerable improvement over the ordinary grease cup, but even with this system lubrication is often neglected, and grease is at best a poor lubricating medium. It is sometimes referred to as a sponge for carrying the oil which gives it the only lubricating value which it possesses, and the oil is not always released until heat generated by friction causes the grease to flow, and wear may then have taken place.

Several car manufacturers and one or two parts makers have designed systems for feeding oil to all points of the chassis requiring lubrication, but the cost and complication of these systems is a serious drawback to their general adoption. Devices arranged to feed oil by wick or as a result of vibration are promising, at least for certain applications, so long as they are made readily accessible for filling, cleaning and adjustment.

The whole subject of chassis lubrication is one deserving of further study. It has an extremely important bearing upon the convenience and cost of upkeep, as well as upon service, and there are few more important items than these demanding the attention of car and truck manufacturers to-day.

## Pollyanna for President

THE pessimist has been much condemned lately. His baneful influence on business conditions has been recognized and he has been very properly squelched when he attempted to sing his song of gloom. But there is a type of professional optimist whose influence is just as evil.

This is the sort of optimist who closes his eyes to facts and implies that all must be well simply because he says so. He is the type of salesman who sits around the salesroom with a cheery smile, saying business is good, despite the fact that he hasn't made a sale for a week.

A sincere regard for facts does not necessarily im-

ply pessimism. Sane optimism finds its very foundation in facts, however doleful the facts themselves may appear. Optimism is no relation to foolhardiness. A recent advertisement in *Printers' Ink* expressed the truth briefly and forcefully. We forget what the advertisement was advertising, but that doesn't matter. Under the heading, "Grin, But Don't Bear It," this advertisement said:

"Would you like to hold stock in a company with Pollyanna as president?"

"The disposition to grin is useful, perhaps, but one must know how to handle it, especially in business. A knowledge of all the facts is really more useful."

A careful search for facts and an intelligent interpretation of those facts may be more difficult than merely grinning, but it will be more productive of results as well.

## A Transportation Project

THERE are movements of a local nature which have a greater significance than appears on the surface. Such is the present movement on behalf of a bridge across the Hudson River, which will connect Manhattan by a direct open-air route with New Jersey. Previously all transportation for motor cars across the Hudson, south of Poughkeepsie, has been subjected to the inconvenience of more or less efficient ferries. Recently the building of a tunnel from Manhattan to New Jersey was started and doubtless will proceed. But, in the words of a veteran and enthusiastic motorist, "Who wants to ride in a dark and smelly tunnel?"

The Hudson River bridge project was started in 1873 or thereabouts under the direction of Gustav Lindenthal, who has a position all his own in bridge building. Mr. Lindenthal has been connected with the movement from that time on. The first plan was for a railroad bridge, and once its building was authorized. Necessary economies, perhaps a lack of vision on the part of some men in his places, and other reasons have kept the project back.

Only recently the project has been revived, and the space allotted to vehicular traffic has been greatly enlarged. Practically every bridge engineer in the world has expressed his views, and, under the direction of Mr. Lindenthal, these views have been coordinated for safety and utility. The array of engineering names behind this project does not leave much doubt as to the thoroughness of the preparation.

It is said of this bridge that it will carry traffic equal to twenty tunnels, and, despite the high figure given for its cost, will cost only half of the total for the twenty tunnels.

The project at present is proposed as one for private enterprise. It is suggested that, with the proper introduction to the public, bonds can be sold to build the great structure. The railroads and similar interests are committed to it. As a first step toward the carrying out of the project, the Hudson River Bridge and Terminal Association has been organized. This is practically a promotion plan for the bridge project. Many men and business organizations have joined this

Association, paying a fee of \$100. This Association will organize the bridge building project.

It is suggested to the automotive industry that an enterprise of this sort means much to the industry. It would greatly add to the value of a vehicle owned in the lower Hudson River community. It would be a precedent for similar work in Philadelphia and other river-bound cities. The sale of only one car would repay the factory or the dealer for his outlay in this connection. Those interested can obtain further information from the Association at 7 Dey Street, New York City.

## Stabilizing Business

"HOW is business?" was asked of a parts maker the other day. "Jumpy," came the reply. "We can't make any plans; can't actually get into production or begin to build up our organization. Orders come in one day and are cancelled a week later. We have one good week, then a bad one." The quotation is typical of business at the present time. It is interesting to attempt to analyze the reason for such a condition, not only because it is specially acute just now, but because it is always more or less true of our modern industrial organization.

If the manufacturer knew for certain how many people were going to buy one of his cars during the next twelve months, it would be a comparatively simple task to order material and route production accordingly. But it is impossible to ascertain such facts accurately. Obviously, however, the more nearly accurate sales estimates are made, the more steady and economical will be the factory production. And while it is not possible to determine a sales figure to the last digit, it is perfectly possible to make a closer estimate than is commonly done.

The factors of merchandising have never been analyzed and examined as carefully as have those of engineering and production. Mechanical knowledge has progressed at a rapid rate during the last twenty-five years, but merchandising methods have failed to keep pace with that advance. Sales analysis proceeds upon scientific lines only in a few cases.

More attention in the future must be paid to determining sales possibilities, to territorial analysis, to discovering the factors involved in selling, and the relative value of those factors to one another. The psychological aspect of the merchandising problem must be studied and intensive work must be done in merchandising and commercial research. A few manufacturers are going forward along this line; others will follow.

The lack of knowledge of markets and of selling possibilities has a far-reaching effect in modern industry. So closely related are the various units that the failure in one department of one company may vitally affect thousands of persons and scores of other companies. Both enlightened self-interest and the recognition of a moral obligation in industry call for strenuous efforts along scientific merchandising lines.

Send in your name for a copy of Index of Vol. XLIV of AUTOMOTIVE INDUSTRIES.

## Parts Factories Short of Orders

Makers Expect Dull Two Months  
But Are Optimistic About  
Future

NEW YORK, JULY 5.—Makers of the most important component parts which go into the manufacture of automobiles are conservatively optimistic about the future. They have no illusions regarding the next two months, and they state frankly that they have few specifications on their books for July, with virtually none for August. In view of this situation and the probable slump in retail sales for the next eight weeks, it is highly probable a considerable number of parts plants will be virtually closed for a month or more while awaiting fall orders.

The optimism is based on the firm belief that the worst of the period of readjustment is over and that after the next sixty days, conditions will gradually improve. As the representative of one big company phrased it: "I don't look for much business before January, but business may surprise us and we may have much more than we expect long before that."

A good many parts factories got more business the latter half of June than they expected and they frankly admit that the same happy condition may prevail the rest of the year. They are convinced that fundamentally the outlook is better than it has been for eighteen months. This is true not only in the United States but in Europe as well.

As a matter of fact the European situation is one of the most encouraging features. Germany seems to have settled down to a grim determination to meet the reparations terms. The British coal strike has been settled and a strike in the British engineering trades has been averted. The Silesian tangle is being straightened out and there is a stronger prospect than there has been for years for a satisfactory solution of the Irish problem. The new tariff which Congress will adopt promises to be the biggest stumbling block in the way of foreign trade.

### Falling Prices Checked

In the domestic field there also are numerous encouraging factors. The chief of these is found in the fact that the precipitate fall of commodities seems to have been checked and while many readjustments remain to be made, prices have been stabilized to a certain extent. The new tariff probably will bring a gradual upward trend in some fields and these advances probably will be reflected in retail prices, especially of food products, which still have a long drop to make before they will adequately reflect the decline in wholesale prices.

The crop prospects generally are gratifying and the fact that in several European countries the harvests will be

## NEW RECORD FOR FORD WITH 4360 CARS A DAY

DETROIT, July 5.—The Ford Motor Co. set a new high record for monthly production with an output of 108,962 cars and trucks in June in the Detroit factory and 22 assembly plants throughout the country. Production has been increasing steadily since early spring and shows substantial gains over the same period last year.

The second quarter of this year shows an output of 301,796 against 220,878 for the same period last year, a net increase of 80,918.

Despite the fact that the plants have been running at maximum capacity, the demand for products is not being met, officials say, and there are many thousand unfilled orders ahead so that Ford sales are still limited by manufacturing facilities rather than marketing possibilities. This is true particularly with respect to closed cars, for which the demand is unusually heavy.

The estimated output of the Ford company for July is 109,000 cars and trucks, or a production approximating 4360 daily for 25 days. Since the assembling of cars is handled during an eight hour work day only, the hourly output will be approximately 545 cars. In other words, one Ford car or truck will leave the assembly line every six and a half seconds.

shorter than had been expected, will increase export demand. The new tariff was framed specifically to aid the farmers. These two factors should tend to break down the sales resistance in the agricultural sections and enable the farmers to liquidate some of their bank loans. Conditions also are improving gradually in the south and business certainly is no worse than it has been reported, especially in automobiles.

In the industrial sections unemployment probably will increase somewhat during July and August, but this is the normal mid-summer condition and there is every reason to believe that it will be preliminary to a slow but steady march forward after the middle of September.

### June Sales Amazing

An amazing sales record was made in the retail automobile field for June and in most districts the volume of business ran ahead of May and even of April. There are no indications yet of a July slump but sales are not likely to continue at the pace set last month.

Parts makers are the first to feel a slump and the first to recover from it. For that reason there is reason to believe that within sixty days their plants will be running on a better basis than they dare hope for now. Their June business ranged from 25 per cent. to 50 per cent. of that done in May.

## Two Measures Cover Truck Dumping Evil

Section of Permanent Tariff Provides Duty—Graham Resolution Hits Speculators

WASHINGTON, July 1.—Two measures to prevent reimportation of American made trucks are now pending before Congress. Chairman Fordney of the House Ways and Means Committee says Section 317 of the permanent tariff bill fully covers this important issue. Congressman Graham of Illinois has a joint resolution before the Ways and Means Committee which would practically prohibit reimportations and favorable action on the resolution is promised by Chairman Fordney as a means to expedite this legislation.

Section 317 of the tariff bill reads as follows:

"That upon the reimportation of articles once exported, of the growth, product or manufacture of the United States upon which no internal tax has been assessed or paid, or upon which such tax has been paid and refunded by allowance or draw back, there shall be levied, collected and paid a duty equal to the tax imposed by the Internal Revenue laws upon such articles, except articles manufactured in bonded warehouses and exported pursuant to law, which shall be subject to the same rate of duty as if originally imported, but proof of the identity of such articles shall be made under general regulations to be prescribed by the Secretary of Treasury."

If this item is included in the permanent tariff when finally enacted it will put an end to underselling the American market by speculators who have purchased army trucks abroad at ridiculously low prices.

Because of delay incident to the debate on the tariff bill the Graham resolution may be rushed through the House and Senate. It provides for an assessment of 300 per cent on reimportation of war supplies, based on American valuations. This rate is sufficient to equalize prices in this country and halt the flood of remanufactured or altered trucks sold by the army agents which found their way into the hands of speculators.

### NEW DILUTION GAGE

CHICAGO, July 2.—An instrument for determining the dilution of crankcase oil has been placed on the market by the Lubricating Appliance Mfg. Co. under the name of the Larcliff Dilutometer. It is in the form of a hydrometer on the stem of which there is a sliding tube with scale marks lettered "Danger," "Poor," "Fair" and "Good." The sleeve is set so that new oil will show "Good," and the scale mark to which the instrument submerges then indicates the degree of dilution. Tables for different oils have been worked out for the use of the operator.

## Reserve Board Finds New Prices Paying

### Fair Profit Shown by Leading Companies but Smaller Makers Suffer

WASHINGTON, July 5—Bankers throughout the country are watching the effect of the recent price reductions in the automobile trade with interest. The survey of general business and financial conditions for June as completed to-day by the Federal Reserve Board shows that the month has been relatively quiet and of temporary reaction marking the close of spring demands while arrangements for autumn trade have not been completed. Prices in all lines tend more toward stability and the downward movement during May was the smallest since the decline first began. One of the encouraging signs is the recovery of agriculture, though there is some hesitation in buying.

Discussing the automobile situation, the Federal Reserve Board says:

"May shipments of automobiles by factories producing three-fourths of the total output of the country show a falling off from the April figures. May shipments amounted to 18,608 carloads, as compared with 20,087 carloads during April, although driveaways increased from 14,197 machines in April to 15,200 machines in May. Thus far this year carload shipments have been greater than last year only during April, but driveaways have been much less in every case and during May were only slightly over 20 per cent of the May, 1920, figure.

"Manufacturers of popular standard makes who build their own cars are able to make a fair profit and do a good business at present prices, but assemblers, as well as some of the smaller and weaker companies find their overhead increasing as competition to supply the restricted demand becomes keener."

### Dyneto Renames Officers; Finances Show Gains

SYRACUSE, July 5.—Charles L. Amos has been re-elected president and chairman of the board of the Dyneto Electric Corp. Others returned to office are Vice President H. B. Leary; Secretary John C. Boland, and Treasurer Jacob B. Stemmler. Directors re-elected are Charles L. Amos, Jacob Amos, John C. Boland, Jacob D. Stemmler, George H. Dennison, James G. Grant, all of Syracuse; R. M. Owen and H. B. Leary of New York and H. M. Ballard of Chicago.

The committee of creditors created Nov. 20 by order of Judge Ray in United States court will continue, the stockholders' action not affecting the work of the five men named to conserve assets of the corporation. The company is slowly throwing off the financial difficulties which forced creditors last

fall to begin a friendly suit in equity, according to the statement made by one of the committee.

The five men named on the committee are members of the board of directors. They are Percy H. Ridings, E. A. Hardman and C. Hamilton Sanford of Syracuse, and H. W. Barnard of Rome and William E. Lowther of New York.

When the court order was made last fall, liquid assets of the corporation were \$1,552,550.36 and liabilities \$690,037.39 with the business ordered aggregating more than \$8,000,000. The financial difficulties were attributed to the slump in automobile manufacturing and failure of sales to materialize.

## Federal Conflict Follows U. S. Tax on Manufacturers

RALEIGH, N. C., July 5.—While attorneys are advising one or another of the 92 automobile manufacturers liable for the \$500 tax recently invalidated by the United States Supreme Court not to pay this tribute, State Treasurer Lacy is sending out letters calling for the payment of this state tax, and there is another North Carolina federal conflict.

Treasurer Lacy is proceeding under the advice of Attorney General Manning, who reads the highest court's opinion as no bar to the recovery of the tax imposed upon these outside dealers. Judge Manning thinks that the Supreme Court merely invalidated the discriminatory section and makes all dealers equal.

The last session of the general assembly put in a proviso making the act applicable to all alike, if there was any trouble about it, and Attorney General Manning, after quoting that section, says:

"The effect of this provision, in the light of the decision of the Supreme Court of the United States is to strike out from section 72 of the revenue act of 1921 the proviso which, under this opinion, discriminates against non-resident manufacturers, and to leave the remainder of the section intact. Thus, in the opinion of this office, you should continue to collect the license tax of \$500 from those engaged in the business of selling automobiles and automobile trucks in the state, and you must likewise collect it to the full amount from those resident manufacturers who have heretofore paid only \$100."

### TULSA AUTOMOBILE SOLD

TULSA, OKLA., July 2.—The plant of the Tulsa Automobile Mfg. Co. has been sold to D. M. Witt of Oklahoma City by R. M. McFarlin and his associates. Floyd Thompson, former sales manager of the company, will be interested with Witt and will be manager of the Witt-Thompson Motor Co., which will be the new name of the concern. The company has dealers in California, Oregon, Washington, Missouri, Colorado, Arkansas and Oklahoma, and an export department in New York. The new company takes over all the assets of the old but none of its liabilities.

## Sales Continue High As Summer Sets In

### June Business in New York Equals Expectations—Look for Good Season

NEW YORK, July 1—June has closed with both retail and wholesale sales of passenger cars in the New York territory running strong. Several medium priced cars have run far ahead of their April and May records and a large number of cars which were not selling at all in April and May, because they had not yet reduced prices, have had brisk sales, with the result that the total of June sales and deliveries will be the largest for the year.

Despite persistent rain sales have not shown any decided falling off as the month has drawn to a close and there has been no indication of any July and August slackness beyond that which is normal when large numbers of automobile owning people are away on their vacations.

Buick has closed its June books with the second largest month in the history of the New York branch. The record month was in 1918 but it exceeded the business of the past 30 days by only a few cars. Franklin's June was better than 1920. Oldsmobile exceeded its May record and almost equalled the heavy sales of April, business in the territory outside New York City being especially good. Maxwell's sales curve has climbed steadily through April, May and June.

There are a few cars which have not sold well and several of the high priced makes have had some slowing up, as compared with their April and early May records.

In general dealers are agreed that business is good.

Used car demand is brisk but buying is extremely close.

### STARK-INLAND ASKS MORE TIME

ST. LOUIS, July 5—Creditors of the Stark-Inland Machine Co. have been asked to grant an extension of six months on their accounts. The business of the company is said to show a substantial profit and the promise is made that any sum above the actual running expenses will be used in the cutting down of obligations. Creditors whose claims are less than \$100 will be paid in cash. The bank which is the largest creditor is said to have agreed to give such financial assistance as may be necessary for the proper conduct of the business if the other creditors will grant an extension of time.

### ROSE GUARANTEES PRICES

HASTINGS, NEB., July 5—The Frank Rose Mfg. Co., manufacturer of Rose specialties, has guaranteed its prices up to Jan. 1. Dealers have been informed that if manufacturing costs can be lowered all stock purchased after July 1 will be protected up to Jan. 1.



## Army Truck Disposal Opens Way to Sales

**Future Markets Being Created  
As Vehicles Exemplify Value,  
Declare Officials**

WASHINGTON, July 1—Distribution of surplus trucks, passenger cars and tractors from the army to the various highway departments has stimulated sales and developed service rather than retarded the trade, according to the opinion expressed to-day by officials of the Bureau of Public Roads. Emphatic denial was made that the Government had distributed unserviceable motorized equipment to the States, and it was pointed out that all unserviceable vehicles were sold under the auspices of the Motor Transport Corp.

The Federal agency stated that no highway equipment was dispatched to the State highway officials except upon requisition and after a complete inspection and report had been submitted. The Bureau of Public Roads will have approximately 4000 army trucks of varying sizes and 1800 passenger cars to dispose of under the terms of the Army Appropriation Act, which went to the President for his signature last week.

It is the contention of Government officials that the automobile industry, as a whole, particularly the motor truck division, has materially benefited from the distribution of surplus war material. It is stated that handing out approximately \$80,000,000 worth of samples must eventually bring returns to the manufacturers and dealers. As an illustration, it is declared that one American truck manufacturer had restored confidence in his product by the development of service in the various states where the equipment had been placed with the highway commissions.

This motor vehicle had been condemned as inefficient for several months prior to the armistice, but it soon proved its worth when put to domestic uses. In fact, one state which had accepted the consignment of trucks, reluctantly, finally adopted it for standardization purposes, and has expressed a preference for the models manufactured by this particular firm. It is further declared that these trucks actually in use and giving as satisfactory service as could be reasonably expected because of their present physical condition, make it easy for a truck salesman to sell newer and improved models to the state.

### 87 Per Cent Now Delivered

The statement of allotments and deliveries of trucks, Fords and other automobiles from surplus war materials to the several states and retained by the Department of Agriculture to June 1, 1921, shows that the deliveries amounted to 27,983 vehicles, of which 21,115 were trucks delivered; 2770 Fords delivered and 433 other automobiles, making a total of 24,318 vehicles, or 87 per cent, delivered.

## WHIP FACTORY QUILTS AS DEMAND SLACKENS

WESTFIELD, MASS., July 2—The coming of the automobile has made such serious inroads on the whip industry that the United States Whip Co., the largest factory of its kind in the world, has suspended operations. The company has been operating on a four-day basis.

## Ohio to Seek Repeal of Truck Weight Limit

CLEVELAND, July 1—State Senator J. F. Burke of Elyria, gave his pledge to the Cleveland Automotive Trade Association at a meeting in the Hotel Winton that he would lead a fight at the next session of the Ohio General Assembly to restore to Ohio highways the 14-ton maximum of truck and load combined.

A measure passed this year limits the weight to 10 tons. The Cleveland organization joined with the State and other kindred bodies to fight the measure, and delegations asked the Governor not to sign the bill. The executive approved it, however.

Senator George H. Bender of this city, also promised to give his aid to the movement, as did E. J. Shover, secretary of the State association.

The action in this city is the opening gun of a battle that will be waged against the bill by all automobile trade associations in the State under the leadership of the State body. Senator Burke, Shover and other speakers declared that the measure was discriminatory; that it would cause thousands of dollars worth of trucks to be put out of commission, and that it was a serious handicap to the motor transportation facilities of the commonwealth.

## Construction Costs on Highways Decrease

CHICAGO, July 1—State contracts for 29 miles of concrete roads on the Chicago-St. Louis route have just been let at a marked reduction from the first bids received and refused because they were excessively high. The awards show a drop in the price of cement compared with the bids of last February of 14.4 cents a barrel, or of \$476 a mile.

Governor Small, it is said, still considers the bids too high but expresses satisfaction that the figures are well within the \$30,000 limit set by his office.

## FRUIT GROWERS USE TRUCKS

INDIANAPOLIS, July 1—William Guinot, distributor in Southern California for the Swinehart Tire Co., was in Indianapolis this week. He says the fruit growers of his territory are solving their own freight rate question by using trucks and he says the major portion of his tire business is developing into a truck tire business.

## Truck Outlook Fails to Justify Gloom

**Fenn Says Fall Should Bring Considerable Buying—Normal Trade in Spring**

KALAMAZOO, MICH., July 1—That an unjustifiable feeling of pessimism pervades the motor truck industry is the opinion advanced by F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce.

Fenn was the guest of H. G. Stiles, sales manager of the Kalamazoo Motors Corp., during a short stay in the city. He is making an extended tour of the Middle West and visiting motor truck manufacturers in all localities. Going over the situation and the outlook for the future, Fenn said:

"From information we have been able to secure, there is an unjustifiable feeling of pessimism pervading the truck industry. I look for considerable buying next fall, with a slight slump during the winter months, then normal business from next spring forward.

"My reason for holding that opinion is that business in general is coming back and with the resumption of activities in other manufacturing lines, there is bound to be a demand for trucks."

The Kalamazoo Motors Corp. has been able to operate remarkably well, market conditions for the past year considered. The company has been satisfied to maintain its organizations and accept only such business as could be handled at a profit. H. A. Crawford, president of the company, has adopted a conservative policy in the conduct of the business and has made no effort to greatly increase the company's sales force in face of conditions which made that possible only at great expense.

## NEW CHASSIS LUBRICATION

SAN FRANCISCO, July 2—A new chassis lubricating system by which grease is forced to the bearing surfaces of the chassis under high pressure has been developed by the Lathan Auto Supply Co. The Critz lubricator is made of heavy gage brass. The small diameter barrel used makes high pressures easily obtainable, and by means of the ball check head and the special fittings supplied, it is possible to reach all bearings without the use of flexible connections. The lubricator can be operated with one hand by simply turning the handle to build up pressure in the gun, after slipping the head over the nipple. Where a bearing requires a quantity of grease the head is snapped over the nipple and the latch pulled, the head being locked to the nipple, and the amount of grease required is then forced into the bearing by turning the handle. It is claimed that the lubricator is capable of developing 1500-lb. pressure. In installing the system, the old cups are removed.

## Credit Diversion Harming Business

### Loans Increasingly Hard to Get Despite Liquidations—Finance Companies Gain

NEW YORK, July 5 — While the Federal Reserve Board and the big banks are asserting that there is an abundance of liquid funds to meet "legitimate" business needs and that credit conditions are easier than they have been in months, business men in some cities declare they are finding it increasingly difficult to get bank loans adequate to handle the volume of orders they are getting.

It unquestionably is true that enormous sums in frozen loans have been thawed out and that money is more plentiful than it has been in the last 18 months, and quoted interest rates have steadily declined, but reports indicate that there has been no material increase in the volume of funds turned into industrial channels. On the other hand, there is an abundance of call money for Wall Street and for other speculative purposes.

Many banks regard loans of this character as more secure than those made for business and industrial purposes, for the reason that they are amply secured by more or less marketable collateral.

While it is vigorously denied that excessive rates are charged for loans of this nature, there is reason to believe that these denials are somewhat technical. When money was scarcest, banks demanded and received bonuses and commissions in addition to high interest rates. It would be difficult to convince a perfectly solvent manufacturer who had been denied a loan by his bank that the surplus funds of that bank were not being sent to New York or some other financial center to be loaned at a greater profit than would be possible in the home town.

#### Complaints from Up-State

AUTOMOTIVE INDUSTRIES recently received complaints from upstate cities in New York that reputable concerns were experiencing great difficulty in getting bank loans. The subject was taken up with Governor Harding of the Federal Reserve Board. He said that no other complaints of a similar nature had been received and pointed out the low interest rates quoted here. He called the question to the attention of Governor Strong of the New York Federal Reserve Bank, however. Strong stated that it would be impossible to inquire into the complaints without the names of the banks involved and other data which it would be difficult to obtain.

It is somewhat significant that automobile financing companies report that they recently have had more calls for loans than they previously had received for months. This may be accounted for in part by a larger volume of sales, but the finance companies are inclined to believe it represents increasing difficulty in getting bank loans.

Banks have devoted much of their attention for the last year to the liquidation of frozen credits. This process has been successful and they have recovered from industrial enterprises enormous sums which they had invested when the slump came. Bankers in the agricultural sections have been less successful. In some cases business men and manufacturers to whom banks had made loans were carried along until the loans were liquidated in large measure, after which the interest of the banks in these enterprises rapidly dwindled.

It has been contended by the banks ever since the readjustment period began that it would be marked by a survival of the fittest with a gradual weeding out of those weakest financially. There is reason to believe that the "big fellows" will be given stronger banking support than the smaller ones.

## Iowa Investigation Shows Business Better

DES MOINES, July 1 — After four days survey of business conditions in southeastern Iowa, H. J. Lytle and A. J. Knapp, president and secretary, respectively, of the Iowa Motor Trades Bureau, report that the past month has seen a decided improvement in conditions among the motor car dealers of that section of the State. The two bureau officials held dealer meetings in Centerville, Albia, Ottumwa, Fairfield and Burlington, and spend their days in interviewing individual dealers.

Dealers in all of the above towns report that there has been a decided upturn, only a part of which is attributed to price cuts. In the main, however, the improvement has not extended to sales among farmers as the farmer has not as yet returned to the market. During the past month, however, prices of grain have shown an appreciable gain and it is thought that if this continues it will result favorably for farmer sales.

The optimistic dealer reports tally with the personal experiences of Lytle, whose firm, the Burlington-Overland Co., is a large distributor in that section of the State. Up to June 25 the business of the Burlington-Overland Co. has surpassed any June business during the past five years.

#### NORTHWEST CONDITIONS GOOD

SAN FRANCISCO, July 1—The condition of the automotive industry in the Pacific Northwest, throughout Oregon and Washington, is better than has been reported, and is showing continuous signs of improvement, according to W. D. Patterson, head of Patterson Parts, Inc., of this city, who has just returned from a trip through those States. Patterson said:

"Jahns and I found the automobile trade in Washington and Oregon in fairly good shape. It is true that conditions are not all that could be desired, but those concerns selling dependable merchandise are doing a fair volume of business, with a steady, though small, degree of improvement."

## Industry Prospering on New Price Basis

### N. A. C. C. Reports Mid-Year Changes Bringing Increased Sales to All Companies

NEW YORK, July 1—Price readjustment in the automobile industry seems to have been about completed, judging from the final report just issued by the National Automobile Chamber of Commerce, which shows changed prices on the various makes of cars. The new prices in many instances go back to the figures of a few years ago, notwithstanding that the models, in many cases, are bigger, with better finish and such additional equipment as cord tires and improved electrical apparatus.

In the opinion of students of the industry, the mid-year change has now stabilized the industry to a degree that is bringing increased sales to all companies. Carload shipments from the factories during April and May were 67 per cent of the production for the same two months of last year, and there is reason to believe June will be at approximately the same rate.

Compared with the feverish rush of motor cars last spring a two-thirds demand looks to be a big falling off, but compared with normal years it shows that the motor car business is faring much better than other lines.

Good buying power has been shown where prices have been reduced or where it was known that present prices and quality would be maintained. The National Automobile Chamber of Commerce figures show that with more than 8,000,000 passenger cars in use, the replacement demand alone should be about 1,000,000 cars. The production of passenger cars last year was 1,883,000.

While this week may bring a few more changes in cars that have not been reduced this year, it is generally agreed that the mid-year reductions have stabilized conditions in the industry with little possibility of further changes during 1921.

#### Better Cars at Lower Price

The success of the automobile industry has been based on big production and the resulting low prices which insure a broad market. For that reason every effort has been made to produce better cars at lower prices to insure the big productions which make increased values possible. Moreover, in these readjustments of the past few weeks, motor car manufacturers generally have taken into consideration the need for increased car and truck sales by the 35,000 dealers throughout the country.

The truck business continues to be on a par with general business, but with an improved future just as soon as general construction and road building programs get under way and railroads perfect their plans for the use of motor trucks for short haul traffic and in connection with store-door delivery.

## Few Attend Auction of Overseas Trucks

### Conditions in the Transportation Field Blamed for Light Bidding and Sales

NEW YORK, July 5—Lack of interest was the most striking feature of the three-day auction sale here of reconditioned American-made army trucks brought back from England by the Truck Co. of America. There was light bidding because of the small attendance, which did not exceed 50 the last day. Only 90 of the 200 trucks offered were put on sale.

General business conditions in the truck transportation field were blamed for the lack of demand. During normal times there would have been little hesitancy on the part of buyers. One man in attendance stated that while he considered the trucks good purchases, he could not afford to add to his fleet when many of his vehicles were already idle.

Though the vehicles were in good condition and considered bargains, those wishing to buy were reluctant to bid much above \$1,500 for any of the trucks. The sale included 5½-ton Macks, 5-ton Pierce-Arrows, 3½-ton Packards, 3-ton Whites, 4-ton Rikers and 1½-ton Commerce.

Because of the light bidding, the auctioneer was forced many times to reject the bids. The last day \$900 was the highest bid for one of the Packards. While some of the trucks were said to have been sold for around \$2,500, the bidding was carried above the \$1,500 mark by representatives of the company.

In one particular instance, the auctioneer led the prospective buyers to believe that the trucks carried a manufacturer's guarantee. This was not so, the only guarantee being one against defective parts within 30 days of purchase.

It is stated that the Truck Co. of America is planning to auction off reconditioned passenger cars used in Europe during the war. No date has been set for this sale.

## Alena Steam Products to Make Engine Only

INDIANAPOLIS, July 2—Plans for the manufacture of a steam-propelled truck and tractor have been definitely abandoned by the Alena Steam Products Co., which will devote itself entirely to the production of power units. The Hamilton engine, designed by Fred Hamilton, president and chief engineer of the company, is said to have less than 50 moving parts. It is a double cylinder type, with 4½ by 5½ in. cylinders, radial valve gear and piston valves, and develops up to 110 hp. One feature is that the engine takes care of condensation without the use of cylinder drain cocks. Exhaust steam is carried directly from the cylinders to a tubular condenser mounted in the position of

the conventional radiator. Gravity carries the condensed water back to the tank. Pumps supply the boiler.

A feature of the boiler construction is claimed to be that it is impossible to burn the crown sheet. A "mud-ring" at the base of the boiler provides a "self cleaning" feature, and it is said that a clean crown sheet cannot be burned. In addition, the boiler is said to be designed so as to entirely eliminate pitting of flues and to do away with the need for frequent cleaning of flues.

An enlarged type of Bunsen burner, using kerosene, is used. A super-heating device permits of carrying the steam to a temperature of 650 deg. An experimental 5-ton truck has been getting five miles to the gallon of kerosene and 75 miles on 50 gallons of water, according to the officials of the company.

When installed in a truck, the engine crankshaft is connected directly to the differential, and the whole assembly from the rear resembles the conventional rear system of a gasoline truck. The boiler is carried under the hood, which is of the conventional style. The water level in the boiler is controlled and maintained automatically, as is the fire.

The company was organized in February, 1920, and is capitalized at \$1,000,000. It will build two types of power plant, a horizontal one for trucks and a vertical one for tractors. The officers are Fred Hamilton, president and chief engineer; John W. Cadle, secretary and treasurer; George W. Kilman, vice-president; C. E. Gordon, general sales manager; R. B. Hall, plant superintendent.

## Car Registry in Iowa Ahead of 1921 Totals

CEDAR RAPIDS, IOWA, July 2—Linn County automobile registration for the first half of the year has surpassed the 1920 total and dealers estimate that the 1921 figures will be nearly 50 per cent greater than last year. A few days before the half-year ended the total registration was 11,143 cars and trucks as against a total registration in 1920 of 10,054.

This increase is pointed to by dealers as final answer to reports that business is on the decline and that the much heralded revival failed to materialize. Price reductions in the last few weeks brought immediate response from buyers and the easy manner in which automobile paper is being absorbed is taken as indication that the rural midwest sections are far from financially shaken.

### ST. LOUIS REGISTRY GAINS

ST. LOUIS, July 5—Enormous increases in the number of motor vehicles owned by St. Louisans is shown in a survey of the State and city licenses issued by the local offices. Traffic congestion has been so apparent for the past few months that it was certain an increasing number of motor vehicles were using the streets.

J. E. Johnston, supervisor of the St. Louis office, reports that 68,700 State licenses have been issued to date.

## Britain Registers 853,900 Cars to May

### Passenger Cars and Motorcycles Show Largest Gains—Trucks Growth Small

LONDON, June 24 (By Mail)—Failing an exact statement and an official certificate of production corresponding to the yearly returns of the National Automobile Chamber of Commerce the inquirers after British automobile output have to be satisfied with abstract figures collated from various sources and on odd occasions.

Some striking figures are just issued officially by the Ministry of Transport, London, which cover the five months, January to May. They concern the number of automobiles licensed for road use and the sums paid for that privilege by way of the new horsepower tax. The number of automobiles for which licenses were in force on May 31 was approximately 853,900, yielding \$42,180,000 in tax.

The most marked increase is in category "motor hackneys," where the annual licenses have increased from 40,500 to 64,000, while the second quarter licenses were 32,500 as compared with 200 in the first quarter.

The "horse power" class, which includes all private cars, shows an addition of 2000 annual licenses, while the quarterly licenses have increased from 14,000 to 36,000. The increase in the number of licenses for trucks is relatively small, from 13500 to 15000, and it is possible that the numbers shown for this class in the previous return were slightly overestimated.

The number of vehicles for which revenue licenses were issued in the year ended March 31, 1920, was: Private cars, 185,700, as compared with 226,000 in 1921; motorcycles, 278,600, as compared with 370,000 in 1921; motor hackneys, 71,400, as compared with 96,500 in 1921.

The rebate of 25 per cent allowed in the case of "horsepower" vehicles whose engines were constructed before Jan. 1, 1913, has been paid in approximately 31,300 cases, the amount refunded being £133,700. This last item indicates the comparative few pre-war autos now in use.

### OILING SYSTEM CHANGES HANDS

PHILADELPHIA, July 2—The manufacturing and patent rights to the safety oiling system have been purchased from the Charles Kralicek & Co. of Cleveland by the Safety Oiling System, Inc., which has occupied its new building at 2303 Fairmount Avenue, this city. Preparations have been made to manufacture the device on a larger scale than ever before. The Philadelphia company has recently been reorganized and incorporated with W. H. Simon, former general distributor for the safety oiling system, as president. The device is designed especially for use on Ford engines but can be used on other types also.

## Lower Prices Reduce Export Trade Totals

### Trade Index Shows Return to 1913 Volume — Congress Studies Wages Abroad

WASHINGTON, July 2—Speculation has developed of late as to the effect which recent price reduction on automobiles will exercise on foreign trade. There has been unmistakable evidence that the volume of export business in automotive products continues to shrink without signs of abatement. All branches of the Government have manifested unusual concern over trade tendencies, and the legislative branch is giving careful consideration to the possible effects of high tariffs. While there has been a tendency towards improvement in the domestic situation, the foreign prospects are still unsatisfactory, principally because of the unsettled conditions abroad.

The tariff framers, known as the House Committee on Ways and Means, have just received a compilation of wage information showing wages in the automobile industry here and abroad. They intend to use it in designing tariff schedules in Congress and in establishing a protective policy for American workmen and American standards of living. The statistical study of wages in the automobile industry in this country and abroad was based upon wages paid in automobile factories in 1920. While this data was gathered primarily for the lawmakers, it is of far greater importance to American automobile manufacturers contemplating an expansion of their foreign sales.

Secretary of Commerce Hoover has repeatedly warned of the tendency abroad among manufacturers to consolidate for militant export purposes. It is known that our domestic markets could not be easily invaded because of the strength of the American motor car industry. However, the same condition does not apply abroad, where foreign manufacturers, having the advantage of cheap labor and, in many cases, governmental subsidy, may unite to capture foreign automobile markets from American competitors. It is the labor factor that dominates the whole situation.

#### Wage Scale Much Lower

The official information in the possession of the United States Government shows, for instance, that skilled mechanics working an eight-hour day in automobile factories in Lyons, France, in 1920, received an average of 26-30 francs per day, which is equivalent to \$1.80-\$2.10 in American currency. Ordinary mechanics, carpenters, etc., received from \$1.54-\$1.82 per eight-hour day; unskilled laborers working at machines in automobile factories, \$1.40-\$1.68; bricklayers, masons, \$1.40-\$1.68; ordinary unskilled laborers \$1.12-\$1.40; unskilled female laborers at machines,

84c-\$1.40 per day; unskilled female sweepers, etc., 78c-\$1.12.

In Germany, with statistics taken from the German Industrial Inspector's report, in 1914 and 1919 it was shown that the rates per day for car and motor workers in Stettin, was \$1.09 in July 1914; for machinists in December 1919, 44 cents per eight-hour day. These figures, of course, are based upon the exchange which was remarkably low in Germany at the time. Coppersmiths were paid \$1.20 per day in July 1914, and 54c in December 1919; lathe operators, \$1.18 per day in July 1914, as compared to 43c per eight-hour day in December 1919; tinsmiths, \$1.02 in July 1914 and 46c in December 1919; blacksmiths, in July 1914, \$1.09 and 50 cents per eight-hour day in December 1919; cartwrights, \$1.11 in July 1914, as compared with 45c in December 1919; cabinetmakers, \$1.11 in July 1914 and 45c in December 1919; carpenters, \$1.11 in July 1914 and 45c in December 1919; saddlers, \$1.11 in 1914 and 42c in December 1919; painters and varnishers, \$1.07 in July 1914 as compared with 46c in December 1919; drill operators, \$1.09 in July 1914, as compared to 41c in December 1919; planers, \$1.13 in July 1914, as compared with 43c in December 1919, and apprentices 25c in July, 1914, and 11c in December 1919. All of these figures represent the rate per eight-hour day.

In England brass polishing and nickel plating plants pay platers of brass a weekly rate of \$18.25 and the same applied to nickel platers in 1920.

In comparison, the House Ways and Means Committee has statistics from the report of the New York State Industrial Commission, using the average weekly earnings of New York State factory workers in 1914, 1916, 1918 and

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## Gasoline Price Cut Helps British Sales

LONDON, June 24 (By Mail)—The recent reduction of 12 cents a gallon for gasoline has had a stimulating effect on the car trade, though it is reflected chiefly in the light-car class and in Fords. The position of the latter make in Britain has been eventful of late. It has been up against severe competition with the Citroen four-seater from France, especially since the price of the Citroen was reduced by \$500 and is now \$2,000 against the Ford's \$1,200.

The fuel consumption of the Citroen, however, is about half that of the Ford and the taxation is less than half. A while back Citroens were selling in Britain at the rate of 1000 a month and could not be supplied fast enough. The demand for Ford cars thereby was affected seriously but Fords have a more than offset advantage in the van and one tonner. The latter model is selling by the thousand, both this and the van having the market practically to themselves.

The activity in the light-car stock quotations continues, but there is a slump in large car stocks.

## Goodrich Organizes Foreign Sales Body

### International Subsidiary Will Handle Interests in All Countries but Canada

NEW YORK, July 1—B. F. Goodrich Co. has completed the organization of a subsidiary, the International B. F. Goodrich Co., incorporated under the laws of New York, with an authorized capital of \$10,000,000, represented by 100,000 shares of \$100 par value common stock.

The new company will represent B. F. Goodrich Co. in all foreign countries except Canada. It will take over the parent company's interest in factories (with selling organizations) located in France and Japan, as well as its selling subsidiaries in Great Britain, Italy, Spain, South America, Straits Settlements and Porto Rico, acquiring distributors in all foreign countries. It will handle all the products of the parent company, which include tires for automobiles, trucks, motorcycles and bicycles; rubber footwear, and all sorts of mechanical rubber goods and druggists' sundries, in addition to the products turned out from factories in France and Japan.

The great volume of foreign business which has been worked up by the Goodrich company has made necessary an organization like the International B. F. Goodrich Co., through which will be effected centralization of all these foregoing activities, which will be directed from administrative and operating offices located at Akron.

Officers of the new company are B. G. Work, president; W. C. Arthur, vice-president; F. C. VanCleaf, secretary; L. D. Brown, treasurer; H. Hough, controller; F. E. Titus, director of sales, and W. H. Aleen, director of manufactures. The directorate comprises B. G. Work, W. O. Rutherford, H. K. Raymond, L. D. Brown, H. Hough, W. C. Arthur, C. B. Raymond, F. C. VanCleaf, and W. C. Gear.

#### FRENCH REVISE SPEED LAWS

PARIS, June 12 (By Mail)—Abolition of the speed limit is the outstanding feature of the new traffic laws signed by the President of the French Republic last week.

While there is no speed limit for automobiles weighing 3 ton maximum, it has been considered necessary to fix limitations when this weight is exceeded, in order to assure reasonable protection to road surfaces.

The maximum load per centimetre of tire in contact with the road is fixed at 150 kilos. Steel tires are forbidden for all types of automobiles, but a period of five years is allowed to make transformations. Strakes cannot be used on the wheels of any road vehicles. The maximum overall width of vehicles is fixed at 98 in., and wheel hubs must not project.

## European Factories Develop Small Cars

### Paris Show to Exemplify Drift from High Operating Cost Vehicle

PARIS, June 18 (By Mail)—Average piston displacement will show a considerable drop on the automobiles to be presented to the public at the Paris automobile show, opening Oct. 5. At the present time the average piston displacement of French automobiles is in the neighborhood of 183 cu. in. if considered on the basis of number of types produced. If actual production figures are considered, however, the average piston displacement drops to about 130 in., for the cars built in the greatest quantities are those with small engines.

The coming drop in size is due to the decision of several important firms having hitherto built only large and medium size cars to put smaller models on the market. This move has been rendered necessary by the changing economic conditions and the desire of the public to possess cars which will be less costly to maintain. It does not imply a reduction in quality, but the building of cars which will be economical to operate because of their low gasoline consumption, smaller tire costs, and reduced taxation.

There is a feeling even among users who have the means to operate a big car that it is economical to maintain two machines—the big one being used for long distance travel when a full load is carried, and the small car getting general and about-town service. The economies in gasoline and tires more than compensate for the taxes on two cars.

Among those who are stepping into the small car field is Delage with a four-cylinder, 10 hp. model fitted with front wheel brakes. When he entered the automobile business, Delage specialized on a car of this size, but during the war he transferred to a big six-cylinder luxury type. This model is being continued, but the new model will be a four-cylinder type of 2.7 in. bore. Delage has no intention of invading the cheap, big production field, but is presenting his smaller type for those clients who feel that it is uneconomical to use a 40 hp. six-cylinder model for town service and short distance trips.

#### Darracq to Make New Line

Darracq, whose present models are an eight-cylinder of 2.9 in. bore and a four-cylinder of 3.3 in. bore, will probably drop the latter next year when they put on the market a new 10 hp. four-cylinder type. The line will thus consist of a powerful luxury type car and an economical 10 hp. four-passenger automobile. A similar change is contemplated by Lancia, one of the most reputable makers on the Italian market, who will maintain his present big four and supplement it with a popular high grade four.

Sunbeam, in England, has a 10 hp. four-cylinder car under construction, and the Austin factory is also preparing an automobile of the same size and power. Panhard, whose smallest model at present has a four-cylinder engine of 2.8 in. bore, is contemplating the production of a still smaller type. The three biggest producers on the Continent of Europe—Fiat, Renault and Citroen—will not make any important change, for these firms already build cars with the smallest engine possible on a full size four-passenger automobile, the piston bores being 2½ in. for Fiat, 2.9 in. for Renault, and 2½ in. for Citroen.

#### Voisin to Be Only "12"

With the exception of Voisin, who has a big 12-cylinder high grade car under test, there are no indications that new luxury models will be presented at the Paris show. Even if the 12-cylinder Voisin is offered for sale it will not interfere with the output of the present four-cylinder, sleeve valve engine of 3.7 in. bore.

Two or three of the leading French makers are experimenting with cycle cars, but it is too early to state whether these will be placed on the market next year or not. French conditions call for a machine which will be economical, and which at the same time can maintain a high average over fast and rather rough roads. It is recognized that the problem of producing a two-passenger machine with an engine of not more than 67 cu. in., weighing 770 lb. complete, is not an easy one, and there is a certain amount of hesitation in placing on the market anything which is not mechanically satisfactory.

Up to the present the cycle car has remained in the hands of a limited group of very small firms who do not possess the means to produce in quantities. Experiments are now being carried out by several of the big producers.

## California Rail Board Opens Car Department

SACRAMENTO, CAL., July 1—The California State Railroad Commission announces the establishment of an automobile department, due to the great growth of freight and passenger transportation by automotive vehicles in this State. The department will be under the direction of Charles A. Bock, and headquarters will be in the offices of the railroad commission. According to the announcement, the new department will be responsible for all detail work connected with the automobile stage and truck industries in California; will care for all informal as well as official correspondence, complaints and suggestions; will maintain up-to-date timetables and schedules of all automotive services in the State; will handle applications which can be disposed of by ex-parte orders; handle and assign public hearings, answer all verbal inquiries, and in general, assume responsibility to the State Railroad Commission for all work in connection with the operation of motor stages and trucks.

## American Cars Open Route Across Andes

### First Trip Between Argentine and Chilean Capitals Is Successfully Negotiated

NEW YORK, July 1—The long awaited completion of a transcontinental automobile trip across South America, from Argentina to Chile, has at last been realized. Under the auspices of newspapers of Buenos Aires, the capital of Argentina, and of Santiago, the capital of Chile, with the Automovil Club Argentino, likewise of Buenos Aires, two American cars recently completed the long trip between the two countries, and the Argentine club sees in the result a great boost to road improvement and to touring generally.

Information received by *El Automovil Americano*, the Spanish automotive publication of the Class Journal Co., shows that the two cars were forced to go far south to find a crossing over the Andes. The actual start of the trip to Santiago was made from Bahia Blanca, Argentina, some 700 kilometers south of Buenos Aires. From Bahia Blanca, the cars proceeded westward, crossing the Andes to the south of Chillan, proceeding from there to Santiago by way of Talca. Twelve days were required to make the trip, and the only really serious difficulty was found in crossing the mountains. One of the cars was threatened with being upset when ascending a steep mountain grade, but by quick action the driver was able to prevent serious damage, and the car continued its run without loss of time.

The pathfinders were welcomed by crowds at every city and a reception was tendered them by President Allesandri of Chile at Santiago. For the return trip, which was to be made to Buenos Aires, the route picked to Bahia Blanca and then northward to the Argentine capital, was 2630 kilometers (about 1600 miles).

"The first trial run has brought the matter of road construction and improvement to the attention of all leading persons in both countries," the Argentine club comments. "It will help more than anything else to promote highway building and will be a big influence in fostering the idea of long distance touring in this country."

#### TRACTORS DO ALL WORK

INDIANAPOLIS, July 1—Tractor men in Indianapolis are interested in a test field of corn just south of the city. The owner of the field is attempting to cultivate the entire crop with motive power. Tractors were used to break the ground to prepare the soil for planting, and for cultivation up to the present time. Yesterday, with the corn three feet high, a tractor was used to draw the twelve-shovel two-row cultivator. The corn sprang up behind the power machinery unharmed, demonstrating the practicality of tractors for this work.



## High Tariffs Hurt Exports to Spain

### Splendid Opportunities for American Makers Seen With Revision on Equitable Basis

WASHINGTON, July 2—The American automobile industry in Spain has been almost killed by high tariff duties. Commercial Attache Charles H. Cunningham, stationed at Madrid, reports that at the present time it is necessary to pay a duty of approximately 14 pesetas per kilo on automobiles and motorcycles. This includes 45 per cent surtax for gold.

During the past 18 months the Spanish market has been rather well supplied with second-hand automobiles, both touring cars and trucks, which were left over from the supplies in France. It is reported that aside from these 5000 used automobile trucks have come from Germany and Belgium, though this figure is questioned considerably. In any event, the automobile imports into Spain are quite badly paralyzed by the heavy import duties which were imposed on Dec. 1, 1920. Practically no orders are being placed except for spare parts and a large number of cancellations have been made.

The tariff and exchange situation also has given the French a great advantage in the automobile tire market in Spain, which had been more or less in the control of American manufacturers. The American market also has been greatly harmed, according to Cunningham, by the vast number of irresponsible tire concerns which have sent their products into Spain during the last four years. Some have sold their tires in job lots. Some have sent tires originally destined for use in France. A large number have placed agencies with small concerns doing a business of 40 or 50 tires a month. These concerns cannot sell as cheaply as the larger ones, are unable to guarantee their goods and American tire companies which are being represented by them frequently have to bear the brunt of having their reputations sullied by the practice of their agents.

#### Recommend Combination

The commercial attache recommends combination as a remedy, through some sort of consolidation similar to the United States Steel Consolidated Corp. under the Webb-Pomerene act, which would maintain an American in Spain to supervise the sale of the products and keep a watchful eye over distribution and at the same time support and stimulate their selling desire. Complaint also is made that American makers of automobiles and tires do not grant as liberal sales commissions as do the French and Germans.

Discussing in detail the situation as it relates to automobiles, it is pointed out that, although supposedly the tariff duties would weigh with equal burden upon all importers, as a matter of fact

this is not true. The Ford plant in Cadiz, which was putting together 700 cars a month and employing 200 men, has closed down. It is impossible to sell the more expensive cars of the Packard type for less than 65,000 pesetas, while the Hispano-Suiza and the Fiat of the same reputation and caliber can be sold at 45,000 pesetas, including the body.

The duty paid on automobiles of the Cadillac and Packard types has been increased from 2000 to about 10,000 pesetas, rendering the sales of such cars almost impossible. It is not possible that the Spanish industry will be able for a long time to meet this market's requirements. Accordingly, the new tariff is a protection against American automobiles, the sales of which necessitated the employment of hundreds of people throughout the country, who are now finding their business ruined unless active steps are taken to remedy the situation.

#### Importers Make Protest

Protests have been made by a number of automobile importers and associations of importers, and it is the common belief that the Spanish government is aware that the Spanish industry is not sufficient to supply the home demand and that the new tariff will bring about a reduction in the duties as established last December.

The general policy of automobile dealers in Spain at the present time with respect to new business is one of watchful waiting. However, in the meantime, it is explained, a typical American industry excelling that of other countries is entirely paralyzed, and should this condition continue there will be considerable financial distress among friends of American manufacturers and the former will be forced to turn to the representations of German and French cars against their will.

The only plant in Spain that seems to be doing a purely Spanish automobile manufacturing business is the Hispano-Suiza of Barcelona and Guadalajara. It is stated that the total capital invested in this enterprise is about 50,000,000 pesetas. During the war the Hispano-Suiza Co. sacrificed its automobile production for the making of airplane engines. 75 per cent of which were sold to the allies. There is said to be at present about 1600 men at work in these plants. They earn all the way from 8 to 15 pesetas a day in wages. A large part of the specialized machinery utilized came from the United States and England and the American machinery is said to have given entire satisfaction. At the present time Hispano-Suiza is engaged in work on 12 different types of car chassis and engines.

#### All Work Done at Plant

It is stated that all of the work on all of the parts except the wheels for the touring car is done in the Hispano-Suiza plant. Truck wheels are also made and the wire wheels utilized on the touring car and passenger car chassis are of the Rudge-Whitworth type made in England. The output of the Hispano-Suiza plant

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## Dealers to Outline Contractual Views

### N. A. C. C. and N. A. D. A. Conferees Approach Basis for New Business Relations

DETROIT, July 2—Efforts looking to the establishment of close co-operation between factory executives and dealers are beginning to breed results. Committees representing the National Automobile Chamber of Commerce and the National Automobile Dealers' Association expressed themselves highly pleased with the results of their second conference held at the Detroit Athletic Club yesterday. The conference was continued to July 12, when the committees will meet in Buffalo.

A formal draft of the position of dealers on matters under discussion will be presented at the Buffalo meeting by Harry G. Moock, general manager of the dealers' association. Following yesterday's meeting he expressed confidence that action favorable to the industry generally would be taken at that time.

Developments at yesterday's meeting were practical agreements to the effect that cancellations of contract in the future shall be only on recognized factory authority rather than at the hands of various persons as now is possible. That persons suffering cancellations should have opportunity for appeal also seemed to carry weight with many of the conferees. There also seemed to be unanimity of opinion that contracts should be made dependent on performance rather than subject to renewal at definite dates.

The question of the disposition of cars in cases of contract cancellation brought forth considerable discussion but no definite action was indicated.

General Manager Alfred Reeves of the N. A. C. C. expressed gratification after the meeting at the harmony which characterized the proceedings and said it gave assurance that all problems now being threshed out would be settled.

### Reports on N.I.V.A. Contest at Fargo Available July 11

FARGO, N. D., July 5—The National Demonstration and Show Committee of the N. I. V. A. has issued the following statement in regard to the tractor and horse contest staged here.

"Data secured in connection with the Fargo Farming Demonstration will not be complete until the horse outfits have finished their work and the records of all tractors and horses have been carefully checked. No information on this subject will be given out until July 11, on which date the National Committee will meet again in Chicago.

"Results of the Fargo Demonstration will be discussed at that time with a view to deciding future demonstrations. Information and the data regarding the Fargo demonstration will be made public."

## Babson Would Keep Executives on Job

Says Market Speculation Hurts Car Development—Predicts Coal Dust as New Fuel

TOLEDO, July 6—Roger Babson, economist, who visited Toledo to make several addresses to business men and to study the automobile industry here, declared his studies had led him to the belief that the best showing is going to be made in the automobile industry by the companies which absolutely bar the officers and employees from automobile and other stock market speculations.

"Automobile officials have paid too much attention to the stock market and not enough heed to the quality of the cars they were turning out," he declared.

Babson said the swing in automotive channels was toward not only the use of light models but the manufacture and use of lighter machines than are now being driven.

He pointed to two lines of experiment that were fundamental to the automotive industry, in his opinion. One was the use of bituminous coal dust for fuel and the other was the development of cottonoid and paperoid bodies for lighter construction.

"I happen to be conversant with experiments now being made by several automobile manufacturers in the use of bituminous coal dust as fuel for automobiles instead of gasoline," said Babson, "and the result of the experiments so far indicates that within a few years gasoline at high prices will no longer be used as motive power for automobiles.

"The coal dust will be blown into the carburetor of the car and burn with sufficient intensity to provide all the heat and power necessary for the operation of the machine. Fifty cents' worth of coal dust thus utilized will carry a car the same distance that five dollars' worth of gasoline now carries it. This decrease in the cost of operating an automobile will greatly increase the use of automobiles.

### Plan Lighter Automobiles

"I have witnessed experiments with cars whose bodies are made out of a combination of formaldehyde, glue and cotton, a material that has come to be known as cottonoid. Similar material may be made out of paper as one of the three ingredients, so to speak, instead of cotton. So we are to have automobiles with cottonoid or paperoid bodies, making the car much lighter, and more durable and cheaper.

"I saw an experiment made with a car that had a cottonoid fender. The car was made to collide head on with a brick wall. The cottonoid fender gave in like rubber and rebounded the car like a rubber ball. Such a fender does not break or bend like steel, but has resiliency and sufficient strength to protect the machine in collision.

"It is not the initial cost of a car that

keeps down the sales of automobiles, but the upkeep. With lighter bodies made of the new material and with better tires—and they are coming, too—the increase in the sales and the use of automobiles will be enormous, for the initial price will be lower and the upkeep much less expensive."

Babson believes that the present center of manufacture of motor cars is best adapted to their production and that the territory in the vicinity of Detroit, Cleveland and Toledo will continue to be the great automotive district.

## Willys Takes Message of Cheer to Dealers

PHILADELPHIA, July 2—John N. Willys, president of the Willys-Overland Co., introduced by Harry B. Harper, president of the Overland Harper Co., addressed a meeting of Overland Harper dealers at the headquarters of the local company, Forty-second and Chestnut streets, bringing a message of optimism to the trade.

Among the things Mr. Willys said were:

"Work is a great thing. It will accomplish anything. We have weathered the storm and now it is plain sailing ahead. We are back to the production of 400 cars a day and by next month we expect to increase this to 600 cars. Our organization is the best we ever had, and so are the shopmen."

"June was good," said H. B. Harper, "but it isn't going to be a patch on what we are going to do in July. Our product is right, our prices are right, and this response of the buying public proves that better business, increased sales and a big future await us."

## Rush of Truck Sales Reported in South

BIRMINGHAM, ALA., July 6—With the renewal of activity in the lumber business and all other building material businesses in Birmingham, the sales of trucks have shown a marked increase, according to local automobile dealers.

The demand for new trucks has increased during the month of June so rapidly that all orders placed by local building material dealers could not be filed on schedule time. Many of the most urgent buyers were compelled to wait for delayed shipments to get their new equipment.

"Receipts on repairs at the garage would indicate that the number of cars is increasing," said P. Y. Whitman, of Whitman's Fifth Avenue Garage.

"Buicks are selling faster than we can order them in," said Donald Drennen of the Birmingham Motors Co.

"Dealers who are members of our organization are very optimistic over the outlook for the coming year in the automobile business," said James P. Dobbins, secretary of the Birmingham Automobile Club. "They are anticipating a banner sales year for new cars. Business was light for a time, but the automobile line is picking up now."

## Denby Creditors Plan Funding Firm's Debt

Committee Is Named to Work Out Refinancing—Truck Prices Reduced

DETROIT, July 2.—Creditors of the Denby Motor Truck Co., at a meeting yesterday, named a special committee of five, headed by J. H. Johnson, president of the Peninsular State Bank, to formulate plans for presentation July 12 for funding the company's indebtedness. C. A. Ailes, a member of the creditors' committee which has been operating the plant for the last year, said that while the plant is free of all bonded indebtedness the plan in view is to ask creditors to accept part payment in bonds and the balance in stock in order that the company's statement may be put on a bankable basis. It also is proposed to issue bonds for about \$100,000 as class A bonds to furnish working capital.

In addition to Johnson, the committee is composed of J. M. Burns and B. J. Lincoln, Detroit attorneys representing creditors, O. W. Myers, district credit manager of the Goodyear Tire & Rubber Co. and W. P. Fuller of Fuller & Sons Co., Kalamazoo. The Denby company will continue in operation. It has debts of about \$650,000 but is solvent and assured of success if given opportunity to work out of its present difficulty, said Ailes.

Announcement was made by the Denby company today of price reductions effective immediately. The three-quarter-ton and 1-ton speedster will sell for \$1,625; the 1½-ton for \$2,300; the 2-ton for \$2,600; the 3-ton for \$3,300; the 4-ton for \$4,200; the 5-ton for \$4,850, and the 7-ton for \$5,500. This is a reduction of \$200 on the 2-ton, \$300 on the 3-ton, \$400 on the 4-ton, \$500 on the 5-ton and \$700 on the 7-ton.

The light trucks are equipped with pneumatic tires and the others with solids. All models except the speedster are equipped with bumpers.

## Federal Trade Board Accuses Rubber Firm

WASHINGTON, July 5—Issuance of a complaint against the Diamond Holfast Rubber Co. of Atlanta, Ga., has been announced by the Federal Trade Commission on allegation of unfair competition in the manufacture and sale of automobile accessories and repair materials in interstate commerce. It is claimed that this company marketed its products in such a way as to pass them off as the products of the Diamond Rubber Co., a subsidiary of the Goodrich. It is further alleged that the respondent sold its products in containers with labels which featured the word "Diamond" and so closely resembled the labels of the Diamond Rubber Co. The company has 30 days to file an answer.

# 122 Inch Engines for 1923 Classic

## Indianapolis Fixes Lower Displacement

### Limitations Below Specifications of Any Car Now in Quantity Production Here

INDIANAPOLIS, July 7—T. E. Myers, secretary and manager of the Indianapolis Motor Speedway Co., has announced that the 1923 race on the famous track will be for cars powered with engines having a maximum piston displacement of 122 cu. in. Translated into European terms this is two litres. The 1922 500-mile race, the tenth annual event, will be for three litre cars, or engines of 183 cu. in., the same size as the 1920 and 1921 races.

This is the fifth time that the Indianapolis track has reduced the engine sizes for the cars competing in the five-century, considered by some the classic of all the world's annual speed events. Off-hand such reductions would be expected to result in decreasing the speed of the cars, but such has not proven to be the case. Automotive engineers have thus far been able to obtain more speed in fact by designing smaller bore and higher speed engines.

The 1923 race will have engines smaller than anything now built in quantity in America. The smallest engined car to-day in large production is a four cylinder, measuring 143.1. The Ford engine is near the 183 maximum. Reductions in the size of racing engines have frequently been reflected later in the stock production of the American makers. The "crucible of racing" has proved to the satisfaction of the engineers that fuel economy could be effected by reducing the engine sizes. In the last race the average car's mileage was ten to the gallon. Two years hence it should pass the twelve mile mark.

The efficiency of the two litre engine was demonstrated recently in the French economy Grand Prix at LeMans, where a De Dion Bouton of this class showed 49.09 miles to the gallon in a stock test.

Except for the announcement of the engine limitations no other specifications for cars admitted to the race have yet been made public.

## Overland Goes Over Expected June Output

TOLEDO, July 5—With a big drive through to the last day of June, the Willys-Overland plant here went 37 cars over its schedule for the month for a total production of 8537 cars for the month. On June 2 the schedule was fixed at 3500, but the increased volume

of sales caused this to be boosted to 8500 for the month. Purchasing agents, production men and others struggled through the hot weather to "come through," and the record was made.

The July production will be increased 50 per cent and, according to appearances, August will be a busy month at the plant. Some departments at the factory here have been forced to put on three eight-hour shifts this month. The big month was the first real test of the new production system put into effect by Vice-Presidents Walter Chrysler and Charles B. Wilson.

## Reo Motors Down for Two Weeks' Vacation

LANSING, MICH., July 2—All departments of the Reo Motor Car Co. except the service and repair closed to-day for two weeks. The simultaneous vacation plan has been under consideration for some time. Opposition to the plan was overcome by the argument that present business conditions made the opportunity for trying it out most propitious. H. C. Teel, general superintendent and an ardent advocate of the plan, said it was the intention to drop all work wherever possible even in the repair and service departments and take two weeks rest in the hope of eradicating all feeling of apprehension regarding market conditions.

## Dodge Orders Assure Production to 1922

DETROIT, July 2—The announcement was made to-day by Dodge Bros. through President Haynes that production would be maintained at capacity for the remainder of the year. Production at the Dodge plant since the price cut has been increasing daily and is now around the 600 mark. That output, Haynes said, would be continued throughout the year. This assertion is based on present orders and prospective demands.

Haynes said dealers' stocks were exhausted and that cars rapidly are going into the hands of consumers. The factory is far behind on orders.

### TO PICK A. A. A. SECRETARY

NEW YORK, July 6—The Executive Committee of the American Automobile Association at a regular meeting at the Hotel Commodore to-day named a committee of three—George Diehl, president; David Jamison, past president, and Horace Bonnell, treasurer—giving it authority to appoint a successor to A. G. Batchelder, the late executive secretary who was killed in an airplane accident near Langley Field. The committee will announce its selection soon.

## Franklin Sets Marks on 20th Anniversary

### Ships 138 Cars in Day and Completes Biggest June in History

SYRACUSE, July 2—Three leading events in the history of the Franklin Automobile Co. were celebrated this week—two of them records for shipments and sales, established on the same day, June 30, and the third, the twentieth anniversary of the company, July 1.

The Franklin company shipped 138 cars Thursday, the biggest shipment for one day it ever made. The last previous record was made on Dec. 31, when 110 cars were shipped.

On the same day Franklin dealers throughout the country sold 132 cars, which establishes a record, and helped make the company's business for the month the largest for June in its history. Last year was considered a banner year for car orders, but four more cars were shipped last month than in June, 1920, the total being 1031.

In celebration of the anniversary the company officials and employees held a parade, headed by the Franklin band of 35 pieces. A feature of the procession was the first Franklin car ever sold, run on its own power. In this car rode a man and woman dressed in the styles of twenty years ago. John Wilkinson, who built the car, rode just behind it in a 1921 Franklin sedan.

In 1901 Wilkinson, who is now vice-president and consulting engineer of the Franklin company, started work for H. H. Franklin and A. D. Brown, now of the Brown-Lipe-Chapin Co., under the name of Brown & Franklin Co. The first car was turned out March 3 of the following year. This car had four elliptic springs, a wood frame instead of steel, and an air-cooled engine, features which have endured in Franklin cars right through to the 1921 models.

Thirteen cars were turned out in 1902, of which eleven were sold. Sixty-five persons were employed the first year, and in the twenty years since then the force of employees has grown to 3200.

## Car Reductions Swell Chicago Sales Totals

CHICAGO, July 6—In all lines of cars which have reduced prices there was a very decided improvement in sales for the month of June as compared with May and April. In many cases reports are to the effect that record sales are the result of June efforts. Automobile Row in Chicago appears to be busier than in months.

## Lower Prices Reduce Export Trade Totals

Statistics Show Wide Difference in Wages Abroad and in Factories Here

(Continued from page 41)

1920, the statistics show that workers in automobile, carriage and airplane factories in 1914 received \$17.06; in 1916, \$18.86; in 1918, \$23.39; in 1919, \$27.49 and in 1920, \$32.51. The industrial survey by the Department of Labor Statistics, comprising 28 states in 1920, showed that the average weekly earnings in the United States for factory machine workers, machine molders, etc., was \$29.70 for 49.8 actual hours of work. Pattern makers' actual earnings for 48 hours work averaged \$43.73; rough carpenters and patternmakers' helpers, \$26.08; bench molders, \$28.06; core makers, first class, \$31.36, actual average earnings; second class core makers, \$26.52; laborers, \$22.22, actual average earnings.

These figures show the advantage which producers of foreign cars have over American automobile manufacturers and exporters.

In England, the average earnings for common laborers in the iron and steel industry in 1921, per 47-hour week, amounted to \$12.52, under the present rate of exchange. In France, the mean rate per day of eight hours for metal workers, in 1921, was considerably below the average rate in this country. For illustration, fitters in automobile plants received an average of \$1.72 per day; fitters on chassis, \$1.47; automobile electricians, \$1.34; countersinkers for automobiles, \$1.62; ordinary laborers in automobile factories \$1.04, and wood working machinists on automobiles, \$1.32; pattern makers for automobiles, \$2.18, and turners for automobiles, \$1.81.

### Must Revive Foreign Trade

Of the utmost significance is the fact that the Federal Reserve Board believes that we cannot reasonably expect a complete recovery in domestic trade without having a somewhat corresponding advance in foreign business. They insist that foreign trade is needed as a stabilizer of values, besides being essential as the means of insuring full demand for goods and complete activity for productive energies. The Board believes that the change in the balance of trade has been brought about, not so much through increase in the value of imports, but rather by decline in the value of exports. In fact, the value of exports, although showing some increase over the very low figures of January of this year, is still in value only half the figure for April 1920.

Price declines have naturally been responsible to a considerable extent for the reduction in values during recent months. For this reason the foreign trade index of the Federal Reserve Board is particularly significant in interpreting the volume of trade as com-

pared with previous months. This shows that while the volume of exports has been shrinking steadily since the latter part of 1920, the physical volume of imports has been increasing much more rapidly than the value figures indicate, owing to reductions in prices. To the extent that this index is representative of our foreign trade as a whole, the conclusion is justified that exports in April had declined to about the same volume as in April 1913, while imports were reaching this country in nearly double the quantity of the corresponding pre-war month. So far as individual commodities are concerned, the increased volume of imports is well distributed among the several classes of goods.

## France Soon to Market New Gasoline Mixtures

PARIS, June 18 (By-Mail)—Gasoline, alcohol, benzol mixtures for automobile use are likely to find a place shortly on the French market. When the next lot of German benzol to be delivered under the terms of the Peace Treaty is received, the French stocks will amount to 2500 tons. An attempt to dispose of this fuel to private interests met with no success, for one of the conditions was that the purchasers should also buy an equal quantity of Government alcohol to be mixed with the benzol. As dealers will not accept this, the Government doubtless will be obliged to make a gasoline-alcohol-benzol mixture and place it on the market. It is impossible to delay any longer for no more storage space exists for the accumulating stocks.

To reduce the alcohol stocks, a proposal has been made by the Mining Commission that no gasoline shall be allowed to be sold unless it contains at least 10 per cent alcohol. As alcohol will not dissolve in gasoline, a solvent would have to be used, and among those recommended are gasoline 80 per cent, alcohol 15 per cent, and castor oil 5 per cent, or gasoline 80 per cent, alcohol 10 per cent, and ether 10 per cent.

Alcohol manufacturers have carried out tests with a mixture composed of 30 per cent alcohol at 90 degrees, 11 per cent benzol, and 59 per cent gasoline, which they declare gives a saving of about 2 per cent compared with straight gasoline. Professor Letombe and Captain Mau'ere have experimented with a stock Renault, with normal carburetor adjustment, using a mixture known as E. H. A., comprising 65 per cent alcohol, 10 per cent ether and 25 per cent gasoline of benzol.

### HARPER-BEAN GAINS TIME

LONDON, June 17 (By Mail)—The court has again heard the petition of G. Johnston, furnisher of upholstering and body trade materials, one of whose specialties is the American leather substitute called "Duratex," for an order for the compulsory winding up of the Harper-Bean company. It was adjourned on the statement that a plan is being prepared by a creditors' committee. Output is continuing steadily.

## Hoover Pushes Plan to Expand Commerce

Industrial Groupings Under Way to Meet Individual Needs—Appropriations Made

WASHINGTON, July 2—With an appropriation of \$250,000 at hand, Secretary of Commerce Hoover is ready to undertake the development of American foreign trade through the reorganization of the Bureau of Foreign and Domestic Commerce. He has definite plans for the expenditure of this amount in order to boost sales of automobiles and other commodities on the foreign markets. He has already completed the organization of several industrial groups including textiles, chemicals, coal and oil, leather products and foodstuffs. The automotive group will be decided upon within a few days.

It was the original intention of Secretary Hoover to establish twelve industrial groups but it has not been definitely determined as to the number that will be set up and no specific provision is made by Congress as to the groups organized. These groups will carry the same parallel groupings that apply to the Bureau of Standards and the Bureau of the Census.

The Bureau of Standards also was given \$250,000 of the appropriation of one million dollars for the Bureau of Census, for the continuation of investigation of structural materials for which \$50,000 is allowed; for technical investigation in co-operation with industries upon fundamental problems involved in industrial development following the war, with a view to assisting in permanent establishment of the new industries developed during the war, including personal services of the District of Columbia and elsewhere, for which \$100,000 was allowed, and for co-operation of the Bureau of Standards with Government departments, engineers and manufacturers, with regard to standardization and testing of instruments, equipment, tools, etc., for which \$100,000 is allowed.

### Needs Two New Assistants

The Hoover plan for groupings calls for two additional assistant directors, making four in all, who will constitute the heads of division and assistants to co-operate with service committees selected in the various industries.

Experts will be assigned to the automotive field to make special investigations into particular trade conditions abroad. Information relating to vital facts of value to industries in this country will be collected abroad, adequately prepared and distributed to show the trend of conditions on foreign markets. Secretary Hoover is convinced that co-operation of industry with the Government is essential to check the growing tendency in foreign countries to consolidate for militant export purposes.

## High Tariffs Hurt Exports to Spain

### Output at Hispano-Suiza Plant About 15 Units Each Month

(Continued from page 43)

in Barcelona at present is said to be 100 units per month. It also is stated that orders are booked up for a year in advance and dealers usually tell prospective buyers that it will be necessary to wait a year ahead.

It is evident that the Hispano-Suiza people are counting on an extension of output in the future as they are enlarging their factory and installing more extensive and modern machinery. Stress is laid on the fact that this is the only automobile plant in Spain where all parts from engines to truck bodies are made. There is also an Hispano-Suiza plant for the manufacture of trucks in Guadalajara. It is claimed that the output at present is not more than 15 units per month.

Neither the Renault nor the Fiat, being marketed in Spain, is said to be performing up to former standards. The Germans have recently imported into Santander a light car, the Simpson, selling at 10,000 pesetas. The Germans are also selling an apparently new truck, made by the N. A. G. Co., at 32,000 pesetas. This company also is selling in Spain a 35-hp. type C limousine at 37,000 pesetas, and a smaller car, four cylinder, of 20 hp., at 28,000 pesetas.

Relating to the tire situation, Cunningham said he had been informed that the French give 25 per cent commissions on sales prices. In view of the fact that more costs are borne by dealers representing American cars than the French, freight, commission, pilferage, interior freight, etc., it seems that American concerns should give more liberal instead of less liberal terms.

The French, of course, enjoy a great car advantage in that they are able to run their cars into Spain instead of shipping them by boat or rail. The commission of English cars is usually from 15 to 20 per cent. Some American car dealers, it is said, give better commissions. The disadvantage to American sales is apparent when it is remembered that in many of these cases agents who sell American cars also sell French or German makes, and it is naturally to their interest to sell the car which will yield them the largest commission.

#### Payment Terms Too Rigid

There is quite a general complaint against the rigid terms of payment demanded by American automobile makers. It is said that the usual terms now are cash against documents or a guaranteed credit at a local bank for siting fund in New York when the automobiles are shipped. This, the dealers state, is not sufficient to compete with the French, who are now granting 90 days after the cars arrive in the dealers' hands, and the

larger makers of France are even willing to give an extension of time.

Another criticism which is made of American tire and automobile manufacturers is that they do not assist in bearing the burden of advertising.

Early in March Mr. Cunningham, the commercial attache at Madrid, cabled the Bureau of Foreign and Domestic Commerce that a Royal Decree would be issued about March 20 lowering the present high duties. This was to be done, he declared, in order to restore the industry to something like its previous magnitude, as it was realized that the new rates were too high. However, a few days later, on March 13, he cabled again that internal conditions in Spain were such that the decree would be postponed until a later date. No further information concerning the subject has been received at New York, but the hope was expressed that the duties would shortly be decreased.

## Tire and Rim Men Want Change in Disk Wheel

NEW YORK, July 6—The Tire and Rim Association is endeavoring to induce disk wheel manufacturers to design their wheels in such a manner that tire valves will be accessible from the outside of the wheel. It is thought that because of the necessity of inflating disk wheel tires from the inside, tires have suffered through under-inflation.

The regular semi-annual meeting of the Tire and Rim Association will be held at its Cleveland headquarters July 27.

Members of the Tire Manufacturers' Division have been requested to advise the association of their views respecting the desirability of quarterly meetings being held in addition to the regular monthly meetings of its executive committee.

## Cadenhead Rim Nears Early Production Date

BIRMINGHAM, ALA., July 2—The Cadenhead Auto Rim Co., Inc., has completed its 10-inch rolling mill, or guide mill for the patented rim making works, and the machinery is being placed. It is expected operation will be under way in July, some delay having been encountered. The first date set for the beginning of operations was in May. The patented rim will be manufactured complete in the local plant, which is located at Tarrant City, a suburb of Birmingham. The steel billets for the rolling mill will be purchased in Birmingham and worked up in the plant.

The rolling mill is 60 x 120 ft., and the rim plant, 60 x 160 ft. It will have a capacity of 3000 rims per day. Rims for both passenger automobiles and trucks will be manufactured. Between 40 and 45 men will be employed in the first unit of the plant, and as soon as the first one is well under operation work will be started on another.

## METAL MARKETS

It is obviously by amicable arrangement that market leadership has for the time being come to be vested in the "Independent." Announcement by the chief "Independent" interest of a downward revision in prices, which was made on Tuesday, was followed by a similar proclamation issued by the Corporation on Wednesday. The Corporation's monthly unfilled tonnage statement, which will be issued on Saturday, will undoubtedly reveal a further shrinkage in its backlog of orders. The cuts announced are nothing more than a process of clothing what for several weeks have been market prices in the garb of official quotations. The Corporation has not been selling any steel at its official prices for some time and has been meeting competition wherever any desirable business offered. The steel market has never been more demoralized than it has been in the past few weeks, and it remains to be seen whether these revisions in prices will raise its morale. It is amazing how quickly the lustre of a set of prices wears off once it becomes obsolete in practice. While the Corporation adhered to the Industrial Board's schedule and "Independents" exacted fat premiums, every steel buyer in the country knew the Corporation's prices by heart, whereas its late official prices have been all but forgotten. Step by step, however, the market is coming nearer to a return of stabilization, and as demand for the present is negligible buyers can well await further signs of such stabilization, meanwhile covering their requirements by less than carload lots, which appears to be about all the business in sight. Producers are giving their principal attention to further downward adjustment of wage scales. At least one of the "Independents" has fallen away from the Amalgamated Association and is seemingly prepared to go on an open shop basis. Others are continuing further negotiations with the union at a meeting in Columbus, Ohio, this week. The union sheet mills are closed. The concessions asked by the mills are of minor importance and pertain to efficiency rather than to wages.

**Pig Iron.**—Automotive foundries, if buying at all, confine themselves to small tonnages, many of which they are able to pick up at concessions in the resale market.

**Steel.**—Were it not for a desire on the part of many mills to afford their employees an opportunity to work at least part time, they could save money by shutting down. The leading low-priced passenger car maker is said to be buying very little in the way of sheets, but has placed additional orders for bolts and nuts. Prices appear to be absolutely at buyer's mercy.

**Aluminum.**—It would seem that with knowledge of the aluminum tariff recommended by the Ways and Means Committee, 5c. a pound on ingots (as foretold in this column) and 9c. per pound on sheets, somewhat more interest on the part of buyers should develop in the course of the next few weeks. While newspaper opinion leans to the view that there will be a marked difference between the committee's recommendations and the law that will be passed, there will be those who will want to provide against any contingency.

**Magnesium.**—In view of the fact that quite a little magnesium is used in pistons and as an alloy in die-castings, the proposed duty of \$1 a pound is attracting considerable attention.



## FINANCIAL NOTES

International Motor Truck Co. reports sales to June in excess of 2400. This is at the rate of 70 per cent of last year's business. Net quick current assets are in excess of \$20,000,000. Cash is over \$3,500,000, while notes and accounts receivable are in excess of \$5,000,000. Inventories have been reduced more than \$3,000,000 since January and will be reduced still more during the next three months. Commitments for material are very slight and only for current requirements.

Timken-Detroit Axle Co. reports sales running at approximately \$1,200,000 a month. Normal business is about \$35,000,000 annually. Since January 1 inventories have been reduced from \$10,900,000 to about \$9,500,000. Bank loans were cut from \$3,000,000 to \$1,200,000, but \$1,000,000 one year notes were sold.

Kelly-Springfield Tire Co. will pay quarterly dividend of \$2 a share on its 8 per cent preferred stock August 15. A quarterly stock dividend of 3 per cent will be paid on the common stock of the company, in common stock, on August 1.

McCord Mfg. Co., Inc., reports an increase in its cash balance to well over \$500,000, as against \$100,000 in February, 1921. It was said the company had sold a large amount of radiators into which it had put copper costing 24 cents a pound.

Malbohm Motors Co. has been granted a judgment of \$14,000 against the Sandusky Chamber of Commerce as the 1921 installment of \$100,000, the Chamber agreed to pay provided the company moved its plant to Sandusky.

Handley-Knight Co. has had approved by the Michigan Securities Commission its \$200,000 issue of first mortgage 7 per cent convertible gold bonds. They are dated April 1, 1921, and run fifteen years.

Studebaker Corp., with a total production in June over 8000, will give the company the biggest quarter by far it has ever had. Studebaker should top 25,000 cars in the third quarter if present conditions continue.

American Motor Body Co. reports net profits of \$269,457, after interest and Federal taxes, for the period from August 11 to December 31, 1920. Sales during this time amounted to \$8,523,875.

Federal Motor Truck Co. paid a dividend of one-half per cent (5c.) on July 1. The last previous payment was 1 per cent on January 1, 1921.

## INDUSTRIAL NOTES

American Forging & Socket Co., Pontiac, Mich., reports that after several months of idleness, in which the plant was almost wholly inoperative, it is now going strong and experiencing a steadily increasing demand for products. At present operations are about 60 per cent of normal.

C. G. Spring Co., Kalamazoo, Mich., is now working 75 per cent of capacity to keep up on orders for automobile bumpers. Several large contracts have recently been taken on, while the replacement business is growing rapidly.

H. L. Hess Co., Philadelphia, has been appointed representatives for the Mueller Metals Co. of Port Huron, Mich., in Eastern Pennsylvania, Delaware, Maryland and Southern New Jersey.

Alvord Reamer & Tool Co. of Millersburg, Pa., now has branches in the following cities: New York, Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, Louisville and San Francisco.

Cleveland Tractor Co., Cleveland, has moved its Atlanta office to larger and more pretentious quarters at 254 Peachtree Street. S. A. McGonigal is in charge.

Winton Co. is operating at 30 per cent capacity and orders are gaining, President Winton reports.

Goodyear Tire & Rubber Co. will increase production to 3500 tires a day at the Los Angeles plant.

Greenfield Tap & Dye Corp. four plants at Greenfield, Mass., will be closed until August 1.

New Plea to Creditors  
Made By Oklahoma Firm

MUSKOGEE, OKLA., July 5—The Oklahoma Automobile Manufacturing Co., which asked unsecured creditors early in the year to accept 25 per cent of their claims in full payment, now has notified creditors that it is unable to make good on this offer, but that it is in a position to pay 20 per cent. It is said that by the hardest kind of work the management has raised about \$88,000, but is unable "to raise another dollar." This is sufficient to pay only 20 cents on the dollar. The letter says the receiver is selling no trucks whatever and is unable to collect installment notes taken in payment for trucks. Collections are so small that they are not sufficient to continue operations even on a very small scale. Creditors are informed that if they fail to accept the offer made, the company will be thrown into bankruptcy.

Gorrell Takes Over  
Marmon Sale on Coast

SAN FRANCISCO, July 5—One of the most important announcements made in the automotive trade of northern California in June was that of an almost complete change in the personnel of the local division of the Al. G. Faulkner Co., Marmon distributors for California, Nevada and the Hawaiian Islands. Colonel E. S. Gorrell, formerly in charge of merchandising for Nordyke & Marmon, Indianapolis, becomes manager of the San Francisco branch, and brings with him W. E. ("Bill") Combes as sales manager. Colonel Gorrell, who is a graduate of West Point, began his service in 1914 as a flier in the aviation section of the Signal Corps and finally became chief of staff, A. E. F. He was awarded the Legion of Honor by France, the D. S. C. by England, and the prized Distinguished Service Medal by the American Government. During the spring of 1920, Colonel Gorrell resigned his commission and turned his attention to sales promotion with the Nordyke & Marmon company. His combination of engineering, merchandising and general business experience won for him the San Francisco post.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, July 7—While the industrial situation still had a depressed aspect as the half-year closed, the credit situation, as reflected in the bank figures, encouraged the feeling that the basis was being laid for a substantial return to normal conditions. The New York Federal Reserve Bank last week again showed the remarkable improvement which has been characteristic of recent weeks. The ratio of total reserves to deposit and Federal Reserve note liabilities combined increased from 68.9 per cent to 70.7 per cent, the highest since the summer of 1917. The ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, increased from 103 per cent to 106.7 per cent. This improvement in the reserve ratio was largely the result of a \$23,341,000 increase in gold reserves, which was in turn largely due to further gold imports.

The Federal Reserve System's ratio of total reserves to deposit and Federal Reserve note liabilities combined increased from 60.4 per cent to 60.8 per cent, the highest since 1918. Gold reserves increased \$11,443,000 and total reserves \$5,453,000. In spite of a decline in bills discounted secured by Government obligations, total discounts increased \$17,599,000. Total bills on hand, however, increased only \$9,712,000, while total earning assets declined \$21,908,000. Total deposits declined \$11,459,000, and Federal Reserve notes in circulation \$4,844,000.

The local call money market took on a slightly firmer tone the latter part of the week. The range for the week was 5 per cent to 6 per cent, as against 5 per cent to 5½ per cent the previous week. On Monday a uniform rate of 5 per cent was quoted, and the following two days 5½ per cent was the renewal rate; but on Thursday and Friday a uniform rate of 6 per cent was quoted. This firmness was due apparently to preparations made for the middle-of-the-year's settlements and to Government withdrawals. The time money market was unchanged at 6½ per cent for 60 and 90 days' and four months' paper, and 6 per cent to 6½ per cent for five and six months' paper. There was a small supply of loanable funds, and quotations remained nominal. The commercial paper market was unchanged.

Business failures for the month of June showed a decline, the number of failures at 1290 being the lowest for any month since November, and compare with 1356 in May, and 1895 in January. They are, however, far above the 674 failures reported for June, 1920. The liabilities involved were also much smaller than for the previous month, the respective figures being \$31,987,313 and \$57,066,471. The liabilities were also the smallest for the current year.

## NEW CAR PRICES

Packard Cuts Prices  
on Cars and Trucks

DETROIT, July 5—New prices on Packard single and twin-six models as now effective, place the single-six coupe and sedan at \$3,750 and \$3,975, reductions respectively from \$4,150 and \$4,250. In the twin-six the open models are reduced from \$6,000 to \$4,850 and the coupe and sedan from \$8,200 and \$8,450 respectively to \$6,600 and \$6,800. The limousine is reduced from \$8,350 to \$6,650, and the chassis from \$5,300 to \$4,200.

On trucks model EC is reduced from \$3,700 to \$3,500, ED from \$4,450 to \$4,100, EF from \$5,550 to \$4,500 and EX from \$4,200 to \$4,000.

Oldsmobile Revisions  
Include All Models

NEW YORK, July 1—Price changes announced on the various models of the Oldsmobile, effective July 2, follow:

	Old Price	New Price
<b>Four-cylinder</b>		
Roadster .....	\$1,445	\$1,325
Touring .....	1,445	1,345
Coupe .....	2,145	1,895
Sedan .....	2,145	2,100
<b>Light 8-cylinder</b>		
Touring .....	1,695	1,725
Coupe .....	2,395	2,225
Sedan .....	2,395	2,425
<b>Big 8-cylinder</b>		
Touring .....	2,100	1,825
Touring 7-passenger ..	2,100	1,875
Sedan .....	3,300	2,775

90-Day Guarantee Given  
By Mack Against Cutting

NEW YORK, July 5—The International Motor Truck Corp., manufacturers of Mack trucks, has decided to give a running guarantee of 90 days to both dealers and purchasers against price reductions. No time limit has been set upon the period during which this guarantee will be given, but it can be revoked by the company at any time. All purchasers of trucks in the meantime will be guaranteed except where trade-ins are involved.

## CHAMPION MOTORS MAKES CUT

PHILADELPHIA, July 5—The Champion Motors Corp. announces reductions in the prices of its various models. The special touring car is reduced from \$1,595 to \$1,395; the Champion "tourist" from \$1,250 to \$1,095, and the commercial car to \$1,325.

## WOLVERINE TRUCKS CUT

DETROIT, July 1—In conjunction with the announcement of a new line of trucks, the American Commercial Car Co., manufacturers of the Wolverine truck, have reduced prices on the entire

line from \$50 to \$115. The new line will take the place of the former models, and while substantially the same, will embrace new and distinctive features. The new prices are: 1-ton \$2,125, formerly \$2,240; 1½-ton \$2,375, was \$2,465; 2-ton \$2,640, was \$2,750; 2½-ton \$3,425, was \$3,475, and 3½-ton \$4,100, was \$4,150.

## OAKLAND MAKES SECOND CUT

DETROIT, July 6—Prices on the Oakland roadster and the coupe and sedan were reduced to-day by the Oakland Motor Car Co., the reduction being the second announced by the company since May. The new roadster price is \$1,095, a reduction from \$1,145. The coupe is priced at \$1,625 and the sedan at \$1,725, both formerly being \$1,815. The touring car, which was placed at \$1,145 in the May reduction, remains at that price.

## EXCELSIOR CUTS PRICES

CHICAGO, July 2—The Excelsior Motor Mfg. & Supply Co. announces new prices on Henderson and Excelsior motorcycles. The electric equipped Excelsior is reduced from \$480 to \$400 and the electric equipped 4-cylinder Henderson from \$585 to \$485.

## REDUCE VELIE MODELS

MOLINE, ILL., July 5—New prices are announced on various models made by the Velie Motors Corp. The model 48 touring car is reduced from \$1,855 to \$1,595; the model 34 touring car from \$1,485 to \$1,385; the model 48 sedan from \$2,885 to \$2,485; the model 34 sedan from \$2,485 to \$2,085, and the model 34 roadster from \$1,485 to \$1,385.

## CLYDESDALE PRICES CUT

CLYDE, OHIO, July 7—Prices on Clydesdale trucks have been reduced on models from 1½-ton to 5-ton. Model 42, 1½-ton, is cut from \$2,750 to \$2,475; Model 65, 2½-ton, \$3,540 to \$3,250; Model 65E, 2½-ton, \$3,775 to \$3,450; 3½-ton, \$4,400 to \$4,100, and 5-ton, \$5,500 to \$4,500.

## CASE DOWN \$400 TO \$500

CHICAGO, July 9—Prices on Case Motor cars have been reduced from \$400 to \$500 on all models. The touring and sport models have been reduced from \$2,650 to \$2,250, the coupe from \$3,400 to \$2,900, and the sedan from \$3,750 to \$3,285.

## Goodyear Cotton Mills

## Resumes Manufacturing

DANIELSON, CONN., July 2—The Goodyear Cotton Mills, Inc., one of the leading industries of this section, engaged in the manufacture of tire fabric, will be reopened Tuesday morning on a one-shift working schedule of 40 hours per week, according to Vice-President P. W. Litchfield this week. The plant was closed 10 months ago and since has not turned a wheel.

On a one-shift 40 hours per week schedule, the plant will be on a basis of about 25 per cent of the production that was being turned out last summer.

## MEN OF THE INDUSTRY

E. A. Sattler, until recently director of sales of the Howe Rubber Corp., New Brunswick, N. J., and Theodore Weigle, formerly assistant sales manager of the same company, have taken over the sale of the entire output of the Eckrode Rubber Company, Inc., of Newark, of which Clement E. Eckrode is president. Sattler was elected vice-president of the company at a meeting of its board of directors several days ago. Sattler and Weigle are organizing for national distribution before the year's end.

Harry W. Walters has been named sales manager of the Herring Motor Co., Des Moines, to succeed N. W. Lovegrove, resigned. Mr. Walters has been with the Herring organization for nine or ten years, starting in a minor capacity, and for the past three years has been assistant sales manager. Walters has been elected to the place on the directory board of the Motor Trades Bureau of the Chamber of Commerce, made vacant by Lovegrove's resignation. Mr. Lovegrove has not announced his plans.

Charles B. Shanks, for more than six years manager of Motor World, has become associated with the Anderson Motor Co. of Rock Hill, South Carolina, manufacturers of the Anderson Six. He will appear on the official roster as vice-president of the corporation and will give principal attention to sales, advertising and service. Prior to Shanks' connection with the Class Journal Co. he was for ten years sales and advertising manager of the Winton Motor Car Co. of Cleveland.

George R. Morris has resigned as manager of the Chevrolet New York retail store to join W. C. Sills, former sales manager of Chevrolet, in the distribution of that car in the New England district. Harry Horton who has been manager of the Providence retail store will succeed Morris in the New York managementship.

Birger Jacobsson, formerly vice-president of the J. B. Crockett Co., New York, has resigned, and is now in the same kind of business with his own company, of which he is the president, with head offices at Stockholm, Sweden. His address is Birger Jacobsson Company, 11 Kardunsmakaregatan, Stockholm.

W. J. Drumpelmann, assistant sales manager of the Hudson and Essex for the last four years has resigned. He was formerly in the sales department of the Chalmers Motor Co. for three years. He has not announced his future plans.

H. M. Wirth, purchasing agent of the Kelsey Wheel Co., has severed his connection with that organization and is succeeded by Arthur Conklin who for two years was assistant to Wirth and for ten years with the company.

P. L. Emerson, assistant sales manager of Reo, has been transferred to San Francisco where he will take charge of the Reo branch.

## RECEIVER ASKED FOR FIRM

KANKAKEE, ILL., July 2—Dissolution and receivership of the Kankakee Automobile Co., and enforcement of directors' and stockholders' liabilities, were asked in the Kankakee, Ill., Circuit Court June 30. The company was alleged to have violated State laws and was never developed beyond the promotion stage.

# Calendar

## SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair, conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28-Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park, Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

## CONVENTIONS

Oct. 12-14, 1921—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## RACES

July 25—Grand Prix, Le Mans.

Labor Day—Uniontown, Pa., Autumn Classic.

## Tommy Milton in Durant Wins Tacoma Sweepstakes

TACOMA, July 4—Before a crowd of 30,000 Tommy Milton in a Durant Special won the \$25,000 purse in the 250 mile event in the tenth annual racing meet here to-day. He finished the 125 laps in 2:34:15. Roscoe Sarles was second in a Duesenberg Special. The time was 2:34:52. Rene Thomas was third. His time was 2:38:47. Eddie Hearne in a Revere Special finished fourth; Tom Alley, Frontenac Special, fifth; Edward Miller, Duesenberg Special, sixth.

Eddie Pullen and Elliott, the former in a Duesenberg Special and the latter in a Leach Special were flagged from the course at the 100th lap. Elliott was off to a poor start. Soules led the field for the first fifty laps but was forced out in the sixty-first when he burned out pistons. Alley was forced to the pits in the fifty-eighth because of his left rear and again in the eighty-fifth.

Pullen drove a slow race because of pre-ignition troubles. Thomas changed to the rear in the eighty-fifth. Then Hearne followed suit in the eighty-eighth. Alley went to the pits again in the ninety-eighth because of his right rear.

The last twenty-five laps was a battle between Milton and Sarles, Milton passing the Duesenberg in the 105th. Elliott went to the pits in the 119th with left rear trouble. Milton averaged better than 98 miles and broke the record of 1920, adding 500 points to his year's record. Rickenbacker refereed with Harroun driving. A Marmon was pace-maker.

The weather was ideal for racing. Entertainment was provided by massed bands under the direction of the American Legion.

## Milwaukee Plants Hold "Model Factory Picnic"

MILWAUKEE, July 2—A "model factory picnic" was held Saturday, June 25, at Waukesha Beach, Pewaukee Lake, west of Milwaukee, by special co-operative arrangement among the biggest in-

dustries of Milwaukee for the edification of nearly 5000 social workers attending the national conference in Milwaukee, June 22 to 29. Each year the industries individually give outings for employees, usually at Waukesha Beach, the largest resort for this purpose in the vicinity.

A. Holmes of the Cutler-Hammer Mfg. Co. functioned as general chairman of the picnic committee. He was assisted by L. H. Fountain of A. O. Smith Corp., A. E. Borgeson of Avery Co., H. C. Best of National Brake & Electric Co., L. G. Meisenheimer of Globe Seamless Steel Tubes Co., E. H. Fitzgerald, Federal Rubber Co., and others.

## Commercial Haulers Want Parts Service Stations

MILWAUKEE, July 2—A resolution condemning the action of manufacturers of assembled trucks in opposing the establishment of parts service stations throughout the country by makers of unit parts was adopted by the National Association of Commercial Haulers at its annual convention which closed here to-day. The organization will do all it can to foster the service station idea.

Joseph X. Galvin, president of the National Team & Truck Owners' Association, addressed the members and told them he had come to the convention to urge amalgamation of the two associations. A resolution favoring such action was adopted but the actual working out of the details was left to the officers and executive committee.

F. J. Alvin, manager of the United States Motor Truck Co. of New York, which is headed by former Governor Alfred E. Smith, informed the convention that he had come to Milwaukee to pledge the assistance and support of his company to the association.

It was decided to separate the office of manager and secretary, both of which have been held by C. R. Collins of California. Collins will remain as manager while Tom Snyder of Indianapolis, who is secretary of the Indiana Transfermen's Association, will become secretary of the National Association.

One of the resolutions adopted favored passage of the Townsend highway bill.

## Sheet Metal Makers Form Group in M.A.M.A.

NEW YORK, July 6—The Sheet Metal Manufacturers' Association decided at a meeting in Detroit last week to dissolve and continue its work as a group of the Motor & Accessory Manufacturers' Association. It will be the first of many similar groups to be formed within the M. A. M. A. and the decision to dissolve will be followed by several other organizations of manufacturers engaged in the same line. The first group contains some of the leading sheet metal workers in the United States who do an automobile business.

The purpose of the various groups will be to discuss subjects of interest and value to the particular division or branch of the industry in which the members of the group are engaged; to advance and improve the entire industry as well as the particular branch represented; to collect and disseminate statistics and information of value to members; to promote such standardization of mechanical equipment, production methods and commercial practices as may be deemed desirable; to promote a spirit of friendly aid and co-operation within the groups and also with other groups in the industry. It is believed such co-ordination of effort by manufacturers with practically identical interests will largely increase the value of the M. A. M. A.

The affairs of the sheet metal group will be directed by an executive committee headed by H. P. Carrow.

## WILMINGTON ADDS EQUIPMENT

WILMINGTON, DEL., July 2—The directors of the department of Public Safety will soon place orders for about \$108,000 worth of motorized fire equipment. The department, which was recently created, expects to take over the bulk of the equipment of the volunteer fire department, in connection with the proposed new paid department, which will be under its care after Sept. 1. The local equipment to be bought is valued at about \$115,000, but it is not enough, hence the desire for additional equipment. The department is having the advice of former Chief Croker.



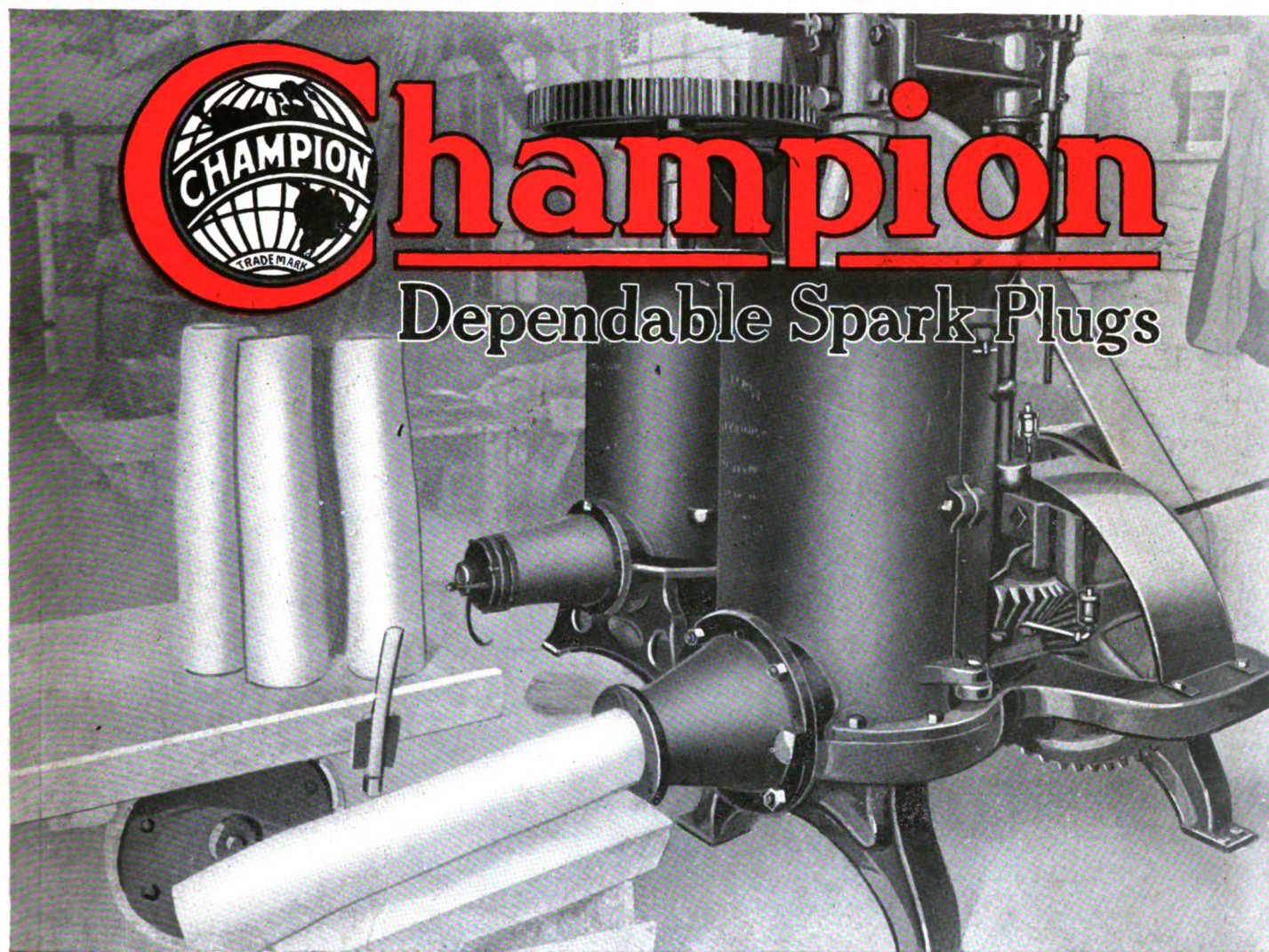
# AUTOMOTIVE INDUSTRIES

## & AUTOMOBILE

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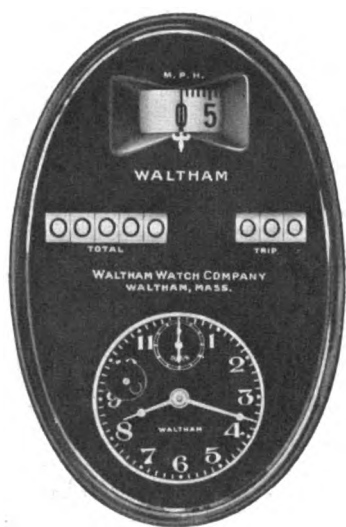
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# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLV

NEW YORK—THURSDAY, JULY 14, 1921

No. 2

## Automotive Business Survives Adversity in North Dakota

Despite the elimination of farmer from new vehicle market and handicap of "no credit" attitude of the bankers, cars are running, dealers are keeping sales-rooms open and are well set for the certain revival.

By David Beecroft

**W**HETHER the Non-Partisan League, the general business depression, the high price of agricultural machinery and living in general, or the adamant policy of the banker, is directly responsible for the present mental attitude of the North Dakota farmer, the fact remains that he has been practically 100 per cent out of the automotive market since September, 1920, and will not be a buying factor during the remaining months of this year. In fact, it probably will be the spring of 1922 or mid-summer when the farmer is quite certain of 1922 crop figures that he is coming back into the purchasing field in anything like what may become his new standard of buying.

The North Dakota farmer is in anything but a favorable mental attitude toward buying, nor have the big branch houses of the agricultural machinery manufacturers been stocked from basement to roof as this year. Threshing machines and, in many cases, farm tractors fill loading platforms and stations, etc. The farmer is temporarily out of the machinery market. Sales are not 10 per cent of former averages in many sections. Tractor sales are best described as nil. The prospects of a fair crop over the entire State, and particularly in the western part, where there has not been a good crop since 1916, may result in a good sale of threshing machines and a few other necessities, but barring this the farmer is not buying

nor is he going to buy if he can help it. He is buying repair parts and doing his own repairing, but he is not purchasing new equipment.

Not only is the farmer sore at the continued high prices of agricultural machinery, but he is ill-tempered all along the line. Last August and September his Non-Partisan League friends urged him not to sell wheat when he might have realized \$2 or \$2.50 per bushel, and later he sold this wheat at \$1.40 or less, if he has sold. The value of everything he had to sell fell so that the index figure for farm products scarcely stood at 117, crops 109, livestock 109, while building material stood at 202, clothing at 181, house-furnishing goods at 262 and fuel and lighting at 194, and metal products at 138.

He cites that his products are not moving to the markets, and that index figures for the movement of his commodities stand far below par, namely, grain and grain products, 91, livestock 80. Farm products are at a low price. Eggs never sold cheaper in the State than they do at present. The North Dakota farmer is not complaining about the present low prices of farm products. He put his crop in at the lowest price basis possible this year. He is satisfied with the present price of wheat and is fully convinced that he can make good money out of his crop, but he is not satisfied with the price of farm machinery. Most of these farmers have no money with which to buy if

the prices were lower, but the almost complete stagnation of sales cannot be entirely laid to the shortage of money.

The tractor demonstration held during three days two weeks ago at Fargo, N. D., exemplified the North Dakota and western Minnesota farmers' state of mind. Twenty-six tractor makers exhibiting 46 tractors and eleven six- and eight-horse plowing outfits staged a 3-day plowing and seeding demonstration and covered the State with publicity, but the farmer stayed at home. On what should have been the biggest day, only 375 motor cars, outside of official cars, were counted at the busiest time of the day. They averaged three persons per car, a grand total of farmer attendance of 1125. Some farmers who were visited after the demonstration was over, said they would not wear out tires, or burn gasoline or buy railroad tickets to see a tractor demonstration this year. Some of them have not the money for railroad fares, or gasoline, and have to conserve their tires.

Yet North Dakota is sound financially. The best bankers in the State declare it is in better condition than many other States that profited by the war, and as a result shared in the inflation and over-expansion, and now must deflate. North Dakota was denied credits, largely due to the Non-Partisan League reputation and activities. In the sale of automotive apparatus very few of the big financing corporations continued to do business in the State, even the General Motors Acceptance Corporation withdrew from the State a year ago.

North Dakota lands have not increased in value. You can get the best land in the State, well improved, at \$40 and \$50 per acre, excepting in one or two sections very close to the larger cities. There is none of the \$500 inflated values of Iowa. In all lines of business, credit was denied during the war and you see no evidences of over-expansion or over-inflation. There is consequently no deflation problem ahead so far as industries in the State are concerned. Farmers in the western part of the State that did not have a good crop since 1916 have not had much chance at war profits. The eastern half of the State has had a good crop each year. The Red River valley occupying the east end, has never missed a crop, but has been subject to the same restrictions of credit that have affected the remainder of the State.

#### State of Mind Typical

The North Dakota farmer's state of mind can perhaps be considered as typical of the state of mind of farmers in many agricultural states, particularly those which depend largely on one crop, such as wheat, corn, cotton, tobacco, sugar, rice, etc. While the North Dakota farmer has not made the money that the farmers of other states have made, he has not the deflation and the North Dakota farmer is to-day perhaps a year ahead of the farmers in other states. As such, his state of mind is a good one to analyze and his State will serve as a mirror in which we may see conditions a year or 18 months hence as they may be in states that profited by war and inflation and are not yet through the deflation program.

The banker of North Dakota has made the farmer more or less what he is. The banker to-day, without reservation, refuses the farmer credit. He will give him no credit to buy a tractor. It makes no difference how many acres the farmer has or whether the land is free of mortgage or not. The banker has his one rule and one rule only, and that is not to lend. He will not handle farmers' notes for cars, or trucks, or tractors, or isolated houselighting plants, or any kind of agricultural machinery. He has only one line of advice to the farmer, viz.: "Get along with the old, repair it as necessary, but do not buy any new equipment."

Here is a typical example: A farmer in the eastern end of the State who has 320 acres of good land without mortgage and has owned it for 30 years and who, in addition, has \$32,000 of his savings loaned in mortgages, etc., wanted to buy a \$1900 car and asked his banker to carry his notes in payment of his car until fall. The banker refused. The car distributor took the notes and is carrying them in his own vault. The bank would not discount them.

This is the general attitude of the bankers of the State. The bankers in such cities as Fargo, 22,000; Grand Forks, 15,000; Devils Lake, 5000; Minot, 8000; Bismarck, 6000, and Jamestown, 5000, have funds, but will not lend them. The bankers in the smaller towns and villages have no funds and could not lend if the spirit were willing.

The bankers' attitude has not been improved by the fifty banks that have closed in the last few months, many of them just waiting until crops move and they can get some money from the farmers and re-open their doors. Some of them will not re-open.

#### He Could Sell

The bankers' attitude has engendered a reaction with farm implement dealers, agricultural machinery branch houses and automotive dealers. One of the biggest of the agricultural machinery manufacturers expressed it best:

"I could sell tractors and grain binders if I would take 3-year notes, but I refuse. I am not going to harvest this year's crop for the banker and that is what I would be doing if I sold a grain binder and accepted 3-year notes. The banker is going to take this year's crop. He took one-half of last year's crop and will, if he dares, take all of this year's crop. Let the banker handle the 3-year notes of the farmers for the tractor, or the grain binder, or the threshing machine. Let him harvest his own crop. This banker has a crop mortgage on a great many of the farms. He has had such crop mortgages for years, but he rarely had to execute them. He executed a few last fall, but has given notice he is going to execute many this fall. He is going to get his pound of flesh. This same banker must be careful he does not kill the goose that lays the golden eggs. Machinery is necessary to harvest crops as well as to seed them, and it is hoped the banker will see the error of his ways if he refuses too long to finance the farmer in harvesting a crop now when he has one worth harvesting."

This epitomizes the general situation in the State. This answers the question why tractors have not been sold this year in sections where many were sold previously, although agricultural conditions are best fitted for tractor use. This tells why tractors have not been used this year; due to shortage of money to buy fuel and the fact that the farmer has horses, that oats are cheap and the banker has told him to use what he has and not buy even kerosene.

From June 20 to July 20 is a period of coma in business cessation in North Dakota. This is the month of crop making or breaking. Business literally stops during this period. The farmer will not buy anything. The banker will not lend. The business man waits. By July 20 the prospect for a crop will be definitely known. The future is uncertain until about July 20. Hot winds before that date may burn the crop white in three days. More crops are ruined in North Dakota in July than any other time. When July 20 is passed and the banker knows what the crop is to be, he is a new man. He is in a position to make loans. He has a definite line on

the business for the next twelve months. The motor car dealer has a knowledge of what he can sell. The farmer has laid his plans. The biggest banker in North Dakota said last week he would discourage a farmer buying anything until the crop for this year is definitely known. He would handle no notes on tractors, trucks, cars, farm machinery or anything else going to the farmer. After July 20 he might make loans if crop prospects are good, and he will not make loans if crops are poor and the farmer has to be financed for another year.

But in spite of all this the North Dakota motor car dealer has carried on. Mortality in his ranks has been amazingly small. Very few sub-dealers have closed shops. The distributors are nearly all in business. The distributor in Fargo, Grand Forks, Devils Lake and Minot tells you his sales are all in the city, none in the country, and yet his country dealers have not gone out of business. They all have repair shops and garages. They sell gasoline, oil, tires and the necessary repairs and accessories. They have reduced overhead to the minimum. They repair tractors, isolated electric lighting plants, trucks, cars, in short, everything that has to be repaired, but they do not sell cars.

#### Salesrooms Open

Many of them have withdrawn their deposits with the distributors and technically may not be dealers in any particular make of car, but they still have their place of business and are operating. They are ready to go when business revives and the farmer comes back. L. C. Eby Buick distributor in Fargo, cites the case of a dealer in Lisbon, a town of 1800 population in the eastern end of the State, who has not yet taken a 1921 demonstrator, but he is still in business and is healthy and hopeful. Eby has 75 dealers, only 25 of whom have not withdrawn deposits. S. Welch, manager of the Dodge Minot agency, has 58 dealers and they all have garages and repair shops, although this year only two Dodge cars have been sold in the territory. The Overland distributor at Grand Forks, in the eastern end of the State, has 100 dealers, all of whom are in business, but few cars are being sold and sales for the district are scarcely one-twelfth that of a year ago. E. J. Siverson, Studebaker distributor in Grand Forks, with 45 dealers, reports them all in business, although practically all Studebaker sales are in Grand Forks. Mr. Hurst, manager of the Nash agency, with 14 dealers, has only three that have left up deposits, but they are all still in business. Dealers in Devils Lake tell the same story of no country sales and only city business. C. D. Haley, Studebaker dealer for 11 years, has only city sales, but a good country dealers' organization. There is not one of these country dealers that could not sell motor cars if farmer's notes could be handled. The spirit to buy is as strong as ever, but finances are weak.

Motor car dealers in cities, towns and villages of western North Dakota have learned how to live and carry on under the hardest severest school of training—necessity. They have been thoroughly tested and tried. They are happy. They have nothing to worry about. The prospects this year are good. They have learned how to do business without assistance of banks. These dealers are all set for the future. They have come through it all. They know how to convert part of their sales building into a garage and carry the overhead charges. They know how to handle two or three tire accounts and make dollars that way. Some of them have sold tractors for years and know why money can be made from farm machinery. They have practically gone on a cash basis for repairs and have learned how to say no when credit on parts or repairs is asked. They had to finance them-

selves and did not stock up on used cars. Had banks given them liberal credits they might find themselves stocked with used cars or with too big buildings on their hands or suffering in other ways from over-expansion. The credit to make such possible was denied and they are better dealers for it.

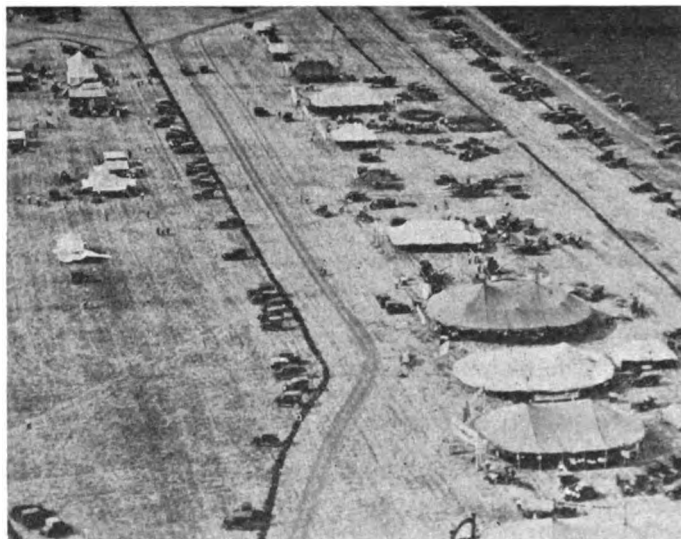
The strenuous character of the times is working a change for the better in many ways. Tire companies that attempted to maintain branches in some cities of 5000 population have closed them and put the tires on sale through dealers. This is becoming general. Some car dealers handle two or three lines of tires. There was not business to warrant a tire branch organization. Tire companies are giving discounts as high as 25 or 28 per cent and the car dealer sees prospects of making money on a tire account, particularly if he is a good merchant and turns his tire stock over six times a year, as he should. The tire companies will maintain warehouse stocks in different centers, but even the number of these can be kept low.

In western North Dakota you do not hear a dealer say he cannot handle different lines, such as cars, trucks, tires, tractors and isolated house lighting sets. He has learned how to do it and also to conduct a garage and repair shop besides. Necessity is ever the mother of invention and holds practically the same relationship to the automotive dealer. No dealer throughout North Dakota or Montana has much of a tire stock on hand. It never was lower. Dealers buy in small quantities. At present mail-order houses, such as Sears-Roebuck and Montgomery Ward & Co., are doing considerable tire business and their lines are cheaper than standard makes. The farmer knows this, but he is short of cash and is content to buy a cheaper article to tide him over until the crop comes in. Once the crop is in, leading tire concerns are looking for a big tire business in this area. There is not a car in the territory but is wearing out its old tires and running short on spares and tubes. Money may be short and there may be none for new cars, but all cars are in use. In one or two places you hear rumors of some cars jacked up in garages, but they are few. There are cases of where tires are worn out and there is no money to buy new ones and cars are laid on the shelf. The use of cord tires, even in Fords, has increased in towns and villages very much.

#### Old Tractor State

North Dakota is one of the best and oldest tractor states west of the Mississippi. The 77,000 farms in the State have an average acreage of 360 acres. Few farms are smaller than one-half section, 320 acres, and that is a good size for a two- or three-plow tractor. The land is generally level and the soil heavy. Summer plowing for wheat should be done in July and August, months when the temperature is too high and soil too hard for horses. This fact has sold many tractors.

Tractor sales this year have been virtually nil, whereas last year they were good. In Devil's Lake area, Mr. McCullough of Auto State Co., Ford dealer, has not sold a Fordson this year, but sold several last year, and if crops are good expects to make several sales this fall. C. D. Haley, Studebaker dealer, handling I. H. C. tractors, has sold one this year. In Minot scarcely a dozen tractors of all makes have been sold this year. The same is true of Grand Forks and Fargo. In parts of the State many tractors are not being used for lack of money to buy gasoline or kerosene. Most of the two- and three-plow tractors are in use, but one dealer found only one of twenty-four machines of his make in use in a part of his territory investigated. These machines were generally more than three-plow capacity. The farmer's



Two airplane views of the recent tractor demonstration near Fargo, N. D.

thought in not using the tractor is that he has his horses and they have to be fed. Hay and oats are cheap. He has no money to spend for fuel, oil or repairs.

In North Dakota the farmer bought a tractor to take care of the peak load on the farm, and last winter being unusually mild, he was able to do much more fall plowing with horses than formerly, and so the acute spring peak did not materialize. Still the farmer realizes the value of the tractor, and, as one said, that previous to buying his tractor he was not able to get all his fall plowing done, but the first year he had a tractor he fall plowed some of the land twice and the increased yield, or crop, the first year was worth one-half of what the tractor cost. Many of the farmers and most of the bankers have yet to be sold to the value of the tractor. Unfortunately, the banker fails to realize the economic value of the tractor. He fails to realize that its greatest value is making it possible for the farmer to plow when plowing does most good and to plow deeper and faster and thus increase his yield per acre. The banker to-day is dead against the tractor. He sees it only as a substitute too frequently for the horse. He urges the farmer to use the horse.

Repair business in North Dakota is good. Every car is being repaired and the farmers are doing more repair work than they ever did before. Sales of spare parts are normal and mostly on a cash basis. While in a Ford agency a farmer came in and wanted to buy a new car on time. The dealer would not sell him, but sold him parts for his old car. The frankness with which dealers refuse sales in which credit figures is encouraging. It is stimulating. It shows the good that comes out of depression and crop failures.

Garages generally are carrying reduced stocks of parts, and, as one man put it, "We carry only necessities." They have learned what accessories are needed and what ones are not. Brake linings, spark plugs, piston rings, springs, oils, greases, wrenches, tires, tubes, bulbs are typical of what are necessities. The accessory stocks are generally liquid. The shelves are not groaning under a load. Purchases from jobbers are in small lots. Sales are for cash, except where accounts have been carried for years and where payment is made in 30 days. There are repair shops that have been carrying farmers since last July, but they have gotten tired carrying such a load and, by refusing further credit, have found that the average farmer has some cash available.

Truck sales in North Dakota are largely in the four or

five cities, with a few in the country. Ford and Dodge jobs are finding their way to the farmers, and the Nash dealer in Grand Forks recently sold a truck to a potato farmer living nine miles out. Farmers are coming to realize that when they live ten or more miles from the railroad depot the truck becomes a real instrument.

George Dixon, Reo dealer in Grand Forks, looks for good truck prospects this fall, many of which will be farmers. W. A. MacMillan, manager of the Pence Co., Buick distributor in Fargo, has sold but six trucks since January 1, and not one in the last six weeks.

Most North Dakota roads are black gumbo and the main routes are well graded and dragged. In dry weather the surface is good, but the roads are impassable in wet times. The motor truck appeals to the North Dakota farmer, due to the short season he has for work. His situation is very different from that in Texas and Kansas, where the farmer has long seasons. In North Dakota the ground freezes in October and by that time he must have his fall plowing and threshing done and his grain delivered to market. He has an acute peak period, and the tractor and truck will be two essentials in his prosperity. He must not be allowed to buy too large a truck. From 1-ton to 1½- or 2-ton appear to be best suited. He may want more, but tear a page from the experience of the eastern farmer, who has found that a 1½-ton job is a better investment than a 3-ton job. The small pneumatic tire, not over five inches, has advantages in the country roads over trucks carrying seven- and eight-inch sizes, where the sides are worn out too quickly in ruts.

Sales of isolated house lighting plants have been slow for the past year, and practically none are moving now. Mr. Ashleman, Delco distributor for North Dakota, has recently disposed of his electrical equipment business, such as chandeliers, coffee percolators, bulbs, flat irons, etc. In fact, the Delco policy has been altered in this regard. For a time the sale to the farmer of this equipment was looked upon as a big part of the business, but difficulties developed. The regular electrical supply dealer of the town, who a few years ago did not have any realization of this new industry, has recently seen the possibilities of business and has resented the sale of equipment by the Delco or other dealer. Then, too, the distributor has had the problem of financing his dealers to a large extent in this equipment field. The dealer can now concentrate on sales of lighting plants and a few major equipments, such as pumps, washing machines, etc.

Service on these isolated lighting units has been a problem, and Willys light has reduced the free service period from one year to 90 days. After that the farmer pays at an hourly rate for service work. Some Willys light dealers are discontinuing the sale of miscellaneous equipment and concentrating on the lighting unit. Not all dealers are giving service. In some areas several Delco dealers do not give service and operate on a lower sales discount basis. Service in such areas centers on one large dealer, fitted to give service for the territory. The sale of lighting outfits through hardware stores is waning. Many garagemen and car dealers make good salesmen, and the garageman is especially well fitted to give service.

General conditions in four of the leading centers of North Dakota may be summarized as follows:

**Fargo,** in rich Red River Valley area. Car sales are 20 to 50 per cent of last year, Fords not included. Price reductions have greatly aided sales, which are nearly all in city and few in country. Western part of Fargo territory has had crop failures for two or three years. Over a dozen Fargo dealers, several of the curbstone type, have gone out of business in the last year. Fifty to 80 per cent of sales in Fargo are on time payment. J. D. Grant, accessory jobber, reports accessories selling well in eastern half of State and western Minnesota. He has five traveling men instead of seven. Payments are in 90 days; used to be 30 days. The eastern part of State is sound, but hard up. Over 80 per cent of farmers have motor cars.

**Grand Forks.** City business is good; no business in

the country. Farmers are doing their own repairing. Studebaker sales 85 per cent of last year. Ford sales slightly under last year, but parts sales are 100 per cent. Several new repair shops have started. No truck sales, and many large tractors were not used this year. Price reductions greatly stimulated sales. Dodge and Buick have few sub-dealers out of business. No distributors have quit business. Nearly 90 per cent of the farmers have motor cars.

**Devil's Lake.** Ford sales are practically equal to last year's. No truck sales; tractors slow. Farmers are doing most of their repairing. Studebaker sales in the city are good. Local banks are sound. General business in Devil's Lake is 50 per cent of normal. Farmers are starting to buy trucks. Several dealers sell tractors, along with cars, tires, etc. Farmers in this community are wealthy and own their land. Nearly 100 per cent of farmers have motor cars.

**Minot.** Crop conditions within a radius of 10 miles are poor. Crop burned last week. Thirty-eight banks failed in this territory, which has not had a good crop for five years. Sales are in cities only. Few tractor or farm implement sales are reported. No truck sales. More car sales, after price reductions, than for eight months previously. Repair business was good until July 1, when it became slack. Few sub-dealers are out of business. Firms that sold 20 trucks last year have sold but one this year. Ford sales are ahead of last year, but sales are only in cities and towns. No cars are laid up. Repair business and tire sales are largely cash. Dealers sell tires, accessories, tractors, etc.

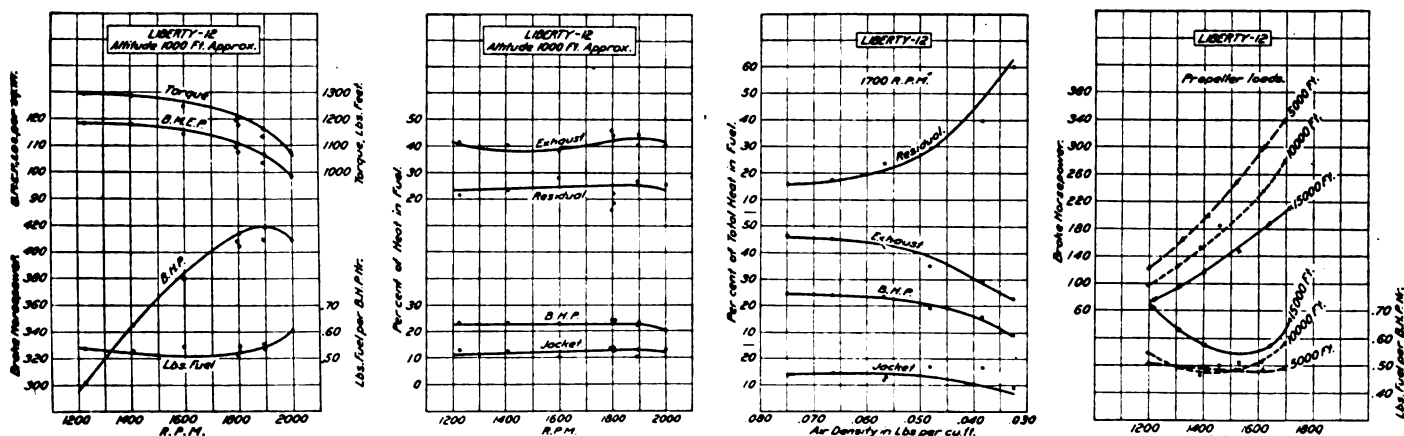
## Performance of the Liberty Engine

**E**XTENSIVE tests of the Liberty twelve-cylinder aircraft engine under varied conditions have recently been made in the altitude chamber of the Bureau of Standards at Washington, and the results obtained published in Report No. 102 of the National Advisory Committee for Aeronautics. The object of the test was to determine the performance of the Liberty engine under such conditions as would yield sufficient information to determine its value for aviation use. A number of the performance charts are reproduced herewith. All the conditions of the tests are indicated on the charts. It may be pointed out, however, that the residual heat is the difference between the heat value of the fuel consumed on the one hand and of the heat equivalent of the horsepower output, the exhaust heat and the jacket heat on the other. This factor therefore includes the heat value of the unburnt fuel. As the fuel requires 15.3 lb. of air per

pound of fuel for its complete combustion and the leanest mixture contained only about 14 lb. of air per pound of fuel, it is clear that some of the fuel must always pass through the engine unburned or only partially burned.

The greatest value of such data as furnished by this test can be realized only by its comparison with similar results obtained with other engines. This not only permits of the engines being judged as to their relative value for a given class of work, but also indicates reasons for superiority in performance of one type over another.

There are two outstanding conclusions, however, to be drawn from the test itself—namely (1) that the carburetor control is inadequate above 15,000 feet and (2) that the most promising line of development for improved altitude performance lies in increased mechanical efficiency through decreased friction horsepower, and in such changes as will prevent the decrease in volumetric efficiency.



Charts showing performance, heat loss, etc., of Liberty aircraft engine under various conditions



# One Four and One Six-Cylinder Chassis Comprise Benz Line

Aside from engine, chassis are practically identical, and possess but few novel features. Transmission brake has provision for water cooling. Steering gear has unhardened screw with non-adjustable babbitt-lined nut. Torque tube and radius rods preferred to Hotchkiss drive.

By Benno R. Dierfeld

**A**T the present time the Benz company is manufacturing two chassis models, a four and a six, of 45 and 70 hp. engine rating, respectively. It is natural that a design with 36 years of experience in the automobile business behind it does not need to be changed very often, hence an annual model is not a feature of the Benz program. The two models here considered are practically identical except as regards the number of cylinders and the rear spring suspension, which latter is of the cantilever type in the six and the half elliptic type in the four-cylinder model.

The engine drives through a cone clutch to the four-speed transmission, which forms a separate unit. The propeller shaft has a single universal joint, and the rear axle is provided with radius rods. The rear axle drive is by bevel gears. Steering gear and control levers are arranged on the right-hand side. One brake acts on the transmission, the other on the two rear wheels. The frame is in-swept at the front and has a kick up at the rear. The fuel is pressure-fed from the rear tank.

The L-head cylinders are cast in pairs as will be seen from Fig. 1. The valves have aluminum cover plates and the camshaft is driven by an easily adjustable chain which also drives the high tension magneto. The starting motor and generator are mounted on cast brackets on the crankcase arm. The water pump is driven by the same shaft as the magneto. Carbureter air is pre-heated in a sleeve surrounding the exhaust pipe; furthermore, the inlet manifold is heated by water from the jacket header. The aluminum crankcase is divided horizontally and has in its upper part three babbitt bearings for the crankshaft, which are offset 15 mm. from the axial plane of the cylinders. See Fig. 3. The pistons are of cast iron and the big ends of the connecting rods have babbitted bearings. Between the two cylinders of each pair a cast passage is provided, connecting the inlet manifold with the inlet valve chamber on the opposite side of the engine,

thus insuring good preheating of the fresh mixture. See Fig. 2. The two inlet valves of each cylinder pair are located between the two exhaust pipes. To prevent rattle the ends of all valve tappets are provided with inserts of vulcanized fiber.

The carbureter is of the Benz-Zenith type. On the four cylinder models fuel feed is by exhaust gas pressure and when the engine is at rest the necessary tank pressure can be produced by a hand air pump on the steering post. In order to maintain a constant pressure on the fuel tank a pressure regulating valve, a sectional drawing of which is shown in Fig. 4, is used. The device consists of two valves, A and B, located one above the other in a common valve housing. The exhaust gases enter through strainer J and valve A, whose spring F has but little tension. By adjusting the tension of valve spring G the pressure in the fuel tank can be regulated. On the six-cylinder model a small engine-driven air pump furnishes compressed air for fuel feed and no exhaust pressure device is required.

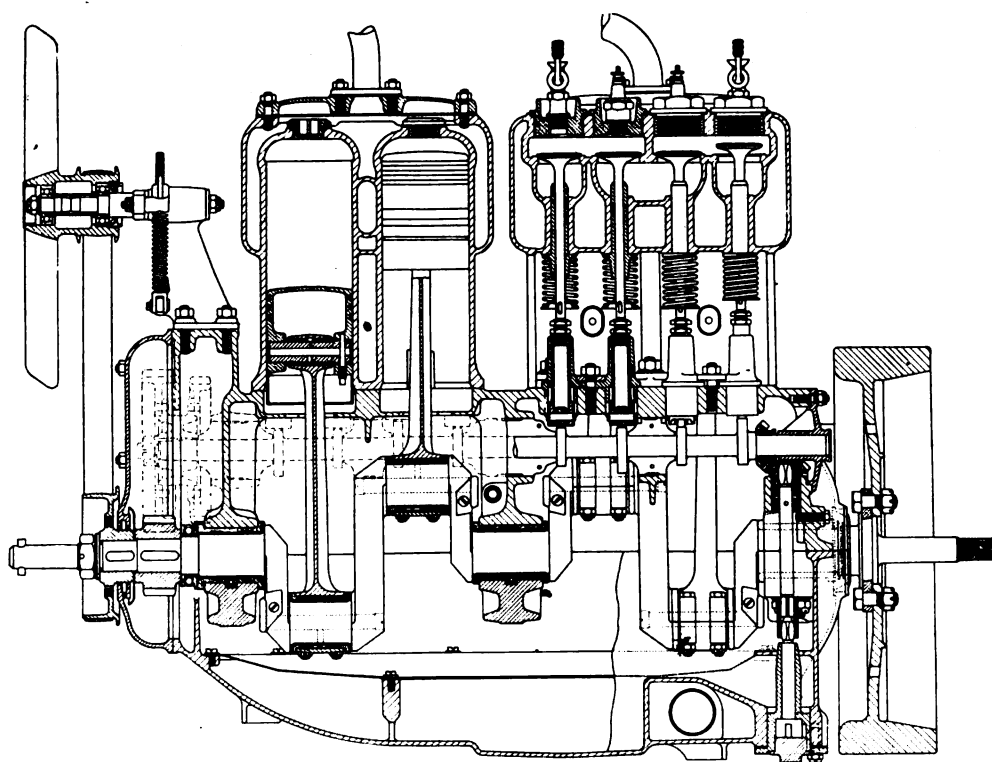


Fig. 2—Longitudinal section of Benz 4-cylinder engine. Note inlet passage cast between cylinders of each pair

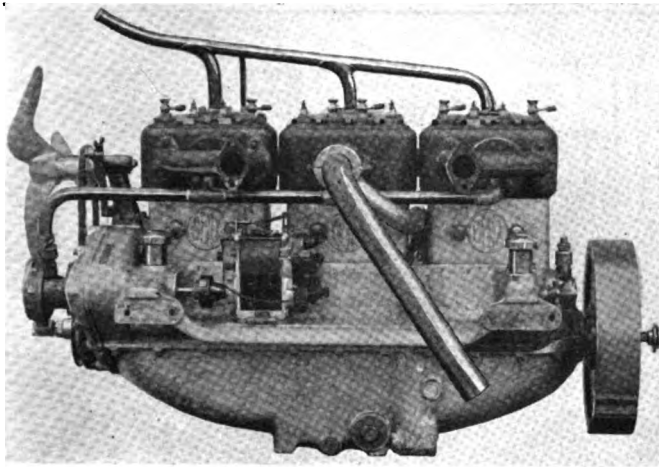


Fig. 1—Exhaust side of Benz 6-cylinder engine. Note location of water pump, peculiar shape of fan and fan adjustments

Ignition is by high tension magneto and battery with one set of spark plugs.

The tubular radiator is connected flexibly by a ball-shaped trunnion to one side of the frame, in order to avoid stressing the radiator core. The pump is of the centrifugal type and the fan is belt-driven from the crankshaft. The fan shaft runs on ball bearings and is supported on a stud carried on the short arm of a double armed lever. The fulcrum of the latter is supported by a cast bracket. Secured to the long arm of the lever is a coiled spring with a butterfly nut, seen in Fig. 1, by which the tension of the fan belt can be easily adjusted. A grease cup provides lubrication for the fan shaft bearing.

Engine lubrication is effected in the following manner: From the sump A, Fig. 5, the oil flows through a strainer to the oil pump B, which forces the oil through pipe C to the main oil tube D. The latter runs parallel with the crankshaft inside the upper crankcase half.

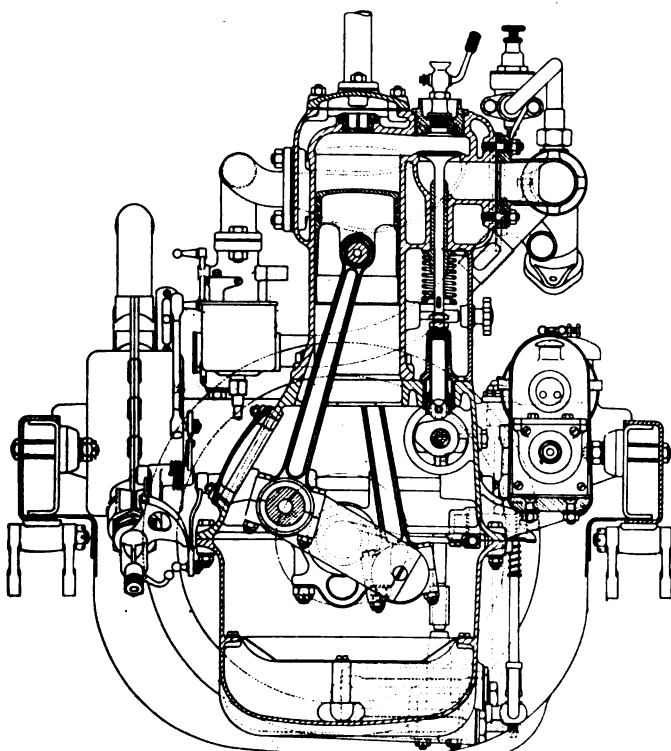


Fig. 3—Transverse section of engine. The crankshaft is offset

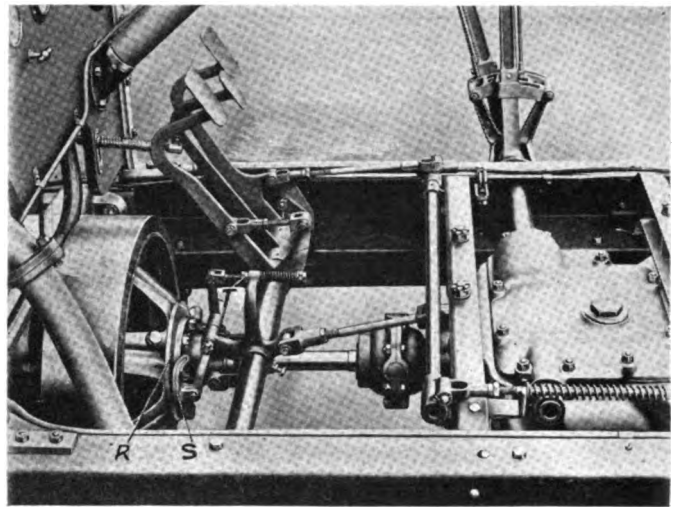


Fig. 9—View showing clutch and brake controls, method of mounting gearbox, etc.

Three branches lead to the crankshaft bearings, the branch H to the magneto shaft and the branch E to the oil pressure gage on the dash. Oil working its way through the crankshaft bearings flows along the shaft webs to the oil pocket J, whence it is forced to the big end bearings by centrifugal force and lubricates the pistons and cylinder walls in the form of a spray. On both sides of the camshaft there is an oil pocket O which collects a part of this oil spray. Oil thus collected is led through suitable passages to the camshaft bearing surfaces. The piston pin bushing is connected by a drilled passage with the interior of the hollow piston pin and the oil necessary for its lubrication is wiped off the cylinder walls. The excess oil, running down the crankcase walls, flows back through the large strainer K to the sump A. The chains used for the camshaft and magneto drive are lubricated by an oil jet coming from a fine hole G in the tube D.

In order to regulate the quantity of oil pumped to the main oil tube, oil pressure valve P is provided on the crankcase arm. It is connected by tube R with the main oil tube D and is shown in detail in Fig. 6. Valve V is held to its seat by the spring F, the tension of which can be regulated by the set screw S secured with a lock nut. As soon as pressure in the main distributing line exceeds a certain set valve the valve V opens and the superfluous oil flows back through passage Q to the crankcase. In order to prevent unauthorized adjustment of the oil pressure valve, it is provided at the factory with a cap which is secured by a lead seal. The height of the oil level in the crankcase is regulated by means of the three-way cock L, Fig. 5. The oil filler tube also serves as a breather. M is the drain plug, which is connected with a cylindrical strainer.

Fig. 7 shows two sectional views through the pump. The pump shaft N is driven by the intermediary shaft M and the bevel gears from the camshaft and bears on its lower end the slotted member K, forming a guide for blade B of the vane-type oil pump. The pump chamber is closed by cover L, upon the removal of which the pump with drive can be removed.

The clutch cone is of pressed steel in the 45 hp. model and has a leather lining. It is pressed into the flywheel by the clutch spring D. Declutching is effected through the pedal, lever H, Fig. 8, and two shackles G. The spring sleeve C is lubricated through the oil screw F. The clutch shaft is connected with the transmission main shaft by the intermediary shaft M and the enclosed universal joint N. A simple clutch brake, shown in Fig.

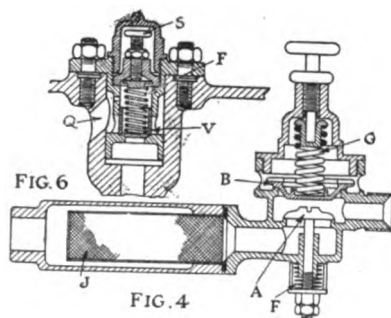


Fig. 4—Fuel feed pressure valve, operated by exhaust.

Fig. 6—Oil pressure regulating valve.

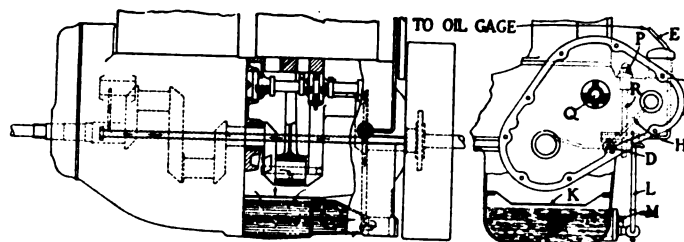


Fig. 5—Lubricating system

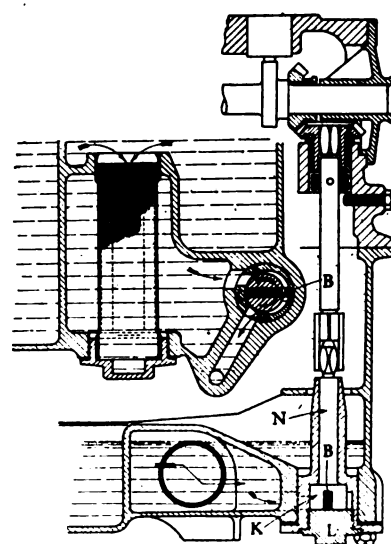


Fig. 7—Sections through oil vane-type pump, showing driving mechanism, strainer, etc.

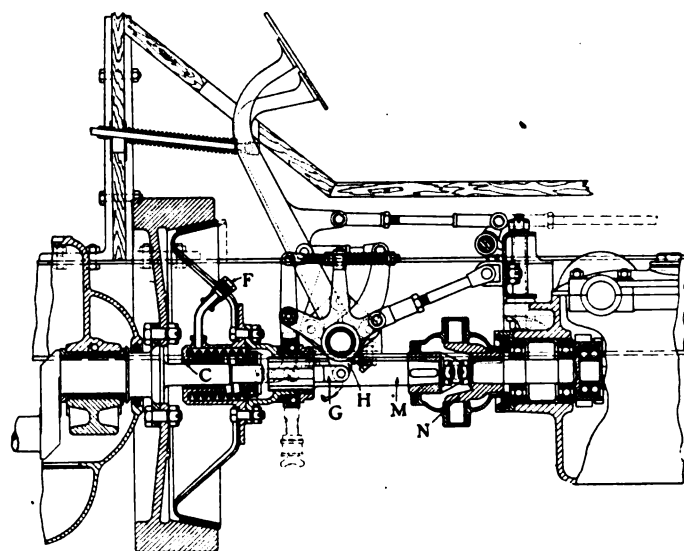


Fig. 8—Sectional view of clutch and adjacent units

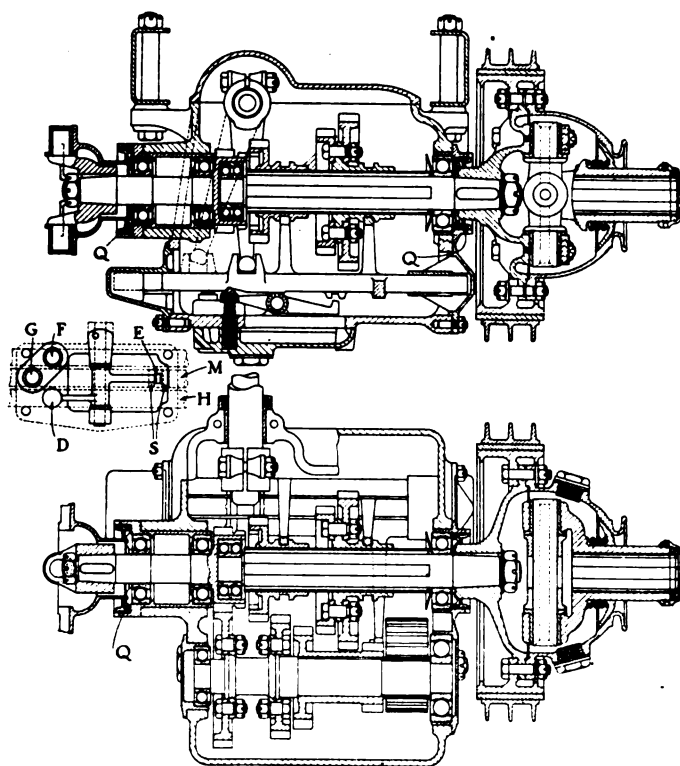


Fig. 10—Sectional views of gearbox and universal joint.

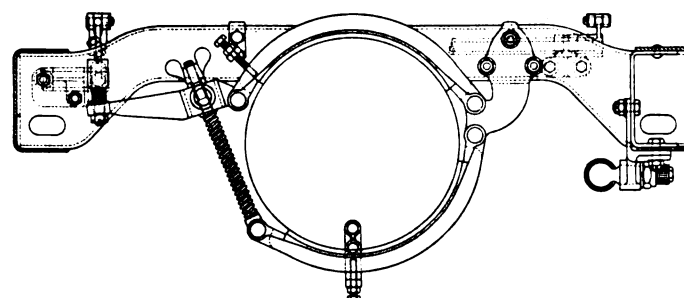


Fig. 11—Transmission brake anchored on transverse frame member. Provision for water-cooling the brake is made.

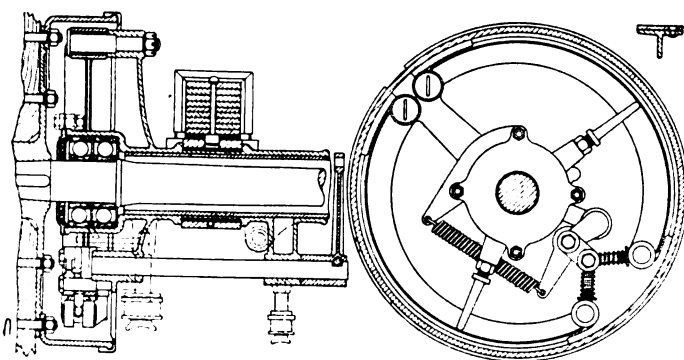


Fig. 13—Axle-end and rear wheel brake mechanism

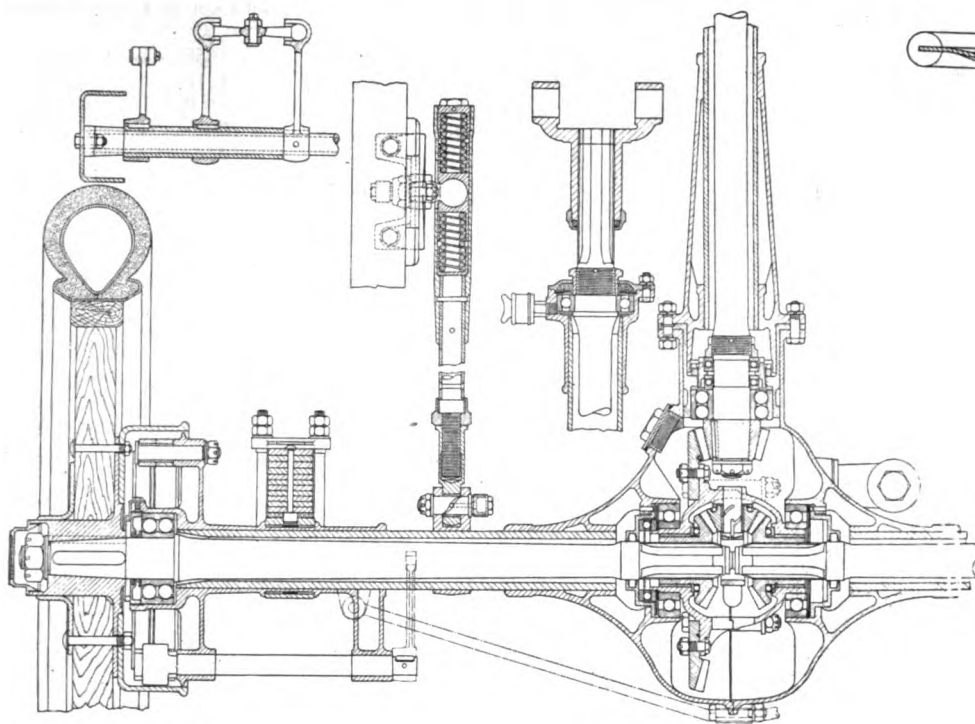


Fig. 12—Horizontal section through rear axle, propeller shaft, torque tube and radius rod. Brake equalizer is shown in upper left corner

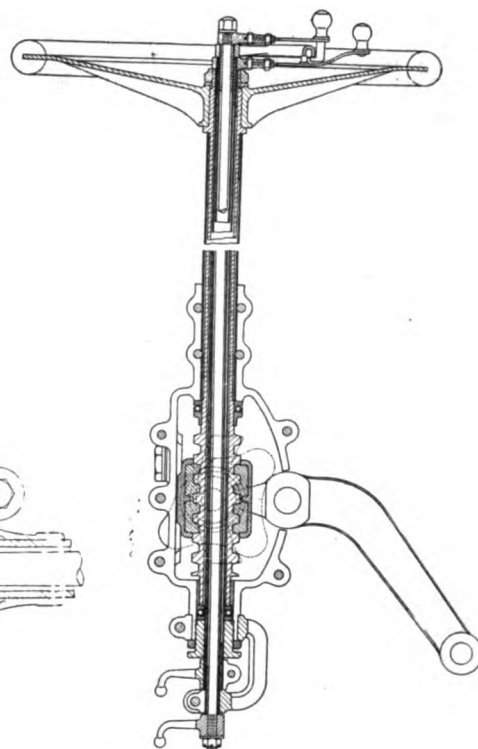


Fig. 14—Longitudinal section through steering gear

9, is provided. It consists of two leather-lined brake shoes S, pressed by a spring against flange R of the clutch cone, this brake can be adjusted by loosening the lock nut T and turning the adjacent nut. In the 70-hp. model the clutch cone is made of cast aluminum.

The gearbox, shown in section in Fig. 10, has four forward speeds. All transmission shafts run in ball bearings. When the reversed gear is engaged the gear shift rod M is secured in its position by a locking device. By moving the gear shift rod H to the left side, the nose D of a two-armed lever is pressed down, the other end E of which then is moved upward, thus entering between the two projections S of the shift rod M and locking it. The shifter rods are locked by the two set pins, F and G. The bearings of the transmission shafts are made dust and oil tight by spring disks of bronze, Q, which are pressed by screw rings against the outer and inner race of the corresponding ball bearing.

The design of the cross pin universal joint is clearly shown in Fig. 10. The rear part of the case has two diametrically opposite screw plugs for lubrication and a pulley for the speedometer drive. This form of speedometer drive is preferred to the front wheel drive, because it is protected against mud and no provision needs to be made to compensate for the spring action.

Oil leakage from the universal joint cases is prevented by a ball sector-shaped piece pressed by a spring against the spherical interior surface of the case and a felt ring held by a screwed retainer.

The transmission brake drum is bolted together with the forward part of the universal joint case. The brake shoes of steel have cast iron linings and their right ends are swiveled to a bracket bolted to the transverse frame member. See Fig. 11. The other ends are operated by a lever and bolt. When the linings become worn slightly the shoes can be adjusted by a butterfly nut. After more extensive wear the brake rod is shortened by screwing up the yoke. In case of unequal distance of the brake shoes from the drum, the lock nuts of the two screw J, K are loosened and the screw adjusted accordingly. To prevent undue heating of the transmission

brake, a water tank is provided at the right side of the transmission case from which cooling water is forced by exhaust gas pressure to the sight feed with stop cock at the dashboard, whence it is allowed to flow to the brake drum. The brake shoes also have cooling ribs on the outside.

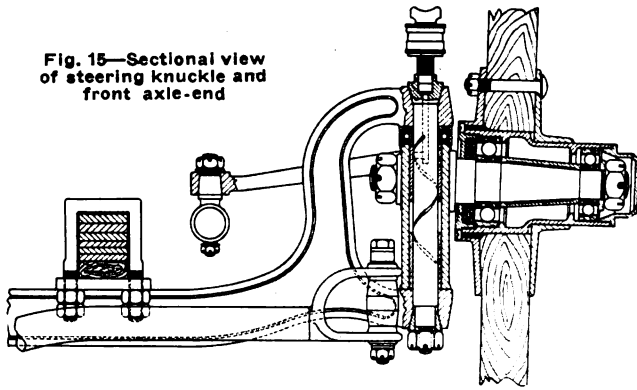
A horizontal section through the drive shaft and rear axle is shown in Fig. 12. Two parallel radius rods serve to transmit the propulsive effort from the rear axle to the frame. They have an eye at the rear end supported by an axially drilled pin with provision for grease lubrication. The front end has a ball joint spring-cushioned to damp out road and starting shocks. This joint is lubricated with grease through a drilled pin. The rear wheels can be detached after removing the axle cap and axle nut by inserting a wheel puller in place of the cap.

The design of the rear wheel brakes is clearly shown in Fig. 13. Inside the brake drum are the two brake shoes lined with asbestos fabric and carried on two pivots. The free ends are connected by toggles and a link with a lever arm. Equalization of the two rear brakes is effected by means of the simple ball-headed balance lever arrangement, shown in Fig. 12. When the brake shoes are worn adjustment can be made in the brake linkage, but it can also be made on the brake itself, after removing the rear wheel, by loosening the check nuts and lengthening the toggles.

A longitudinal section through the steering gear is shown in Fig. 14. By means of the steering wheel, motion is given to the long unhardened steel screw and the babbitted non-adjustable nut. This screw and nut arrangement is said to have proven entirely satisfactory. The throttle and spark levers are arranged in the usual manner.

The front axle, Fig. 15, has forked ends and the steering knuckle pivot has plain bronze bushings with ball thrust bearings. The front wheel hub has ball bearings and is closed on the inside by felt rings and metal washers.

In the following table are given some particulars and dimensions of the two Benz cars:

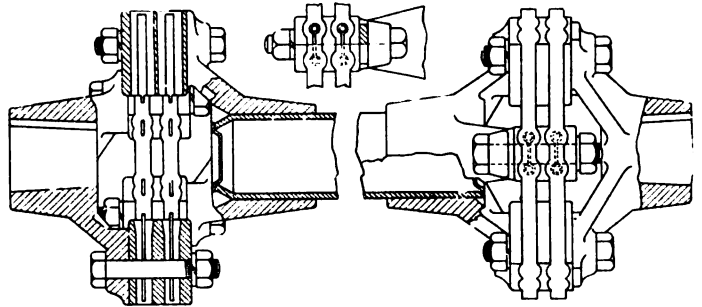
Fig. 15—Sectional view  
of steering knuckle and  
front axle-end

Brake hp. 45 72  
Cylinder bore, millimeters ..... 100 (3.94 in.) 100 (3.94 in.)

Cylinder stroke, millimeters	..... 150 (5.90 in.)	150 (5.90 in.)
Number of cylinders	..... 4	6
Revolutions per min.	..... 1650	1550
Compression ratio	..... 4.15	4.06
Weight of engine	..... 596 lb.	826 lb.
Body length of frame	..... 108 in.	108 in.
Wheelbase	..... 134 in.	144 in.
Tread	..... 55 in.	56.5 in.
Chassis length over all	..... 182 in.	194 in.
Chassis width over all	..... 68 in.	70 in.
Width of frame	..... 34 in.	35.5 in.
Height of frame above ground	..... 24.2 in.	24.4 in.
Ground clearance	..... 10 in.	9 in.
Chassis weight with tires	..... 2640 lb.	3200 lb.
Tires	..... 935x135 mm.	935x150 mm.
Speed	..... 51 m.p.h.	59 m.p.h.
Capacity of fuel tank	..... 20 gal.	37.5 gal.
Fuel consumption	..... 11 1/4 m.p.gal.	8.5 m.p.gal.

## A New Fabric Universal Joint

IN the past some trouble has been experienced with fabric type universal joints from the bolts loosening and the fabric around the bolt holes being torn or worn out in consequence. In the M. & E. Griptite, a new design, it is sought to overcome this difficulty by embedding six tubular steel spreaders in the disks, one at each bolt hole, these spreaders bulging the fabric into semi-circular ridges exactly fitting the formed clamping washers. The spreaders are in contact with the bolts and impart to them part of the torque from the disks. They are also claimed to increase the density of the rubber immediately under the clamping washers, thus allowing greater initial clamping pressure on the disks and reducing the need for retightening to a minimum.



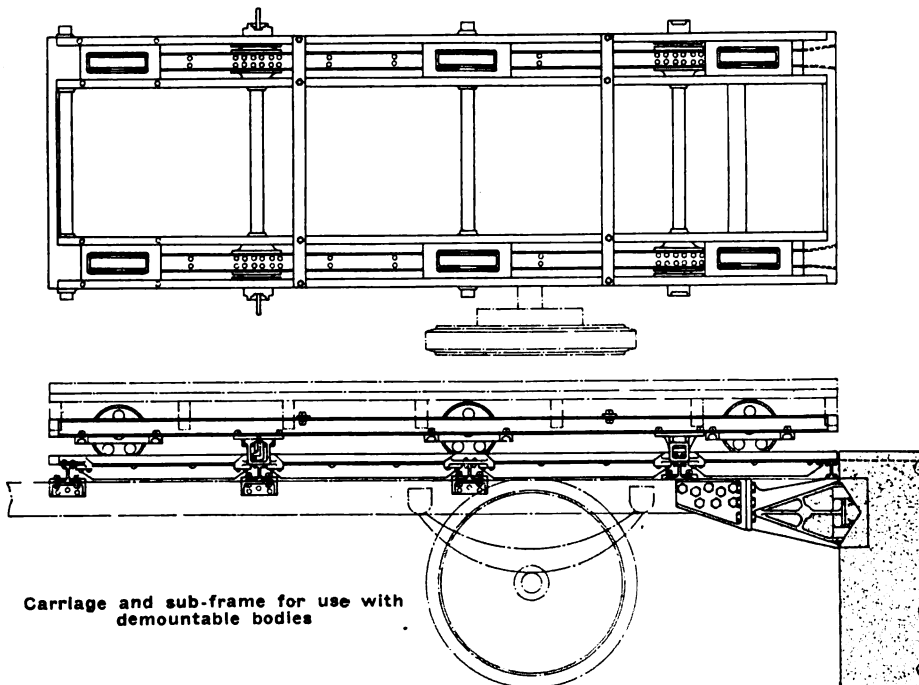
The M. &amp; E. Griptite universal joint

## A Demountable Body Carriage

THE demountable body carriage outfit for truck use, shown in the accompanying cut, consists of one sub-frame, two carriages and two sets of wedge-blocks. Separate units can be added as they are needed. The parts are of steel construction throughout. Channel irons which serve as rails for the steel wheels under the car-

riage to roll on are sunk level with the floor and do not prevent the use of hand trucks on the shipping platform.

The sub-frame is of steel construction, with a channel steel track, the whole being fitted to the chassis by brackets bolted through the sides of the frame. It is made to fit any length and width of chassis. There are four locks, two on each side, which keep the carriage and body in place on the chassis. It is said to have been proven in service that the bodies cannot come off accidentally. The carriage, which can be mounted under old as well as new bodies, is of a construction similar to the sub-frame. It has steel wheels fitted with roller bearings, which make the body easy to roll when unlocked. It is said that two men can easily push a body loaded with 2½ tons, and five men 7 tons. The leveling device consists of the wedge-blocks mounted on the platform front and the V-blocks on the rear of the chassis. Backing the truck into the wedge-blocks always brings the body to the same level, no matter whether empty or loaded and locks it there until the body is shifted. The roll-off carriage and accessories necessary for use with it are manufactured by the Perin Automotive Engineering Co.

Carriage and sub-frame for use with  
demountable bodies



# Experiments With Localized Charge and Supercharging Engines

Report of investigations demonstrating how mean effective pressure and economy can both be increased by use of stratified charge. Excess air and cooled exhaust gas are employed as diluents to limit maximum temperature of cycle and prevent detonation. Unusually high fuel economy at part load is obtained by use of non-throttling engine.

By Harry R. Ricardo\*

IF we consider the usual four-stroke cycle, we find that there are only two obvious ways of increasing the power output, namely, by increasing the mean pressure, or by increasing the piston speed. The former does not leave much ground for hope, for the volumetric efficiency is already within 1 or 2 per cent of the highest obtainable, and the compression ratio has already been carried to the highest safe limit consistent with the fuels available. Moreover, a little investigation will show that any further increase in compression must result in a very large increase in the maximum pressure, involving the necessity for heavier moving parts; hence such increase of efficiency as might be obtained by increased compression will be largely counterbalanced by enhanced mechanical losses due to the heavier masses.

So far as piston speed is concerned, there does not appear to be very much hope either. Until recently the piston speed was controlled primarily by the inertia of the reciprocating masses, but since the advent of the aluminum piston the controlling factor has been shifted to the valve gear and the provision of adequate valve area. By careful design, the limit can no doubt be still further raised, but only at the expense of greatly increased cost of manufacture. Again, if either the mean pressure or the piston speed could be increased, another controlling factor would play havoc, namely, the difficulty of dealing with the intense heat flow, which is already a serious problem, even in the smallest engines. This difficulty can be alleviated to some extent by the use of aluminum piston and cylinder head and water cooled exhaust valves, but it cannot be altogether avoided by such means, and when staved off in one direction it soon crops up in another. In whatever way the problem may be viewed, the conclusion is invariably reached that in order to obtain any really substantial gain in power or economy, the question of heat flow must first be attacked, and some means or other must be found to reduce the flame temperature. In this direction lies not only the one hopeful solution of increasing the power, but also the one chance of a really substantial gain in economy, since the two principal losses, namely, the loss due to direct transfer of heat to the cylinder walls, and the even larger loss due to the increase in the

apparent specific heat of the working fluid at high temperatures, are both directly dependent upon the maximum flame temperature.

If we consider the working fluid from the point of view of an air to gasoline mixture, we find that the proportion giving complete combustion has a heat value in round numbers of 100 B.t.u. per cu. ft. With this mixture density, the combustion of the fuel will raise the temperature of the working fluid to approximately 2500 deg. C. (4532 deg. Fahr.), taking into account the increase in the apparent specific heat and dissociation. At this high temperature the loss of heat, and still more the loss due to the increase of specific heat at high temperatures, are extremely serious.

The air standard efficiency of the cycle is independent of the maximum temperature, so long as the gases are expanded to the same volume as they occupied before compression, but this holds good only when there is no loss of heat, dissociation, or change in the specific heat of the working fluid. When, however, these considerations are taken into account, it will be found that the ideal efficiency falls

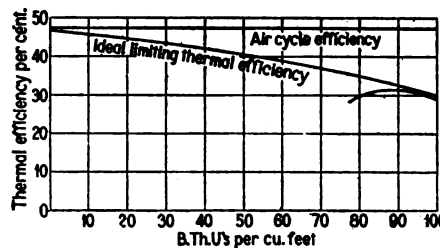


Fig. 1.—Relation between air cycle and ideal efficiencies and heat added per cu. ft. of mixture. Compression ratio 5:1

rapidly as the temperature rises.

In Fig. 1, one curve shows the theoretical efficiency obtainable with a compression ratio of 5:1 on the assumption of no heat loss, no dissociation and constant specific heat; this curve is a straight line, and is independent of the flame temperature or heat value of the mixture. The other curve takes into account the loss due to change of specific heat, and also allows a minimum figure for the jacket loss, and it will be observed that as the heat value of the mixture, and therefore the flame temperature, is reduced, the efficiency rises until, at the point of no heat supply, it would become equal to the air cycle efficiency.

Consideration of this curve shows at once the desirability of working with a weak mixture, and therefore a lower flame temperature, but unfortunately gasoline vapor has only a very narrow range of burning, and so long as the mixture is homogeneous it is not possible under ordinary conditions to employ a mixture weaker than about 85-90 B.t.u. per cu. ft. At this strength the maximum flame temperature is but little lower, since the first effect of reducing mixture strength with gasoline is to reduce the proportion of dissociation and so affect the temperature but little. Any attempt to work below this density

\*Slightly condensed from a paper presented before the (British) Institution of Automobile Engineers.

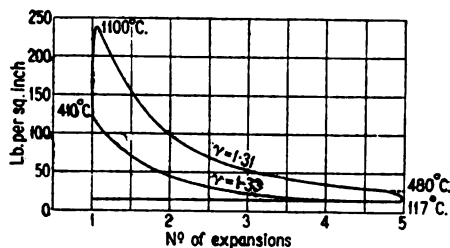


FIG. 2

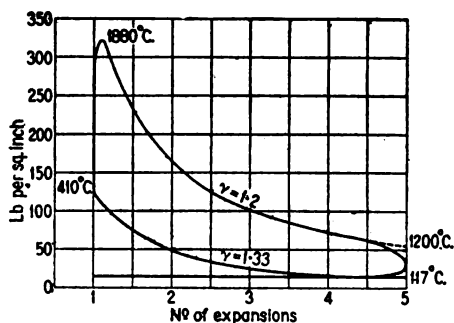


FIG. 4

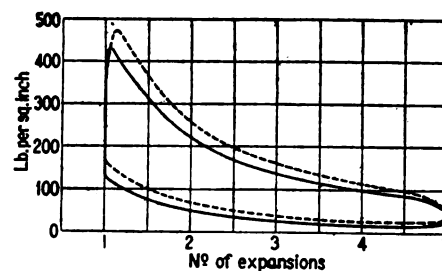


FIG. 5A

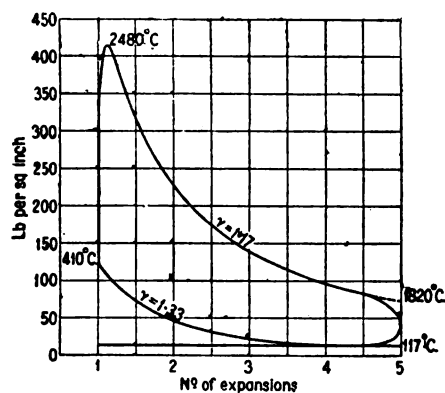


FIG. 3

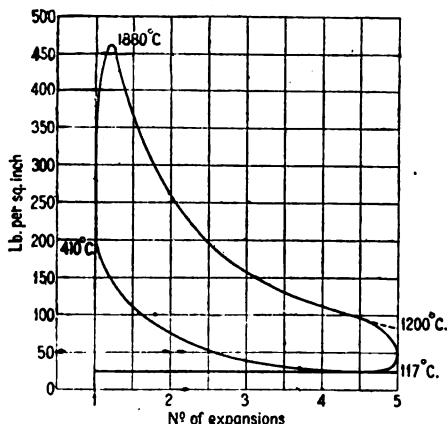


FIG. 5

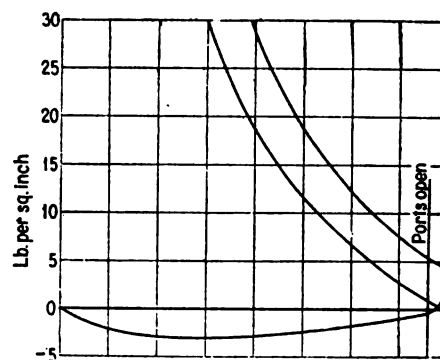


FIG. 13

## IDEAL INDICATOR CARDS FOR VARIOUS CONDITIONS

Fig. 2—20 B.t.u. per cu. ft. Fig. 3—90 B.t.u. per cu. ft. Fig. 4—66 B.t.u. per cu. ft. Fig. 5—66 B.t.u. per cu. ft. plus 33 per cent supercharge. Fig. 5A shows Figs. 4 and 5 superimposed. Fig. 13—Light spring diagram, showing admission of supercharge

with a homogeneous charge results in incomplete combustion, and ultimately so slow a rate of burning that flame lingers in the cylinder and ignites the fresh charge on entry, causing the familiar popping back through the carbureter.

It is evident that were it found possible to work with a much weaker average mixture density, and so obtain a very substantial improvement in thermal efficiency, the mean pressure would be reduced, though not in direct proportion to the heat value of the mixture, because the higher efficiency obtained would mean that a greater proportion of the available heat would be converted into power.

To appreciate the effect of working with a low mean mixture strength it is interesting to consider what would happen if into a cylinder containing nothing but pure air, a paper bag containing a small proportion of fuel and air of normal mixture strength were inserted, and that by some means the contents of this bag were ignited at the end of the compression stroke. The bag would immediately burst, and the burning mixture would be projected into the large excess of air present in the cylinder, thereby heating the air and raising its pressure. The average temperature of the air under these conditions would of course be much lower than if it were saturated with fuel; on the other hand, if the same quantity of fuel had been allowed to mix with the whole of the air it would not have ignited at all.

Fig. 2 shows the sort of indicator diagram which would be obtained supposing that the contents of the paper bag represented 20 per cent of the total cylinder volume, the remaining 80 per cent being either pure air or air and exhaust gas. It will be observed that the maximum flame temperature would in this case be only about 1100 deg. C. (2012 deg. Fahr.). With such a maximum temperature the loss of heat to the walls and the loss due to change of specific heat would be very small, and the efficiency

would be very high in consequence. The theoretical efficiency would under such conditions be just under 45 per cent for a compression ratio of 5:1.

In the experiments described later in this paper the author aimed at—

1. Reducing the mean mixture strength by stratifying the charge and so obtaining a high thermal efficiency.

2. Reducing the heat flow by lowering the flame temperature.

3. Recovering and even increasing the mean pressure by the addition of extra air in the form of a supercharge.

In Figs. 3, 4 and 5 are shown three indicator diagrams which illustrate the objects in view. Fig. 3 shows a normal diagram for the most economical mixture strength with a homogeneous charge, namely, about 90 B.t.u. per cu. ft. This diagram shows a maximum temperature of about 2500 deg. C., a limiting efficiency of 32 per cent, and a mean effective pressure of 138 lb. per sq. in. indicated.

Fig. 4 shows a diagram for a mean average mixture strength of 66 B.t.u. per cu. ft. In this case the maximum temperature will be about 1880 deg. C., the efficiency 34.5 per cent, and the mean effective pressure 98.5 lb. per sq. in.

Fig. 5 shows a diagram also for a mean average mixture strength of 66 B.t.u. per cu. ft., in which the weight of air has been increased 33 per cent by means of supercharging. The effect of the supercharge will be to enlarge the whole diagram by 33 per cent without affecting the temperature and, therefore, the efficiency, but increasing the mean pressure to 152 lb. per sq. in. Under these conditions, not only will the high efficiency theoretically obtainable under the conditions of Fig. 4, be maintained, but the mean pressure will be restored and even raised to well above that obtainable under normal conditions of working.

The experiments may be divided into three phases.

1. An investigation into the efficiency obtainable by varying the mixture strength under normal conditions.

2. An investigation into the possibilities of reducing

the mean mixture strength by working with a stratified charge.

3. Experiments combining the use of a stratified charge with supercharging.

For the first series of tests a highly efficient single-cylinder vertical engine, direct-coupled to a swinging-field dynamometer, was used. The engine was provided with a Hopkinson optical indicator and a carbureter in which the whole of the fuel was thoroughly vaporized, and in which the control of the fuel supply could be regulated with extreme nicety by means of a very fine needle valve. The accuracy of the apparatus was such that the power could be read with certainty to within  $\pm 0.3$  per cent, and the fuel consumption to within  $\pm 0.5$  per cent. Very careful determinations were also made of the mechanical and pumping losses, so that the indicated power could be arrived at from the brake horsepower, and also checked by indicator diagrams which were taken at frequent intervals.

A summary of the results of these tests is shown in Fig. 6 which explains itself. It will be observed that so soon as the mixture strength is reduced to any substantial extent beyond that at which there is just sufficient air to combine completely with the whole of the fuel, incomplete combustion counteracts any gain in efficiency due to the reduced flame temperature. Unfortunately, however, the absolute mixture strength could not be definitely determined because no means were available of measuring accurately the air supply; consequently the curves showing the actual performance may be as much as  $\pm 2$  per cent out in a horizontal direction.

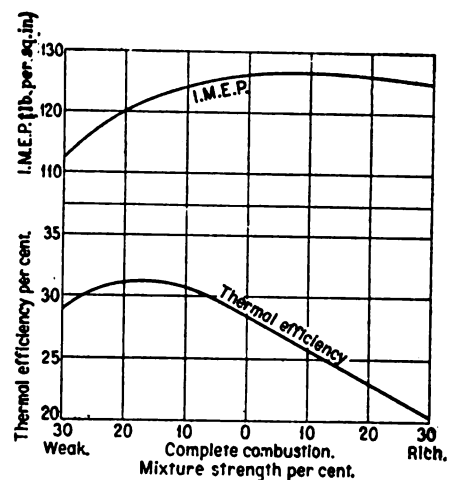
The second series of tests, which was carried out during 1913-1914, was undertaken with a view to determining:

1. Whether it was possible by means of stratification to work with a low mean mixture density.

2. Whether, if it were possible to do so, the results obtained would be found to be in agreement with those theoretically possible, or whether any disturbing factor would crop up to prevent their attainment.

To carry out this series of tests an old single-cylinder vertical engine of 5 in. bore and 6 in. stroke was resurrected and provided with a new cylinder, cylinder head and valve gear. In view of the fact that the use of a stratified charge and a low mean mixture density would, if successful, result in a very low flame temperature, no water jacketing or other means of cooling was provided for the cylinder or cylinder head. The cylinder head was so formed, and the position and timing of the valves were so arranged, that a rich mixture of fuel and air and a large additional supply of pure air entered the combustion chamber at different points, and were so directed that even after their entry, and in spite of very vigorous turbulence, they would not completely mix, the rich fuel mixture remaining always in the neighborhood of the sparking plug, while the air

Fig. 6—Relation between m.e.p. and fuel consumption, homogeneous charge.



remained over the piston.

The power output of the engine was controlled entirely by the quantity of fuel admitted during the suction stroke, no throttle valve or other means of control being provided, so that at all times and under all conditions a full air charge was taken into the cylinder.\*

The results proved that the degree of stratification actually obtainable was far greater than expected. It was found possible to reduce the mean mixture strength from a useful minimum of 85 B.t.u. per cu. ft. under ordinary conditions of working, down to as low as 10 B.t.u., and yet obtain perfectly regular running.

A Hopkinson optical indicator was fitted in the combustion head, and the indicator diagram thrown on to a glass screen covered with tracing paper was carefully watched; a number of indicator diagrams were photographed, but for the most part the diagrams were traced in pencil, which was very much quicker; at the same time the brake horsepower of the engine was recorded.

These experiments proved more successful than had been hoped for, and were in very fair agreement with the theoretical figures. The following observations are taken from notes and test reports of 1913-1914:

1. The engine could be started at all times, even on the coldest day in midwinter, on the first pull-over.

2. When running light with an indicated mean pressure of about 14 lb. per sq. in., the exhaust, though perfectly free, was almost inaudible. Also the cylinder barrel remained quite cool, and it was possible to bear the hand on any part of the cylinder head or exhaust pipe even after an hour's running on no load.

\*A diagrammatic view showing the principle of operation of the Ricardo localized charge (constant compression) engine was shown on page 1243 of AUTOMOTIVE INDUSTRIES for June 16, 1921.

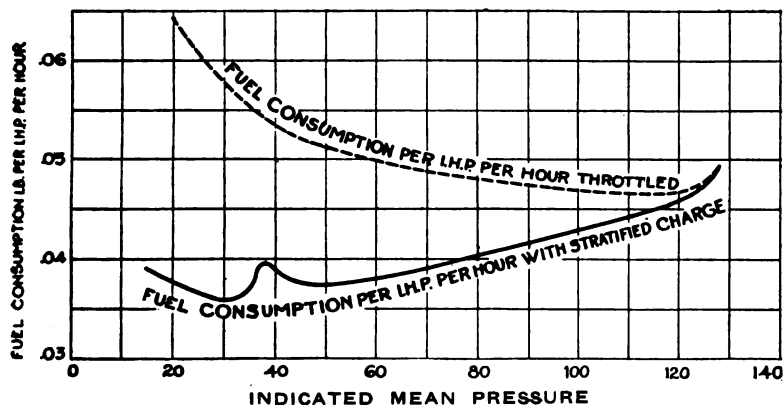


Fig. 8—Relation between fuel consumption and indicated mean pressure in engine using stratified charge

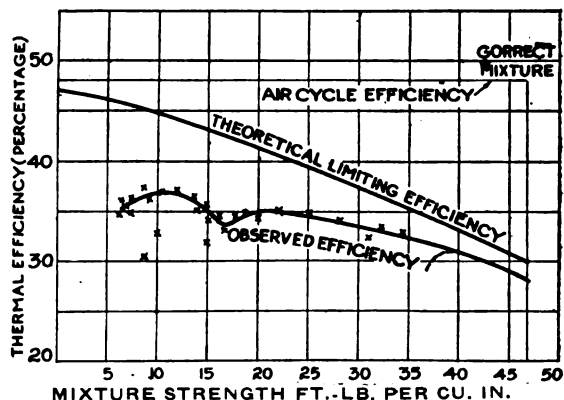


Fig. 9—Relation between thermal efficiency and mixture strength. Observed results are those obtained with engine using stratified charge

3. So long as the admission of fuel was not altered the speed of the engine remained absolutely uniform and the indicator diagrams extraordinarily consistent. Fig. 7 shows an exposure of 20 seconds, taken with the engine running light at about 600 rev. per min., and therefore represents about 100 complete cycles.

4. By opening the needle valve and increasing the admission of fuel the engine would immediately accelerate even from the slowest speed of 120 rev. per min.

5. One very noticeable feature was the extraordinary rapidity of ignition, due to the violent turbulence set up. A fixed ignition timing of 3 deg. before dead center sufficed for all speeds and loads, and invariably gave a perfectly vertical line of pressure rise on the diagrams.

6. Some hundreds of readings of fuel consumption were taken at all loads ranging from dead light to full load, and the mean results of these are shown in Fig. 8, which gives the fuel consumption obtained with indicated mean pressures ranging from 14 to 120 lb. per sq. in. Fig. 9 shows the indicated thermal efficiency actually obtained, plotted against that theoretically obtainable, and presents, on the whole, very tolerable agreement. On the light loads there is undoubtedly some loss due to incomplete combustion.

7. On full load the running of the engine was in every respect normal, but, of course, the absence of any water jacketing prevented the maintenance of full load for more than a few seconds at a time.

8. Perhaps the most noticeable feature of all was the general sweetness and smoothness of running and the extraordinary responsiveness of the engine. Unfortunately, owing to the poor mechanical design of the engine generally, it was not possible to run it at high speeds, the extreme safe limit being only about 800 rev. per min. Tests were made over a speed range of from 150 to 800 rev. per min., and these showed practically no difference in the indicated fuel consumption, the shape or regularity of the indicator diagrams or the general running.

Subsequent experiments carried out on other engines proved, however, that the results obtained on the special experimental model could not be always repeated. Further bitter experience has proved that the author was quite unusually fortunate in selecting proportions in the first instance, and that much further experimental work is required before the system of controlling on the fuel alone can be so boiled down as to be rendered applicable to any type of engine. Quite recently another and much larger engine has been built, operating on the same principle, and employing as far as possible the same form and proportions of combustion chamber. This engine, which has been running at the author's laboratory for the past twelve months, has proved equally efficient, but all attempts to adapt the principle of operating by stratification alone over the whole range of load to existing engines have ended in more or less disappointment.

#### Experiments With Supercharging Engine

Having established that, under certain conditions at all events, a very substantial degree of stratification could be maintained with, at the same time, sufficient turbulence to insure rapid combustion (although the two conditions may not at first sight appear compatible), and having also proved satisfactorily that under these conditions a very marked reduction in the maximum temperature and a corresponding gain in the efficiency could be obtained, the third series of tests was commenced.

For the purposes of these tests, a special experimental engine was designed using a system of supercharging generally similar to that devised by Sir Dugald Clerk and completed in 1915. This engine, a section of which is shown in Fig. 12, had a bore and stroke of 110 mm. and 140 mm. respectively, and was designed to run at a normal speed

of 1500 rev. per min. The upper portion of the cylinder was quite normal and of the L-head type, with the inlet valve placed vertically over the exhaust valve, and operated by a push rod and overhead tappet. The piston, however, was formed in two parts, a plain head of aluminum carrying the piston rings, provided with a very short skirt furnished with a number of small oil grooves and a circular crosshead of considerably smaller diameter, the piston and crosshead being connected together by a hollow aluminum trunk. The crosshead portion of the piston, which carried the wrist pin, reciprocated in a white-metal-lined guide, which was carried in a separate casting interposed between the cylinder and the crankcase.

In its original form the crosshead was of mild steel, and the piston and trunk were of aluminum, the two members being screwed together as shown in Fig. 12. This form of construction, though it cannot be considered mechanically sound, proved very convenient for experimental purposes, since the upper half of the piston could be changed quickly and easily, in order to vary either the compression or the contour of the head, which latter proved to be very important. In point of fact it has never given any trouble in the experimental unit, where great care was taken in the machining of the threads, but the author would never advocate such a construction other than for experimental work. The piston and crosshead, as a whole, were fairly light, the total weight with rings and pin being only 39 oz., which compares quite favorably with that of an aluminum trunk piston of the same size, though aluminum pistons were scarcely known at the time of the experiments.

The cylinder, which was very short, was recessed into the separate casting carrying the crosshead guide, and the extension of the cylinder skirt was provided with a ring of ports uncovered by the piston at the bottom of its stroke; these were surrounded by a movable sleeve or shutter, so that they could be closed off at will. Surrounding the crosshead guide was an annular chamber having a minimum capacity of about 60 cu. in., but the capacity could be varied at will over a wide range by means of hollow detachable plugs. A series of very light phosphor bronze automatic valves admitted air to the chamber and acted as non-return valves during the compression stroke.

Lubrication of the cylinder walls was provided for in the following manner: When the piston had almost reached the top of its stroke a series of small holes drilled through the wall of the crosshead were uncovered above the top of the guide. Owing to the reduced pressure in the crosshead chamber at this point as compared with the pressure in the crankcase, a small quantity of oil-laden air passed out through these holes, with the result that the oil was deposited on the walls of the cylinder, where it was picked up by the short skirt of the piston and distributed evenly over the inner surface.

#### Operation of Supercharging Engine

In its original form the cycle of operations was as follows:

Commencing at the beginning of the suction stroke, the piston, as it descended, drew from the carbureter a charge of gasoline vapor, and air of normal proportions. Toward the end of the stroke the ports round the lower end of the cylinder were uncovered and a charge of air compressed in the crosshead chamber to a pressure of about 12 lb. per sq. in., entered the cylinder. Almost simultaneously with the opening of the ports the main inlet valve was closed. The supplementary air from the crosshead chamber raised the pressure of the cylinder contents to about 5 lb. per sq. in. above atmospheric pressure, and at the same time formed a layer of air above the piston, which remained in a more or less stratified condition throughout the com-

pression stroke. Fig. 13 represents an ideal indicator diagram, showing the cycle in the cylinder during the suction stroke and the admission of the supercharge air, and Fig. 14 shows an actual indicator diagram taken from this engine. During the upward stroke the contents of the cylinder were compressed, the combustible mixture remaining more or less at the top, and the pure air forming a layer over the piston. Meanwhile, another charge of air was drawn into the crosshead chamber.

At the end of the suction stroke the contents of the cylinder consisted of about 70 per cent of combustible mixture of normal strength, namely, about 95 B.t.u. per cu. ft., and about 30 per cent of air, the former being concentrated more or less in the valve pocket, and in the neighborhood of the sparking plug, and the latter forming a layer over the piston. The mean mixture density of the whole of the cylinder content was therefore only about 66 B.t.u. per cu. ft., a density which, under ordinary circumstances, would not have been inflammable. On ignition, the combustible mixture in the neighborhood of the sparking plug ignited with great rapidity, causing further violent turbulence in the combustion chamber, so that the air and the burning mixture were intimately mixed, but not until combustion was well under way.

### Scavenging by the Use of Supercharger

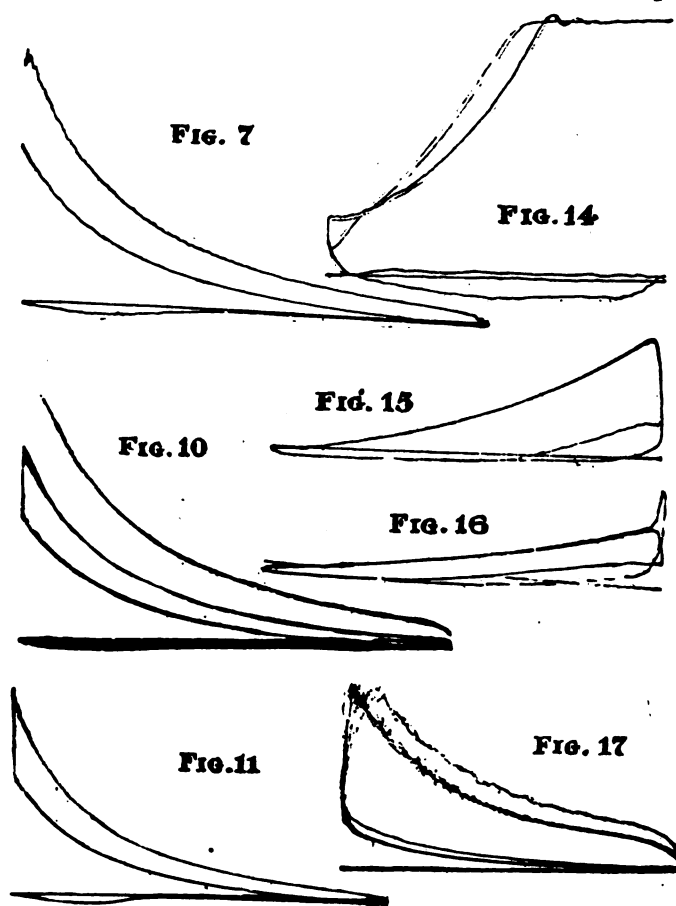
Toward the end of the expansion stroke, the exhaust valve was opened in the usual manner and, shortly afterward, the ports in the cylinder walls were again uncovered, and the cylinder swept through and partially scavenged by the second charge of air compressed in the crosshead chamber; this second charge again entered above the piston in a more or less stratified form, the gas immediately above the piston being mostly air, while that nearer the top of the cylinder consisted mainly of exhaust products. On the upward stroke of the piston, the residual exhaust gases and part of the air were expelled through the exhaust valve, leaving the clearance space partially full of air. There was thus provided alternately a supercharge of air at the end of each suction stroke, and a scavenging charge at the end of each firing stroke, so that not only did the cylinder receive an additional charge of air over and above the charge drawn in from the carbureter, but a further supply of air was provided by the scavenging charge, which had the effect of replacing the residual exhaust gases in the combustion chamber with, at all events, a considerable proportion of pure air.

It will be seen, therefore, that, on paper at all events, the temperature of the cycle was reduced in two directions:

1. By lowering the flame temperature;
2. By scavenging during the exhaust stroke, while the air content was increased approximately 40 per cent, about 33 per cent by the supercharge and possibly 7 per cent by the scavenging.

It is obvious that the engine could be operated on either of two systems. Either a very rich charge could be admitted through the carbureter, providing sufficient fuel to combine with the whole of the air, in which case the mean pressure would be increased by 40 per cent, while the temperature of the cycle would still remain less than normal, thanks to the cooling effect of the scavenging charge; or a normal mixture could be admitted through the carbureter, in which case the air acted merely as a diluent, lowering the flame temperature and so increasing the efficiency of the cycle.

Before attempting any actual tests the engine, which was direct coupled to an extremely sensitive swinging-field electric dynamometer, was driven at its normal speed of 1500 r. p. m., and indicator diagrams were taken both from the crosshead chamber and the cylinder, the indicator being operated by linkage direct from the crosshead, in order to avoid any possible errors in synchronism.



ACTUAL INDICATOR DIAGRAMS TAKEN UNDER VARIOUS CONDITIONS.

Figs. 7, 10 and 11 with stratified charge. Fig. 14 showing admission of supercharge. Fig. 15, diagram from crosshead chamber engine driven by dynamometer. Fig. 16, diagram from crosshead chamber when running under own power. Fig. 17, diagram from working cylinder under normal running and when undercharging.

### Timing Admission of Supercharge

Fig. 15 shows the indicator diagrams obtained from the crosshead chamber after timing of the valves had been adjusted to give what appeared from the indicator diagrams to be the best possible results. In its original form the ports opened and closed 28 deg. before and after the bottom dead-center, and the inlet valve closed 10 deg. before the bottom dead-center; the motoring experiments, however, showed that it was unnecessary to close the inlet valve until after the bottom center was reached, since owing to the time lag there was found to be no tendency to blow back into the carbureter at speeds above 1000 r.p.m.

A very careful analysis was made both of the frictional losses and of the power absorbed in pumping both in the cylinder and crosshead chamber. These were found to be as follows, expressed in terms of mean pressure:

Total frictional losses, including windage losses .....	11.5 lb. per sq. in.
Fluid pumping losses in cylinder.....	3.5 lb. per sq. in.
Fluid pumping losses in crosshead chamber .....	4.5 lb. per sq. in.
Total friction and fluid pumping losses	
When running normally.....	15.0 lb. per sq. in.
When supercharging .....	19.5 lb. per sq. in.

Having arrived at what appeared to be the best possible timing from the point of view of volumetric efficiency, the actual tests were started toward the end of 1915. A Claudel carbureter was used, fitted with a needle valve in the jet, in order to adjust the mixture strength. The



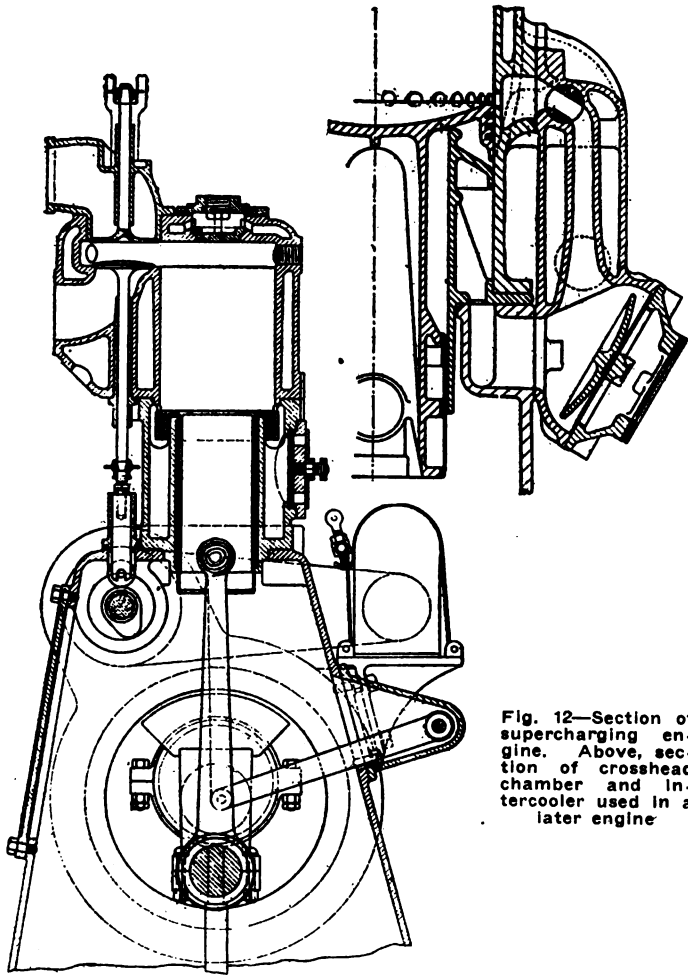


Fig. 12—Section of supercharging engine. Above, section of crosshead chamber and intercooler used in a later engine

first results proved in some respects rather disappointing.

The main object aimed at, namely, the ability to work with a low mean mixture density, proved successful from the start, and it was found that the engine would run perfectly steadily with full supercharge when the charge admitted through the carburetor was rather on the weak side for normal running without supercharge. In spite of the extra work done in pumping on the underside of the piston, both the brake horsepower and consumption were improved by about 5 per cent when supercharging, the gain in indicated efficiency being nearly 10 per cent, which was in very close agreement with the theoretical gain. So long as the supercharge air was used only as a diluent and no attempt was made to increase the mean pressure beyond the increase due to the improved efficiency, all went well, but so soon as an attempt was made to raise the mean pressure to any substantial extent by enriching the mixture admitted through the carburetor, troubles began.

Although the flame temperature was lowered very considerably, as was proved by the gain in efficiency, the average temperature of the cycle was not apparently reduced to the extent that had been anticipated. When running normally with the most economical mixture the brake mean pressure obtained was 106 lb. per sq. in., corresponding to an indicated mean pressure of 121 lb. per sq. in. When supercharging with the same mixture strength the brake mean pressure rose to 112 lb. per sq. in. and the indicated mean pressure to 131.5 lb. per sq. in. When, however, any attempt was made to increase the mean pressure by enriching the mixture, severe detonation was set up which soon resulted in preignition.

At this time very little was known about the phenomenon of detonation, which was supposed to be merely a

premonitory symptom of pre-ignition and not, as is now realized, a perfectly distinct phenomenon, and often the cause but not the symptom of pre-ignition. At that period, however, the author, in common with most others, supposed that detonation and pre-ignition were kindred phenomena and that they were dependent solely upon the temperature of compression. This theory, however, did not appear at all satisfactory, for it was clear that the compression temperature must depend upon the ratio of compression and the initial temperature of the gases in the cylinder; since, however, the compression ratio in the cylinder was the same whether running normally or supercharging, and since the temperature of the supercharge was not high, while the effect of the scavenging was to replace the highly heated products of combustion remaining in the cylinder at the commencement of the suction with a certain proportion of comparatively cool air, it was difficult to believe that the compression temperature could be higher when supercharging than when running normally.

Lastly, the possibility that any uncooled part within the cylinder, such as the sparking plug points or the exhaust valve head, were reaching a higher temperature when supercharging was disposed of. A water cooled sparking plug was made up, and observation through the exhaust port showed that the exhaust valve, which was at a bright red heat when running normally, fell to a dull red when supercharging. Finally a stream of cold water was directed continuously against the underside of the exhaust valve head. Neither of these expedients proved of much avail. Although the author's belief that detonation and pre-ignition were closely allied and dependent upon temperature had by this time received a considerable shaking, he nevertheless decided to make every possible endeavor to reduce the compression temperature.

The direct passage of air from the crosshead chamber to the cylinder was cut off by a diaphragm, and the air was forced to travel through an intercooler consisting of a nest of small tubes cooled with a liberal supply of cold water, in order to insure that most of the heat of compression in the crosshead chamber and any conducted heat from the piston was removed before the supercharge entered the cylinder. This intercooler, which was destined to play an important and valuable part in the later experiments, had at this stage no effect whatever. Next, in order to increase the effect of the scavenging charge, the exhaust valve was set to open some 66 deg. early, or 10 deg. earlier than before, when, contrary to the author's expectation, the detonation and pre-ignition became far worse, so much so in fact that the engine would not run for any length of time on the supercharge at all, even with the weakest mixtures. This was somewhat of a surprise, and pointed to a new line of investigation altogether. The indicator was next fitted on the intercooler and diagrams were observed while running. It was found that when the exhaust valve opened 56 deg. early, the exhaust pressure in the cylinder at the moment when the ports were opened was slightly in excess of that in the intercooler, with the result that a very small quantity of exhaust gas passed out of the cylinder into the cooler and then back into the cylinder, followed by the air scavenge charge. When, however, the exhaust valve was set to open earlier this did not occur.

As a result of this experiment, the author came to the conclusion that the pure air scavenging charge, instead of flushing out and cooling the cylinder, tended to combine with the products of combustion, some of which were then not completely burned down to  $\text{CO}_2$ , and so assisted in the continuance of combustion during the exhaust stroke. Now the effect of passing some of the products of combustion out of the cylinder, cooling them below the ignition tem-

perature and then re-admitting them, was to prevent or, at all events, greatly reduce the after-burning, and also absorb the heat liberated by reassociation.

The next experiment tried was to open the exhaust valve 52 deg. early, with which setting the pressure in the cylinder was approximately 36 lb. per sq. in. when the ports were opened, with the result that a very substantial proportion of exhaust products passed through the intercooler.

Fig. 16 shows an indicator diagram taken from the intercooler under these conditions. With this setting it was found possible to increase the mean pressure to about 128 lb. per sq. in. on the brake, or 147.5 lb. per sq. in. indicated without detonation. This result appeared to clearly indicate that the lowering of the temperature brought about by eliminating the after-burning during the exhaust stroke had reduced the tendency to detonation and pre-ignition. A number of measurements were made of the heat carried away by the cooling water, both when running normally and when supercharging, and it was found that the proportion of heat carried away was about 6 per cent less when supercharging.

During the same period, namely, the latter part of 1915, the author was carrying out another series of tests on the use of kerosene, and great difficulty was experienced with detonation. The experiment was then tried of admitting along with the kerosene, vapor and air a small proportion of cooled exhaust gases, as is done in the case of coke oven gas-engines; this proved so completely successful in eliminating detonation, and with it all tendency to pre-ignition, that the experiment was tried of admitting a small proportion of cooled exhaust gas into the cylinder of the supercharging engine along with the fuel and air through the main inlet valve. This had the immediate effect of entirely eliminating all tendency to detonate, and it was found possible, by merely enriching the mixture, to raise the brake mean pressure to 140 lb. per sq. in. and the indicated to 159.5 lb. per sq. in., which was the highest limit attainable, the whole of the supercharge air being then required for complete combustion of the fuel. The quantity of exhaust gas admitted in this manner was extremely small, and yet its influence was remarkable.

#### Effect of Exhaust Valve Timing

The effect of this experiment was to raise doubts in the author's mind as to whether the after-burning during the exhaust stroke had really been the cause of the troublesome detonation. The exhaust cam was therefore set back to open the valve 66 deg. early, and a further test was made with cooled exhaust gas admitted through the carbureter, when it was found that the mean pressure could still be raised until the whole of the supercharge was saturated without being troubled with detonation, though a somewhat greater quantity of exhaust gas was required under these conditions. This proved that the general rise of temperature due to after-burning was not largely responsible for the detonation, and it seemed probable that the most significant effect of opening the exhaust valve late was that a proportion of the exhaust gases passing through the intercooler did not re-enter the cylinder during the scavenging period, but remained in the crosshead chamber, and were re-admitted along with the supercharge. As it might be rather inconvenient to admit exhaust gas through the carbureter in the case of a multi-cylinder aero engine, the possibility of admitting it along with the supercharge, and at the same time scavenging with cooled exhaust gas, was far more attractive. Accordingly, the exhaust valve was set to open 48 deg. early, so that the pressure in the cylinder was still about 50 lb. per sq. in. when the ports were uncovered, and probably nearly one-third of the total exhaust products passed through the intercooler, for the maximum pressure in the crosshead

chamber rose momentarily from 12 to 28 lb. per sq. in. Under these circumstances the scavenging charge consisted mostly of cooled exhaust gas with a relatively small proportion of air, while the supercharge consisted mainly of air, but with a small proportion of cooled exhaust gas.

With this setting the engine behaved satisfactorily in every respect, and both objects were attained, for on the one hand the engine could be run on a low temperature cycle, using the supercharge as a diluent, and so attain a very high thermal efficiency, and, on the other hand, the supercharge could, when desired, be used as an addition to the active working fluid, and a very high power output could be obtained, while of course any compromise was available between these two limits.

In Fig. 17 is shown a typical indicator diagram taken with the engine running normally and when supercharging—the fuel consumption and speed being the same in both cases.

#### The Effect of Certain Refinements

Having achieved the main objects the next step was to pay attention to refinements, and a number of minor improvements were made.

1. It was found, as might be expected, that the relatively early closing of the inlet valve caused some loss of volumetric efficiency, though this was compensated for to some extent, for when supercharging, the lower the pressure in the cylinder the greater the pressure-difference between that and the crosshead chamber, and therefore the greater the proportion of supercharge which entered. The inlet valve was already very large and the acceleration of the valve gear was very nearly up to the limit, so that little could be done in that direction; but the expedient of recessing the seating of the inlet valve, so that it formed a mask was adopted. The valve then acted as a piston valve, giving a very quick cut off when entering the recess or mask, after which it could be closed on to its seating at leisure; since the pressure-difference on either side of the valve was relatively small during the period of entry of the supercharge and the early part of the compression stroke, the leakage between the valve and the mask was very slight. This simple expedient proved successful, and has been used in all the tank engines and other engines the author has since designed, whether supercharged or not. The effect in the case of the engine in question was to increase the brake mean pressure when running normally from 106 to 109 lb. per sq. in. at 1500 revs. per minute, and when supercharging from 146 to 147.5 lb. per sq. in.

2. The intercooler, which originally consisted of a nest of very small tubes, was changed to a single flattened tube. The small tubes with their many soldered joints were a source of weakness, and since the function of the cooler had changed from that of cooling an already fairly cool air supercharge to that of cooling a relatively small quantity of very hot exhaust gas, it was obvious that a greatly reduced cooling surface would suffice.

3. It was found that the degree of stratification could be further extended and the economy and economical range of the engine could be increased by checking the rate of entry of the supercharge into the cylinder, and also by making the top of the piston concave, which further encouraged the supercharge air to form a layer over the piston. In order to check the rate of entry a baffle was provided in crosshead chamber near entry to intercooler.

4. The effect of cooled exhaust gases in checking detonation was so impressive that it was decided to raise the compression ratio from 4.7 to 5.1:1. Still higher compression ratios up to 6:1 were tried and, although the economy was improved in proportion to the compression, it was then found necessary to add so much inert gas to

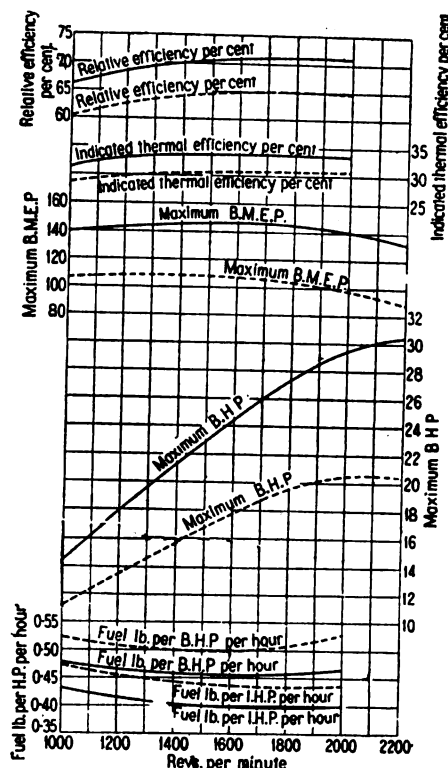


Fig. 18 — Performance curves of supercharging engine. Full lines with supercharger in operation. Dotted lines supercharger not in operation.

the supercharge that the maximum power output was decreased.

With these modifications, the experiments so far as this engine was concerned were completed. The results obtained may be summarized as follows:

#### NORMAL RUNNING

Experimental supercharging engine: 110 mm. bore  $\times$  150 mm. stroke ( $4.33 \times 5.92$  in.). Compression ratio 5.0 : 1.

Revs. per Min.	Max. B.h.p.	Max. B.M.E.P.	B.M.E.P. at Most Economical Load	Fuel, Lb. per B.h.p. per Hr.	Fuel, Lb. per I.h.p. per Hr.	Ind. Thermal Efficiency Per Cent	Relative Efficiency Per Cent
1000	11.2	106	103-105	0.525	0.475	28.6	60.3
1200	13.5	108	104-106	0.510	0.455	29.9	63.0
1400	15.9	109	105-107	0.501	0.443	30.7	64.6
1600	17.9	108	104-106	0.502	0.44	30.9	65.0
1800	19.7	105	101-103	0.515	0.438	31.0	65.3
2000	20.6	99	95-97	0.535	0.440	30.9	65.0
2200	20.5	90	.....	.....	.....	...	...

#### SUPERCHARGING

Revs. per Min.	Max. B.h.p.	Max. B.M.E.P.	B.M.E.P. at Most Economical Load	Fuel, Lb. per B.h.p. per Hr.	Fuel, Lb. per I.h.p. per Hr.	Ind. Thermal Efficiency Per Cent	Relative Efficiency Per Cent
1000	14.7	140	110-135	0.483	0.484	31.4	66.2
1200	18.0	143	112-137	0.465	0.416	32.7	68.8
1400	21.2	146	115-140	0.461	0.408	33.4	70.3
1600	24.6	148	115-142	0.459	0.402	33.8	71.3
1800	27.5	146	115-140	0.461	0.400	34.0	71.6
2000	29.6	141	112-136	0.470	0.405	33.7	71.0
2200	30.5	133	.....	.....	.....	...	...

It may be argued that the normal power and efficiency of the engine were, compared with present-day practice, rather poor, but it must be remembered that the engine was designed nearly seven years ago, and also that the combustion head with valves in a side pocket was not of the form to give either the best power or economy.

It is obvious, however, that the percentage of improvement over normal running, both as regards power and economy, by the employment of a stratified supercharge will hold good whatever the normal performance may be.

The main object of all these experiments has been the application of the system to aircraft, the principal advantages being:

1. A very much greater increase of power in proportion to the increase of weight, the increase of weight being approximately 10 per cent, while the increase of power with fully saturated supercharge was nearly 40 per cent.

2. The method provides automatically a means of compensation for altitude. If on the ground the carburetor is set to give a normal weak mixture, then the whole of the supercharge air is acting merely as a diluent, giving improved economy and a slight increase in power. As the machine rises the flow of gasoline through the jet decreases as the square root of the density, while the weight of air decreases directly as the density; hence the mixture supplied by the carburetor gradually becomes richer and more and more of the supercharge is used as active working fluid, until at about 15,000 ft. the whole of the supercharge air is saturated. From ground level, therefore, to 15,000 ft. the power of the engine will decrease only as the square root of the density instead of directly as the density, as in the case of a normal engine, while throughout the whole of this range there will always be an excess of air present in the cylinder sufficient to ensure complete combustion, and the maintenance of conditions ensuring maximum economy.

3. In a multiple cylinder engine any lack of uniformity in distribution is corrected, since if any one cylinder receives a richer mixture than the others, instead of the fuel being wasted, more of the supercharge air in that cylinder is carbureted and the power output increased.

All the experiments referred to above were carried out during the years 1915 and 1916. During 1916, when the results had reached a reasonably satisfactory stage, an order was placed to build a twelve-cylinder supercharging engine of 600 b.h.p. At that date this was, to say the least of it, an extremely ambitious undertaking, but such an engine was actually built, though progress was necessarily very slow, and all official interest in the engine was lost and the engine had become thoroughly out of date long before its completion. On test, this engine actually developed over 700 b.h.p., but the main crankcase casting proved defective and developed serious cracks.

It will be apparent from the above description of the experiments that although the system of supercharging with a stratified charge can be made to give the performance that might be expected from purely theoretical consideration, yet it is rather sensitive. Much for instance depends upon the opening diagram of the exhaust valve and the closing diagram of the inlet valve, on the capacity of the intercooler and crosshead chamber, and on the position and area of the baffle, etc.

Throughout 1917 and 1918 the engine was entirely monopolized for carrying out tests relating to the tank engines, and since the armistice it has been devoted to carrying out tests on fuels, for which purpose the use of supercharging proved invaluable. A great deal of information has been obtained during the four years which have elapsed since the experiments were broken off, and many of the problems which puzzled the author at that time have now been cleared up. With the knowledge now available as to the phenomena of detonation, as to the important influence of combustion chamber design, and as to the treatment and influence of different fuels, very great improvements could undoubtedly be made. It is hoped shortly to build a larger and more up-to-date experimental engine on generally similar lines but embodying all the most recent information.

SWITZERLAND imported the following quantities of automobiles in metric tons during the years mentioned: 1913, 1059 metric tons; 1919, 5606 metric tons; 1920, 11,747 metric tons. The imports of automobiles into Switzerland during the same years were as follows: 1913, 2171 metric tons; 1919, 2668 metric tons; 1920, 1801 metric tons. It will be noted that not only are the Swiss exports of automobiles much smaller than the exports, but the exports have actually declined since 1913.

# Economy and Efficiency Increased by New Final Assembly System

Many assembly difficulties were surmounted in installing the new final assembly system described here. The equipment had to be adapted to buildings already in use. High efficiency has been attained despite the necessity of turning corners. Methods of equipment are discussed.

By Norman G. Shidle

**S**OMETIMES a production layout can be designed before any structures have been built in which to house it. In such cases the buildings can be erected to conform with the most efficient production system as determined from a study of the theoretical possibilities. This situation is not common, however, in actual manufacturing. More often the production engineer is compelled to adapt his system and methods to a building or set of buildings already erected and perhaps previously used for some other purpose.

Because this latter case is the more usual, a plant in which the adaptation has recently been made with special success furnishes an interesting example for study. Although compelled by the construction of the buildings to take a number of turns, an efficient final assembly system has been put in operation at the Franklin Automobile Company and has already proved its economy in the few months since its installation.

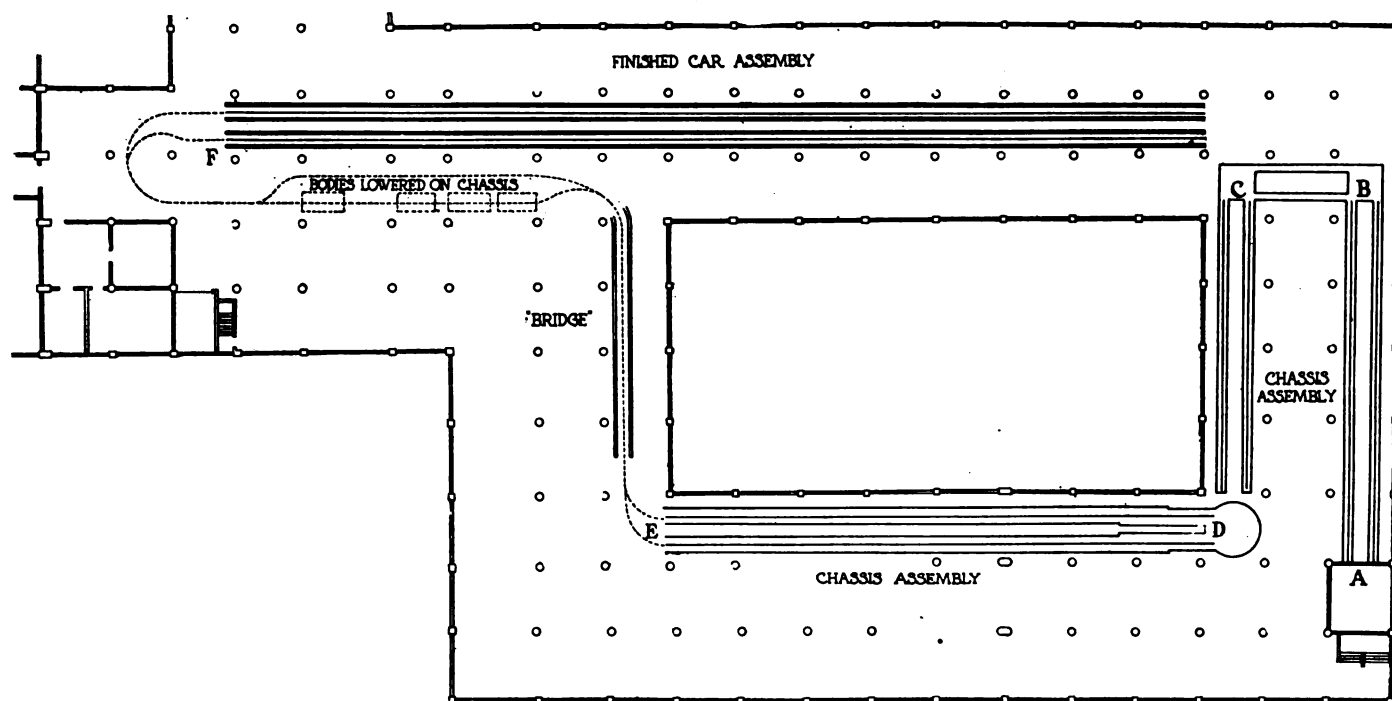
This final assembly system is divided into two parts, namely, the chassis assembly and the finished car lines. The mechanical conveyor equipment for each line is different, the chassis conveyor being a single chain, and the final car assembly conveyor being a two-belt conveyor operating

over rollers. The chassis rests on trucks while on the chassis assembly line, the truck hooking on to the conveyor. When the chassis reaches the finished car line, however, the wheels rest on two moving belts.

A feature of the Franklin practice of special interest at present is the effective utilization of excess equipment with the consequent reduction in unit costs. The conveyor equipment on these final assembly lines is capable of handling over 100 cars a day, while production at present is being held at forty a day. There are two conveyor lines for the chassis assembly and two for the final car assembly, but only one of each is in active use.

The excess equipment, however, is being efficiently used, as will be brought out in the following detailed description. This point is emphasized, however, because it is of great importance just now in many plants. The methods used here may furnish ideas for similar methods elsewhere, whether in connection with assembly or other production work.

The chassis assembly line begins at point A indicated on the floor plan shown in Fig. 1. The front and rear axle and spring assembly is brought to the assembly line in completed form. A few minor operations are completed



Floor plan of chassis and final car assembly layout.

before the frame is placed on the conveyor. These include such operations as assembling bearings to shaft, shaping brake bands, filling and assembling grease cups, assembly ball and spring box steering gear connection, assembling end of emergency brake rods, etc.

Two specially constructed trucks carry each chassis as it moves along the conveyor. These trucks are so constructed as to hold the chassis some four feet off the ground during the first few operations and then to allow the lowering of the chassis to a height of about two feet for the remaining operations. Detailed drawings of one of these trucks are shown in Fig. 2.

The first man performs several operations after the frame has started to move on the chassis conveyor. He assembles the hood holder hinge, bolts for running board, battery box, front and rear bolster bolts, elevator bolts for muffler. Then by means of a power hoist he turns the sill over and it goes on to the next set of operations. Fig. 3 shows the beginning of the chassis assembly line.

While in inverse position, the following units are assembled to the sill: running board bolts, muffler, muffler tail pipe, trunnion support brackets, foot lever springs. The gas tank bracket holes are reamed at this point. The sill is then returned to its upright position.

Two men work together on the next set of assembly operations. They put into place the emergency brake lever, the gas line, horn bracket, battery box supports, emergency brake rod, and the running board.

After the sill blocks have been assembled, the rear axle is put into place and the cardinal shaft is lined up. The sill is returned to its upright position after the rear axle has been assembled.

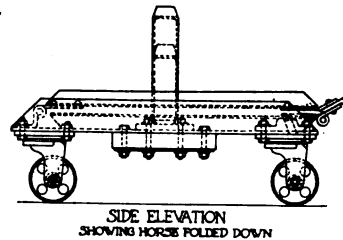
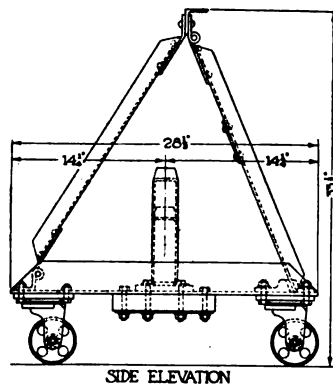


Fig. 2—Special trucks on which chassis is carried over conveyor line

This completes the first stage of the journey. The chassis has then reached the point marked "B" on the floor plan. The trucks are loosed from the conveyor chain and following grooves in the concrete floor, which serve as tracks, is pushed across to the second part of the chassis assembly conveyor line. During its trip across, as shown in Fig. 4, the front and rear wheels are assembled together with the battery box cover, the gas tank, and gas tank filler. The trucks are then caught on the next conveyor line, which begins at the point marked "C."

An adjustment operation is the first one on this line. Two men line up and adjust the emergency brake bands and assemble the gas tank filler. The engine is then put into place. In bringing the engine to this point in the assembly line, a part of the excess equipment, previously referred to, is being utilized. The engines come from the sub-assembly to the far end of the final car assembly line near the point marked "F" on the ground plan.

Since only one of the conveyor lines is being used at present, the engines are transported the length of the building on the second final car conveyor. Thus they are brought to the point "C" on the chassis assembly line at which they are put into place. When both final car conveyors are in use, a separate conveyor will be used for carrying the motors to the place of assembly. Fig. 5 shows the motors on one conveyor and the final car assembly on the other.

After the motor has been aligned and bolted down, the trunnion support rod is assembled, the spark plugs are set and the H. T. wire conduit put in place. The chassis then

passes to the next workers, who line up and bolt down the transmission. They also assemble the foot levers to the transmission rail, put on the steering device and tighten the spark-plugs.

A group of three men performs the next operation, which consists of assembling the front drive shaft flange, placing ball on change gear lever handle, tightening valve caps, assembling battery box holder bolts, fastening spring to foot lever, and assembling engine boots to engine base. In the next operation the starter cable is assembled and the lower flywheel guard adjusted.

The next operation brings the chassis to the end of the second leg of its trip. Here three men perform a number of minor adjustment operations, such as reaming holes and shaping lower flywheel guard, lining up the wheels, assembling diagonal rod to steering device, etc. These operations are preparatory to the first engineering inspection. This inspection is very minute and every detail of assembly and adjustment is carefully checked up. All defects and troubles are listed and the list is passed on with the chassis to the next man, whose task it is to make the necessary repairs and readjustments before the chassis proceeds farther.

When these repairs have been finished the car is ready for the third stage of its journey. As it comes off this conveyor the trucks are removed, and the chassis is run on to a round table, as shown in Fig. 6. This round table swings the chassis around the corner and in position to catch on the third leg of the conveyor system at the point marked "D."

Here the upper flywheel guard and the diaphragm are assembled, the gas line is straightened, the carbure

ter throttle lever put in place, and the junction box is assembled to the sill. The next operation is performed by a group of three men and consists of assembling the front engine jacket, oiling all running parts, assembling pivot bolt cups, knuckle bolt, muffler exhaust pipes and muffler exhaust pipe bracket. Then the drain cock handles are assembled complete, the muffler exhaust stamping box is tightened, the heater pipes are assembled, and the linoleum is fitted and tacked to the chassis.

A second engineering inspection, followed by the necessary repairs and readjustments, then takes place. This is followed by a final engineering inspection with other repairs and readjustments.

Necessary painting is then done of the top of the chassis, the hub caps are put on, the front guards are assembled to the running board and a few minor drilling operations are performed. The chassis is run off the conveyor line at the point marked "E" and on to "bridge," which permits the accomplishment of necessary work underneath the car. This "bridge," shown in Fig. 7, is equipped with a power conveyor which carries the chassis from the floor level. While on the bridge the front guards are assembled to the sill, the seat pedals are finally assembled, and the necessary painting underneath the car is done. The running board shields are assembled and the completed chassis is run off the bridge and into position for receiving the body as indicated by the lines on the floor plan.

This completes the twenty-one operations on the chassis assembly line. Forty-five men are required for the regular work on this line, while four utility men are employed for



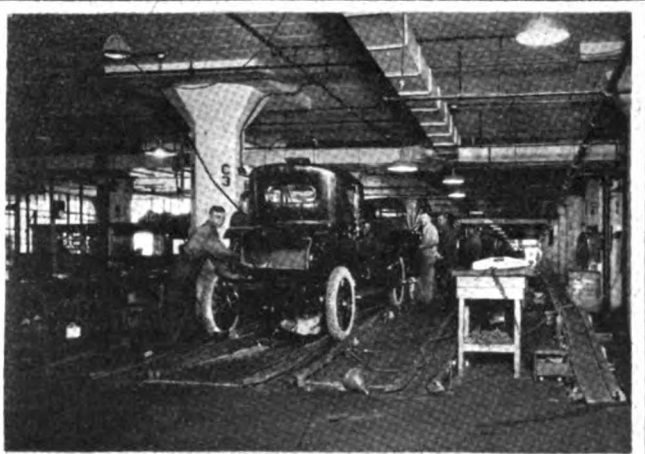
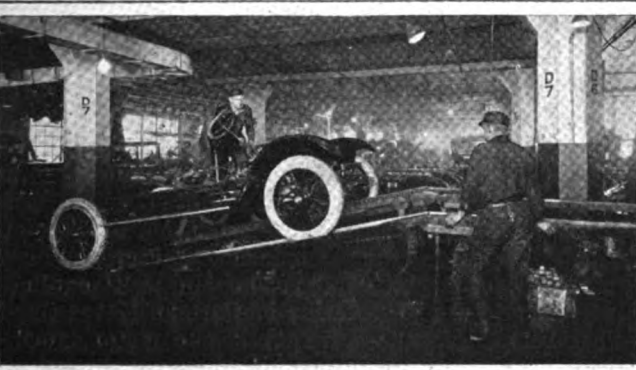
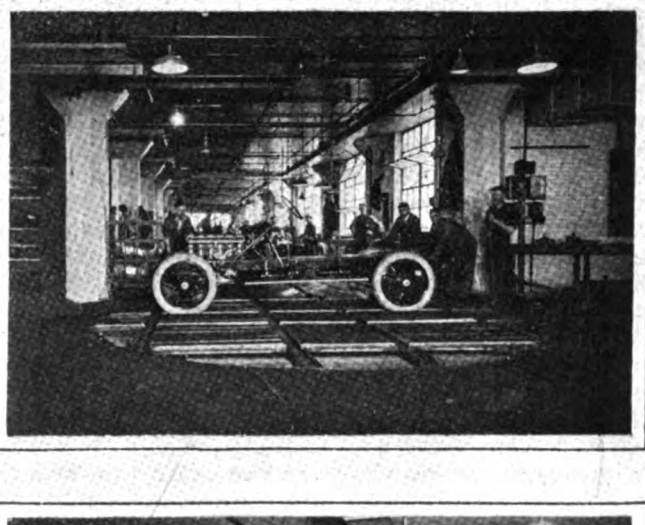
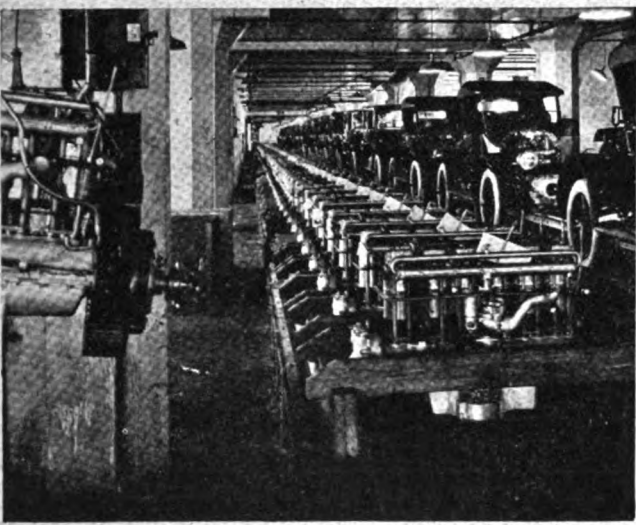
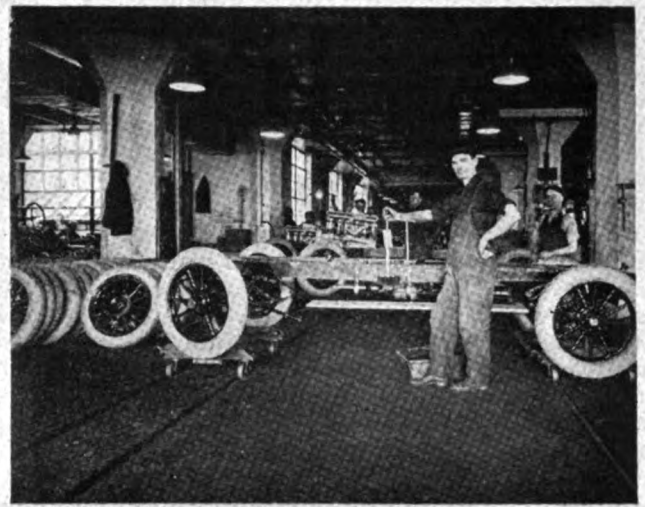
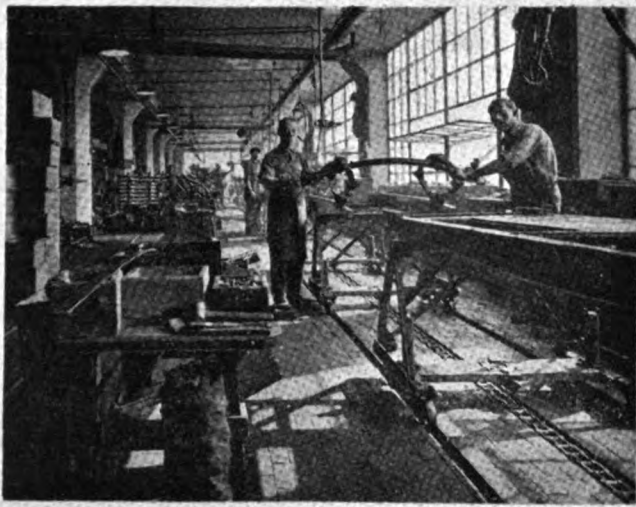


Fig. 3 (Top)—Beginning of chassis assembly line

Fig. 5 (Center)—Showing utilization of second final car assembly conveyor for transporting engines to assembly point

Fig. 7 (Bottom)—Chassis pulled on to "bridge" by power conveyor

Fig. 4 (Top)—First turn in assembly line; wheels assembled at this point

Fig. 6 (Center)—The round table at the second turn in the assembly line

Fig. 8 (Bottom)—Beginning of final car assembly line

general work and for filling in gaps. There is also one working master workman, bringing the total men on the chassis line to fifty. The conveyor on the chassis line moves at the rate of 1 2/3 ft. per minute. This produces the quota of forty a day in 8.7 hours.

The body is lowered on the chassis by means of an overhead crane. The horn wires are assembled to the decks, the horn and headlight wires are attached to the sill, the wires are packed under the cowl and the upper carburetor heater wire is connected. The body is then assembled to the chassis. The chassis with the body attached is then run on to the final car assembly conveyor, Fig. 8.

There are other detailed operations in connection with the body work, but since a change in methods is contemplated in the near future, these details need not be discussed. Twenty-eight men are used in the body assembly work. A plan is now under way to utilize the extra chassis conveyor for the body assembly work. This would put the body assembly on a progressive assembly basis and make for greater efficiency, while there would be no added equipment cost since only equipment now idle would be utilized in making the improvement.

The chassis and body now start down the final leg of the assembly run, beginning at the point marked "F" on the plan. The next operation is that of assembling the rear guards and sill finishing strips and fastening the running board shields to the body. From this point to the end of the final car line there are twelve more operations to be performed. The first of these consists in nailing back curtains to the body, assembling the back curtain complete and assembling the headlight brackets.

This is followed by the toe and floorboard assembly. Next the rear rocker carpets, upholstering, seats, bags, etc., are put in place and the mud apron and headlights are attached. The steering device clamp is next attached, followed by the front and rear mats, the foot lever pads, the dash air control, and the needle valve. This operation is completed by the assembly of the oil can holder, the connecting of the speedometer cable and transmission and the placing of the bell crank.

The next operation includes the assembly of the vacuum tank hush pipe, suction yoke heater, and dash control. The wiring is completely assembled after this and the necessary painting is done. Next the hood is roughly fitted to the dash and the hood V blocks and hood locks are located and assembled. The assembly of hood hinge pins and engine jacket filler constitute the next operation, while the last operation before the engineering inspection consists in finish fitting the hood complete. The usual repairs and adjustments then follow the engineering inspection. The car is then given a final engineering inspection and is practically at the end of its trip. Final repairs and adjustments remain to be made, while a few minor assembly operations, such as assembling brackets on hoods, etc., complete the assembly process.

There are sixteen operations performed on the final car assembly line, forty-four men being used on this job.

This description completes the mechanical phases of this newly installed assembly conveyor system. The results attained have been excellent and are dependent partly upon this mechanical equipment and partly upon the human phases of the production methods in use at this plant.

Since the introduction of this conveyor system a few months ago there has been a decided increase in the production per man. Grouping together the chassis and the final car assembly system, some thirty less men are being used than heretofore to produce the forty car a day quota. For the chassis, body, and final car assembly there are now 131 men used.

There are other factors besides that of the regularity of effort enforced by a moving conveyor, however, which

operate to increase production per man. One of these factors is the goodwill which the management has engendered among the workers.

Because of the unemployment situation there has been an increased individual efficiency noted in practically every plant. This has been the case at Franklin as well as elsewhere. Not only has actual working efficiency increased, but regularity of attendance has become much more common. Every man is there every day, ready to work all day unless something very serious keeps him away. It is not necessary to carry as many extra men to insure a given production.

An unusual feature of the results at this plant is that production per man was increased when the men were taken off piece work and put on a day work basis. The moving conveyor, of course, maintains a scheduled output, but the experience of increasing production when changing to a day rate basis is not common. It is true, however, that wages have not been cut at this plant since the industrial depression set in and the men on these assembly lines are earning as high wages as at any previous time. Thus far wages have been maintained through an increase in individual efficiency and closer study of detailed production factors.

Another factor which should be mentioned is that the men are encouraged to make suggestions for improvements in production methods. Prizes are offered for adopted suggestions and the pictures of those presenting such suggestions are given prominence in the company house organ. There have been several such suggestions adopted in connection with these assembly lines. While the suggestions related to minor phases of production, they each made for greater efficiency. In addition to the actual value of the suggestions, moreover, must be considered the potential value of the increased interest in the work thus aroused among all the workmen on the line.

It is through the effective correlation of the mechanical and human phases of production activity that the excellent results have been recorded at this plant. It is an achievement for an automobile plant to be producing at this time two-thirds of the highest production ever recorded for the factory. The frankness of the management with the men, the real facts and information presented to the men in the company house organ, and the honest attempt to give the workmen a fair deal in every way has undoubtedly played an important part in making possible that achievement. All increases in production efficiency are not made in the office of the production manager.

**V**ARIOUS large bodies interested in the use of automobiles and motor trucks in Germany recently had a meeting to organize with a view of combating a proposed heavy increase in the tax on automobiles. The organizations represented were the Automobile Club of Germany, the General German Automobile Club, the German Brewers' Union, the Association of Automobile-Using Physicians, the Association of Automobile Dealers, the Association of Carriage and Automobile Body Builders and the Association of German Motor Car Manufacturers. Recently automobile and motor truck owners have not only been compelled to pay heavy annual registration fees, but in many instances counties and even communes have levied taxes on cars and trucks. Against this practice it is urged that if it were not for the use of the motor truck many industries would show less profits or no profits at all and hence would not be able to bear such heavy tax burdens. It is not planned to oppose any increase in automobile taxation, but merely to work against the imposition of prohibitive taxes which would prevent the creation of new wealth through transportation.

# Progressive Production Methods Applied to Body Building

The application of quantity production methods to body building is limited by the dependence of the body builders on car production conditions. A high degree of efficiency is possible, however, as is evidenced by the system described. Kiln drying lumber is an important phase.

By George J. Mercer

**W**HEN a body building plant grows to a large size it shares with other industries the necessity for quantity production methods, together with the maintenance of high quality of product. Under such circumstances it is often advisable for the body manufacturer to control rather directly a large part of his sources of material supply.

Certain features of body building practice, however, place a definite limit on the extent to which quantity production methods and automatic machinery can replace human skill and effort. A great deal of hand work is necessary in the actual production of bodies. Then, too, body production must always depend for its rate of production upon the status of car production. The body plant cannot go forward with production until the car factory is in operation. Moreover, the body plant usually must be equipped to handle a variety of designs and materials and to provide bodies for different kinds of chassis. Consequently, it is often necessary to change the set-up of tools and equipment from season to season.

While the dies and jigs in the shop must be changed for each design, a large part of the raw stock, such as lumber and sheet metal, can be bought in quantities and stored ahead, since it is purchased in sizes that are suitable for almost any model.

An examination of the methods used in producing several body models for Chevrolet, Reo and Oldsmobile at the Hayes-Iona Company furnishes an excellent illustration of body building practice. The bodies made at

this plant include the Chevrolet FB sedans and coupes, Chevrolet 490 sedans and coupes, Reo sedans and coupes and Oldsmobile sedans. The daily capacity of the plant is 65 completely painted and trimmed bodies. The accompanying photographs will aid in describing the routing of work and the progressive production system used in maintaining this production.

It is common knowledge that properly dried lumber is essential to the proper construction of composition bodies. Even though lumber be of the highest quality, it will shrink away at the joints and cause trouble during machining and assembling operations if it has not been properly dried. Such shrinking causes the frame to be weak and unstable, thus putting on the panels undue distortion strains.

Thus adequate kiln facilities are of primary importance, while their location as related to the mill and supply source is a production factor necessary to consider. Fig. 1 shows the kilns used at this plant. Kilns line both sides of the central track, which connects the lumber pile to the mill room.

Two kinds of kiln are used, the compartment kiln and the progressive kiln. In the compartment kiln the moisture is forced through the planks when they are first put in. An attendant watches and records the daily condition of the drying process. In the progressive kiln tiny jets of steam are in continuous operation at one end of the kiln. The planks go in at this end and daily progress toward the opposite end. By the time they have

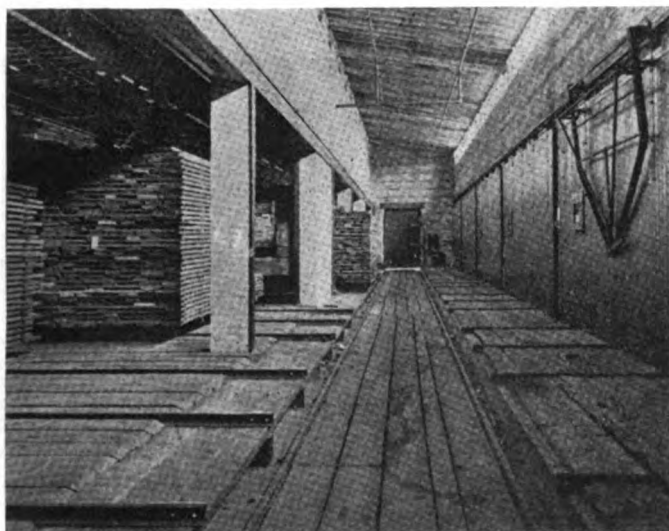


Fig. 1—Dry kilns



Fig. 2—Mill room, showing cut-off saws

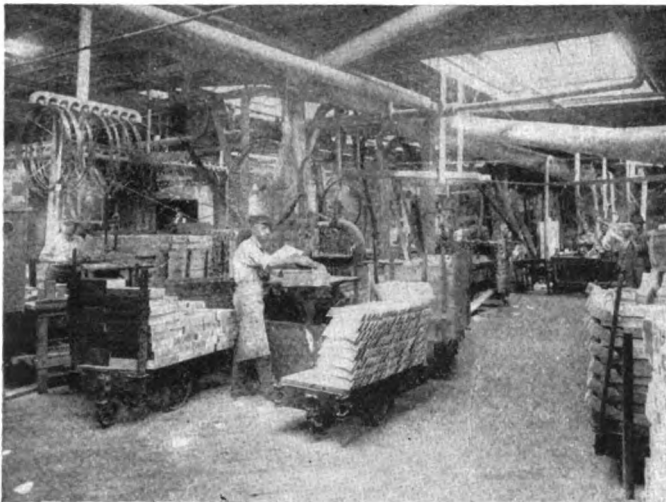


Fig. 3—Mill machine room, showing band saws



Fig. 4—Mill finished stock room

passed clear through the kiln they are dry and ready for removal.

The capacity of these kilns is 18,000 feet per day. The mill room requires approximately 300 feet for every closed body, though the exact requirements vary with different models.

The mill room, shown in Fig. 2, is adjacent to the kilns. In the mill room the planks are cut into lengths for machine operations. The band-sawing operation is shown in Fig. 3, while Fig. 4 shows the dressed stock ready for the frame assemblers. Fig. 5 shows the frames completely assembled and ready for the panelers. The following machines are shown in Fig. 3:

- 4—Swing cut-off saws.
- 4—Band rip saws.
- 3—Planers.
- 2—Automatic feed jointers.
- 2—Linderman machines.
- 1—Double end tenoners.
- 4—Single end tenoners.
- 4—Multiple boring machines.
- 3—Single boring machines.
- 3—Hollow chisel mortisers.
- 1—Chain mortiser.
- 4—Routers.
- 3—Stickers.
- 8—Band saws.
- 8—Mitre saws.
- 10—Shapers.
- 1—Sill shaper.
- 1—Sill gaining machine.

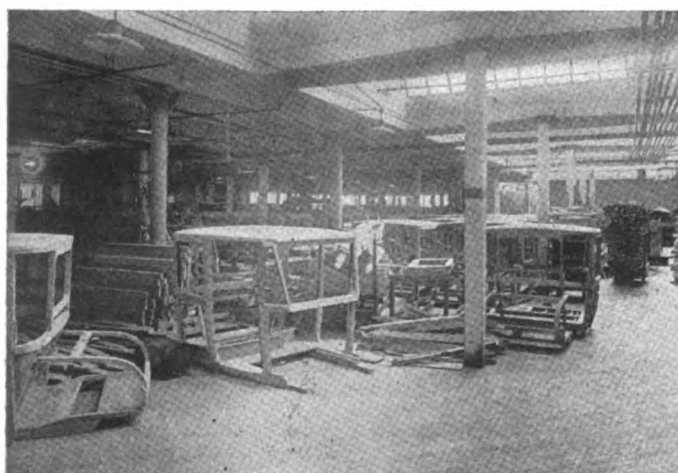


Fig. 5—Framing department

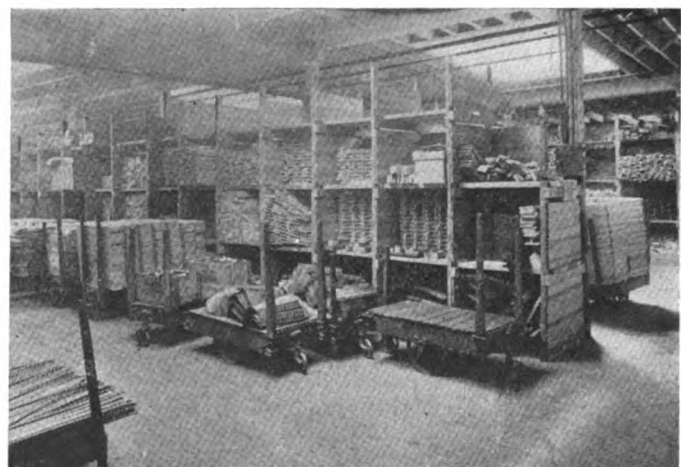


Fig. 6—Finished stock room

- 2—Screwing machines.
- 2—Sand belts.
- 1—Band resaw.

Many of these machines are motor driven, and others are being similarly equipped as rapidly as conditions warrant the change.

Figs. 6 to 16 illustrate various phases of the progressive production system. Each photograph is adequately explained by its caption, and a study of the group in the order indicated will bring out the various steps in production.

The actual work of production starts simultaneously in the mill department and in the metal stamping and forming department. The layout of the department may be likened to an inverted letter Y, the two departments named being at the extreme ends of the angle. The paneling department is at the apex of the angle. From this point onward the various departments are laid out in a straight line.

Drawings and specifications are made up, of course, in the engineering department. From here they are forwarded to the sample and tool rooms. There the patterns, templates, jigs and forms are made and tested. They are then released to the production departments that require them.

Raw metal stock room is shown in Fig. 7. Here enough metal is stored to produce 50 closed bodies per day. The metal is chiefly 22 gage, approximately 1/32 in. in thickness and weighs 1½ lb. per square foot. Each body



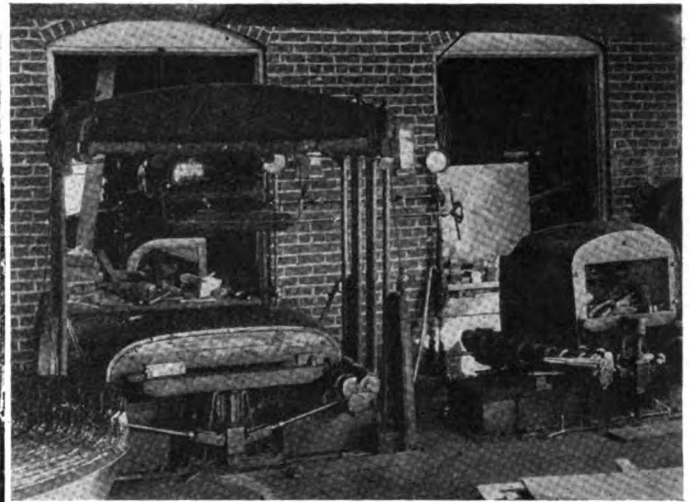
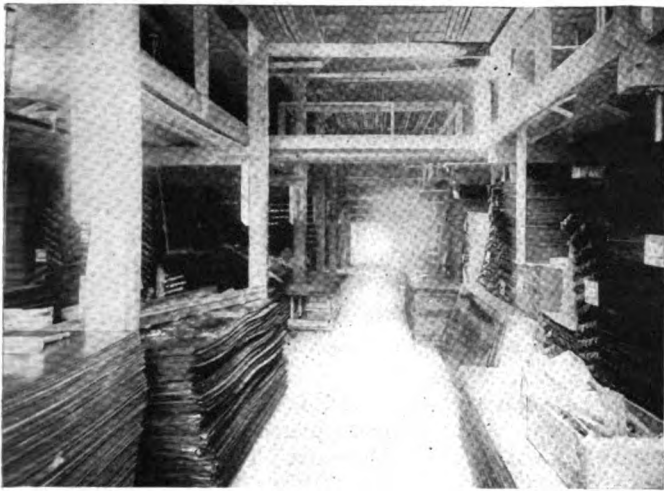


Fig. 7—Metal raw stock room. Fig. 8—Machine used for forming metal shrouds when order is not large enough to warrant making of dies. A form, the shape of the shroud, is placed over a hydraulic ram, and the sheet is laid in this form. The ram forces the form up into the sheet.

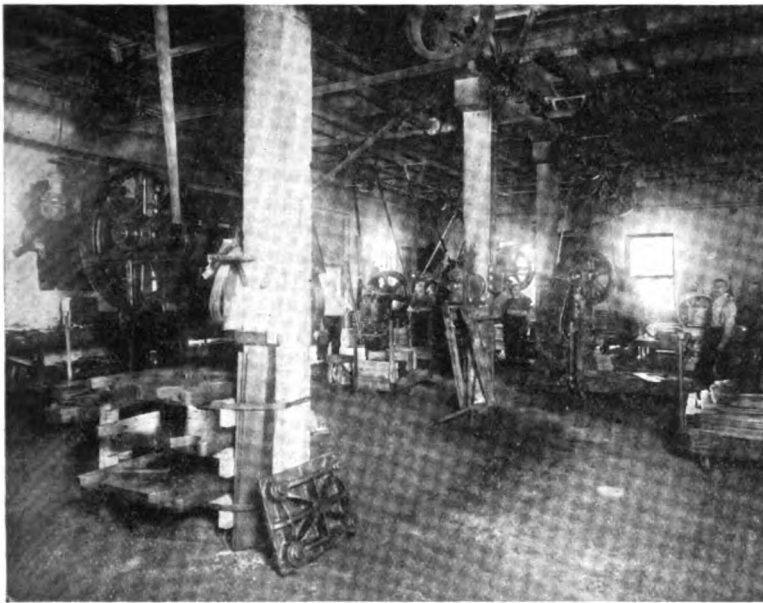


Fig. 9—Metal department

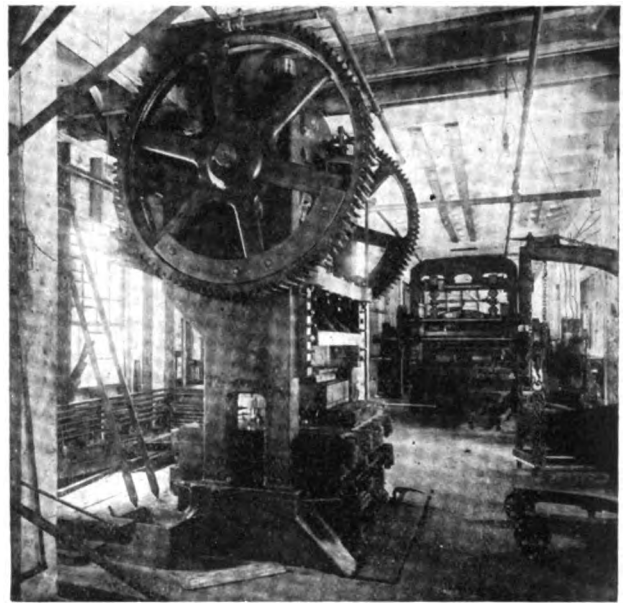


Fig. 10—Large metal presses



Fig. 11—Finished stampings

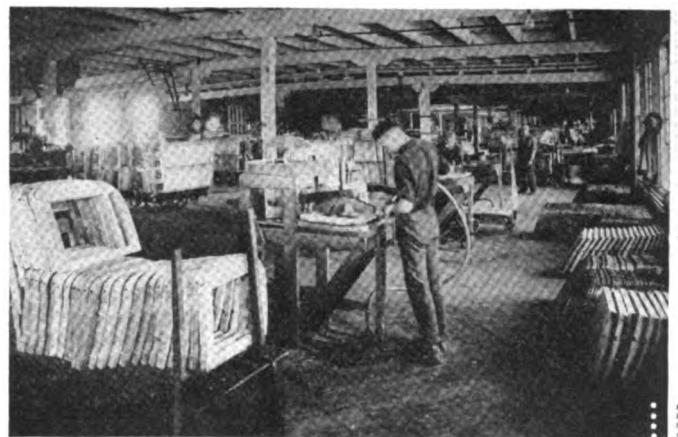


Fig. 12—Forming overlay of touring body doors



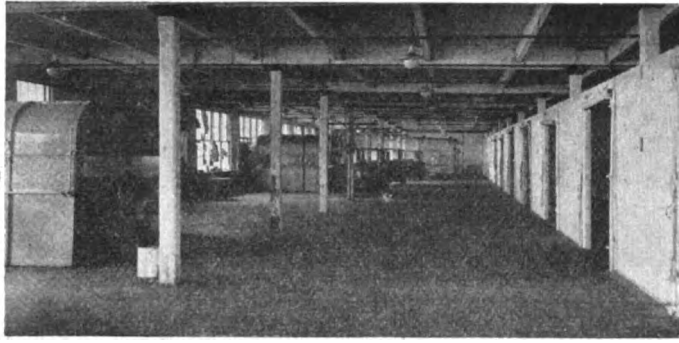


Fig. 13—Paint spray booths and drying ovens



Fig. 14—Cutting operation in trim department

requires for paneling and waste about 240 sq. ft., or 300 lb., of metal. The following machines perform the metal work required:

- 7—Power hammers.
  - 2—Square shears.
  - 3—Rotary shears.
  - 10—Drill presses.
  - 2—Sets metal rollers.
  - 2—Metal band saws.
  - 4—Spot welders.
  - 2—Heading machines.
  - 7—Acetylene welding outfits.
  - 2—Metal breaking machines.
  - 1—Threading machine.
  - 1—Rattler.
  - 2—Folding machines.
  - 25—Air grinders.
  - 22—Metal forming and punch presses, varying from small punch presses to large forming presses used for the large body panels.
  - 1—Large hydraulic press for shrouds and back panels.
- The work is routed as follows:
1. Wood parts are brought from the machine room or frame room, where first assembly takes place, to the paneling room.
  2. The metal stamped panels are assembled in the paneling room.
  3. The shell is then forwarded to the door hanging room where the doors are assembled. The body is then ready for its first coat of paint.

Before the paint is applied the surface of the panels is treated with a bath of Dioxodene. This preparation

is applied with a brush and is then washed off with water. Live steam is then turned on the body and is later dried with compressed air. Thus all corners and moldings are cleaned thoroughly. Since Dioxodene is detrimental to paint, the cleaning process must be performed very carefully. This method of cleaning has superseded the use of the sandblast, because the sand occasioned trouble in the hinges and other parts. The sand cleaned the rust off satisfactorily, but added another trouble more difficult to overcome.

The paint spray booths and drying ovens represent a saving in time of from 40 to 80 hours over methods formerly used. The heat is applied from 160 to 180 deg., and the time consumed in completely painting the body is seven or eight days. The painting process is carried as far as the first color varnish. The final rubbing down and varnish is put on by the customer after the shipment has been received at the home factory.

From the paint shop the body goes to the trim shop and from there to the final assembly department, where the glass, windshield and mountings are put on. Then, after a final inspection, the bodies are ready for shipment.

**T**HE Trompenburg Automobile Works of Trompenburg, Holland, manufacturers of the Spyker six-cylinder car, have secured a license from the Mathis Automobile Co., Strasbourg, Alsace, for the manufacture in Holland of the small four-cylinder 2.36 x 3.94 in. Mathis car.



Fig. 15—(Above)—Finished bodies

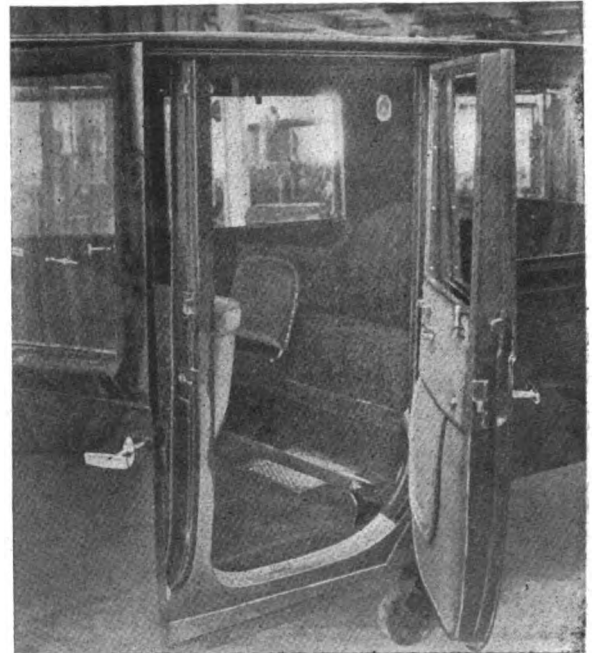


Fig. 16—(Right)—Interior view of finished body

## Exports of Automobiles and Tires for May, 1921

COUNTRIES	COMMERCIAL		PASSENGER				Parts	TIRES			All Other Tires	
	Complete Cars	Chassis	Complete Cars	Chassis	Casings	Inner		Solid				
Europe												
Austria			9	\$ 4,837			\$ 1,234					
Azores and Madeira Is.							26					
Belgium		12	\$ 5,395	17	12,511		3,834	\$ 85	\$ 21			
Bulgaria				1	600							
Czechoslovakia								6,049	575			
Denmark		2	2,800	12	16,860		4,646	10,219	183			
Finland				3	3,000		4,005	1,219	116			
France				5	15,700		17,330	8,767				
Germany				4	8,295		1,380					
Gibraltar				1	2,050							
Greece							3,256	7,932	97			
Hungary							266					
Iceland and Faroe Is.							216					
Italy		2	899	5	6,975		97,169					
Malta, Gosa, and Cyprus Is.				23	10,003		120					
Netherlands	12	\$ 12,738	5	53	52,224		11,043	2,491	305	\$ 118	\$ 12	
Norway	1	650		10	14,245		13,191	84,114	1,669	930	113	
Poland and Danzig			12	11	5,299	10	813					
Portugal	1	3,650		1	1,607		1,183	2,338				
Romania				2	3,241		7,390	131	14			
Russia in Europe				7	10,864							
Spain	1	2,380		35	66,796	2	14,458	1,874	320	156		
Sweden	1	600		110	138,102	1	21,183	48,024	7,101	5,109		
Switzerland				45	61,951		3,341	2,593	31			
Turkey in Europe				15	7,691		2,408					
England				66	117,474		428,089	77,966	5,794	5,006		
Scotland				2	920		698					
Ireland				1	275		50					
Jugoslavin, Albania, etc.		1	150	6	4,685	1	375	1,291				
North and South America												
Bermuda								18		51	105	
British Honduras				1	640		407	381	58			
Canada	83	141,139	72	1,018	1,486,669	3	1,888,915	242,285	26,430	3,896	2,385	
Costa Rica				1	1,650		647	876	190	80		
Guatemala	1	3,080		9	11,910		3,597	926	368			
Honduras				2	873		1,789	1,692	273			
Nicaragua							61	1,117	77		50	
Panama							2,153	7,108	2,554	34	849	
Salvador							1,631	103				
Mexico	101	143,101	10	559	407,974	8	135,071	84,765	9,459	3,407	4,693	
Newfoundland and Labrador							1,486	608	36		87	
Barbados			1	9	5,148	1	2,137	1,824	1,034		790	
Jamaica	4	11,032		7	7,050		10,705	16,007	615	2,110	158	
Trinidad and Tobago			4	1	1,634		4,605	2,810	235	815	43	
Other British West Indies			1	4	1,601		2,523	825	255	45	404	
Cuba	10	26,186	9	65	48,413		74,865	76,365	10,750	29,304	1,391	
Virgin Islands of U. S.				1	421		1,382	962	293		92	
Dutch West Indies				1	490		569	836	101			
French West Indies							2,356		32			
Haiti							149	1,150	255			
Dominican Republic	3	10,080		7	5,325		2,679	11,275	1,339		393	
Argentina			2	3	10,175		73,508	29,406	6,278	3,793		
Brazil				8	16,400		10,325	6,150	209	755		
Chile							9,147	1,608	37			
Colombia	1	840	2	11	10,520		18,948	3,781	430	114	789	
Ecuador							869	328				
British Guiana			2				1,268	190				
Dutch Guiana							181					
Peru				1	1,000		5,527	6,718	667			
Uruguay							4,517	16,710	410	522		
Venezuela	1	3,138		2	4,351		11,322	5,324	572			
Asia and Far East												
Aden							205	150				
China				3	23,566		18,550	4,408	301	527		
Chosen							463					
British India				12	13,656		21,627	6,996	121	7,174		
Straits Settlements							12,332	9,525	2,470	4,589	492	
Other British East Indies							199					
Dutch East Indies			14	10	34,750		49,659	58,762	2,928	18,477		
French Indo China							195					
Hongkong	11	25,615		13	17,182		1,366	305	18		3,707	
Japan	14	35,640	7	19	27,388		24,250	3,355		94		
Persia				1	1,900		1,803					
Siam				8	11,810		1,870	316				
Turkey in Asia			3	48	25,899		4,476	3,592	487			
Australia	7	18,420	17	9	18,633	57	59,161	20,285	3,375	2,262	237	
New Zealand			4	28	37,782		30,859	18,730	1,025	4,814	6	
Other British Oceania							233	1,906	394			
French Oceania				3	3,100		2,710	917	82	760	60	
Other Oceania							963	1,356	51	51		
Philippine Islands			3	6	13,756		15,208	17,620	3,227	13,804	8,301	
Africa												
Belgian Congo							895					
British West Africa				10	11,799	1	4,216	4,924	566			
British South Africa	2	2,362	5	5	6,303		32,808	3,585				
British East Africa			1	26	29,808	3	3,007	3,000	921			
Canary Islands	5	2,248		2	3,504	2	322					
French Africa							2,110	307	12			
Kamerun, etc.							10					
Morocco			12	31	14,607		2,160					
Portuguese Africa				1	510		21	174				
Egypt				1	1,250		1,086	5,717	61			
Total	259	\$442,899	203	2,390	\$2,885,652	89	\$87,682	\$3,204,723	\$941,880	\$95,243	\$108,797	\$25,157

# A Definite Step in Motor Transportation Educational Work

A course at Syracuse University is taking up motor transportation problems from the business and economic viewpoint. The students make practical investigations as well as consider fundamental factors. Such courses may be nuclei of valuable data for the industry in the future.

**C**ONSIDERABLE attention has been attracted to the educational features of highway transportation through the formation and efforts of the Highway and Highway Transport Education Committee. This body, formed through the co-operative efforts of the automotive industry, the Government, and other interested agencies, has concerned itself in the encouragement of highway transport engineering education, both in the way of engineering courses and of general appreciation of the possibilities and advantages of highway transportation.

The necessity for trained men understanding the problems of highway engineering and transportation has become very apparent and various efforts are being made to provide such men. Most of the definite educational efforts have thus far been concerned chiefly with the engineering phases of the problem. Michigan, Pennsylvania, Harvard, Minnesota, and other universities have given courses, of greater or less length, along this line.

There is another important side, however, to the problem of motor transportation. An almost virgin field is presented for research concerning actual transportation costs, the economics of truck performance under given circumstances, in given industries, and under given load conditions. A few truck companies are doing extensive work along these lines in connection with their own product. These efforts, while of rather broad scope in a few cases, must necessarily be aimed directly at immediate truck sales. The data and experience gained by the various companies will aid materially in developing the literature and scientific information necessary, but it will probably be necessary to look to some more disinterested agency for the broader phases of research.

Because of this situation the course in transportation being given at Syracuse University is worth the attention of the industry. This course begins its second year in the fall of 1921. The chair of transportation in the School of Business Administration at Syracuse University was endowed by H. H. Franklin, and the study has gone forward under the direction of Prof. Charles Lee Raper, who has had a very extensive experience in transportation work.

This course has approached the problem of motor transportation from the business and economic viewpoint. It has endeavored to establish the relation of the motor vehicle to other forms of transportation, to determine the cost of operating motor vehicles under certain conditions, and to establish the economic value of the truck as a transportation unit.

The entire course takes up four main topics, namely,

1. Railroad transportation.
2. Water transportation.
3. Motor transportation.
4. Public utilities.

These major topics are supplemented by specific studies in the following:

1. Traffic.
2. Rates.
3. Ports and Terminals.

While the automotive industry is, of course, chiefly interested in the motor transportation phase, the above outline indicates that the function of the motor vehicle is being considered in its proper relation to other forms of transportation. There is a distinct practical value in this, since the field of the motor truck must be defined either in competition or in co-operation with that of other forms of freight and passenger transportation.

In the motor transportation course the principles of motor transportation are discussed, together with its industrial significance. Considerable time is given to a study of truck operating costs. In discussing operating costs, the first thing is to analyze the factors which enter in to making costs. These factors are outlined and discussed, and an attempt is made to establish their proper relation to each other.

The students are required to apply this analysis to some specific case. Last year a number of interesting papers were written by the students concerning truck operating costs and the use of motor trucks in specific industries. One paper, for instance, dealt with the costs, methods of routing, and operating a fleet of trucks for a large baking concern in Long Island. The fleet operated over a distance of some 60 miles and presented an interesting and complex problem for analysis.

The course also takes up the field of the motor truck in a general way. The possible uses in a city, in territory surrounding a city for 50 or 75 miles, and in rural territory. All the factors affecting truck use under these varying conditions are discussed and the field of the motor truck as a transportation unit is fully analyzed.

The relation of truck costs to the various types of highway construction is also taken up, and the students are furnished with the results of the best available tests along this line. Great care has been taken, however, in every phase of the work, not to lay down as fixed rules and as final information any data or factors concerning which there is still considerable debate.

Since this is the case with much of the data concerning motor transportation, the course presents much material for discussion and has aroused a great deal of interest. Such discussion, based upon actual investigations and studies by the students, is an excellent thing for the cause of truck transportation.

Our colleges and universities have furnished the basis for much industrial research in the past. Leaders of industry have come to recognize the potential value to industry of the professors and investigators in our educa-

tional institutions. It is to be hoped that this course and those conducting it will in the future furnish to the automotive industry much valuable data, based upon extensive research and investigation. Professor Raper is intensely interested in the motor transportation phase, and can be counted upon to visualize the big problems of the industry and to push forward needed research in this field.

Such research cannot be accomplished in a few days or a few months, but the value of such centers of potential information as is furnished by this course should be recognized by the industry. In the meantime, young men are being turned out who have a broad conception of the

field of motor transportation; who are certain to spread the gospel of better motor transportation methods whether they directly enter that field or go into business using trucks as part of its transportation equipment.

Next year several older men are going to Syracuse to take this course. One man, for instance, is expected who has had charge of a large fleet of trucks in the Middle West for several years. Men of this kind, working under the direction of a competent instructor, may be expected to give much for the advancement of accurate knowledge and data concerning the business and economic phases of motor transportation.

## Shuler Front Wheel Brake

**A** DESIGN of front wheel brake has been evolved by the Shuler Axle Mfg. Co. and embodied in a front axle for trucks manufactured by that concern. Heretofore front wheel brakes have been spoken of mainly in connection with passenger cars, but it is obvious that they possess considerable advantages when applied to trucks, especially in the case where the truck is used to haul trailers behind it. Powerful brakes are really essential on trucks, because so many of them are operated in the congested sections of the large cities where the chances of collision are great.

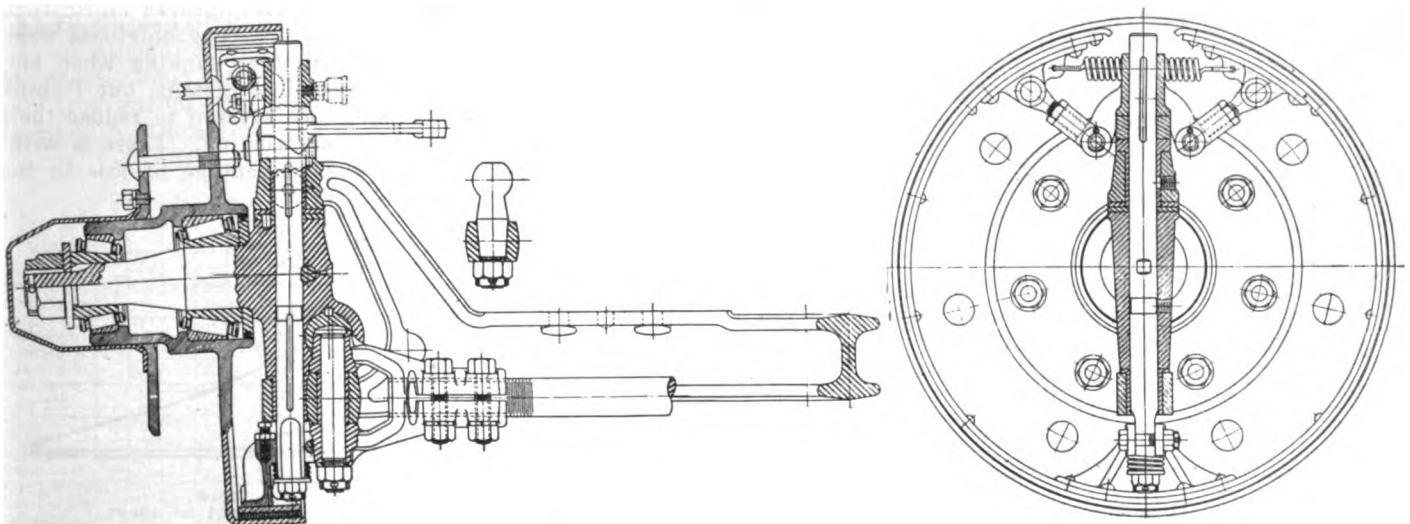
The Shuler brake is of the internal expanding, toggle-operated type. Adjustment required to compensate for wear of the brake lining is made by changing the length of the toggles. The links are hinged to lugs riveted to the brake band near its ends, and they also connect to a two-armed spider, the hub of which is adapted to slide up and down on an extension of the knuckle pin. The knuckle pin is keyed to the knuckle with a tapered key and turns with it, the upper and lower members of the axle yoke being suitably bushed. The bushing in the upper member is provided with a head forming a face cam or end cam, and the brake lever arm, the hub of which is inserted between this bushing and the two-armed spider, is formed with a similar end cam engaging with the former. Any pull on the brake lever causes it to turn around the pivot axis and at the same time to rise on the knuckle pin, carrying with it the two-armed spider and spreading the ends of the brake band through the intermediary of the toggle links. When the front wheel is swung around in steering, the brake lever with its end cam, and the bushing in the steering yoke remain stationary, and the brakes, therefore, are not affected by the steering action.

The axle to which these front wheel brakes are fitted is of 2 and 2½ tons capacity. It has a drop forged I-section center of .30 to .40 per cent carbon steel, heat-treated. Chrome nickel steel is the material from which the steering knuckle is forged, and the steering arms are of the same material. The hubs are of malleable iron and the caps and flanges of pressed steel. The materials used for the brake parts are as follows: Knuckle pin, 3½ per cent nickel steel; drum, pressed steel; band, strip steel rolled to a true circle and lined with asbestos fabric; cam bushing, cold drawn steel, carbonized, hardened and ground; brake lever, No. 1035 S. A. E. steel, drop forged and heat-treated; toggle eyes and links, drop forgings; band fittings, malleable iron. The cam surfaces are true helical surfaces.

## Viscosimeter Conversion Chart

**A** USEFUL chart for converting readings on one make of viscosimeter to readings on other makes of instrument is contained in *Lubrication* for May, 1921. Use of the chart is fully explained. Saybolt, Redwood, Engler and Barbey curves are included and conversion from one to the other scale made as convenient as possible. The scale used is one of kinematic viscosity which is defined as the ratio obtained by dividing the absolute viscosity by the specific gravity at the same temperature.

Another issue of the same publication quotes results of tests recently published by the Advisory Council of the British Department of Scientific and Industrial Research, which show that the viscosity of oils increases rapidly with increase in pressure. In the case of some oils tested increase of pressure to 5000 lbs. per sq. in. increases the viscosity 125 per cent.



Sectional views of Shuler front wheel brake



## Improvements in Fuel Utilization

Editor, AUTOMOTIVE INDUSTRIES:

What impresses me most about this matter of petroleum fuel conservation is the rather minute effect which all our discussions and research have upon the policy of some of the engineering departments of the automobile industry. In general, all car makers would like to get better gasoline mileage, provided the carburetor alone will do it, but many will not change their stereotyped designs nor concede even 1 per cent in any detail of power or speed demonstration to lower their fuel consumption. Similarly it appears that the lower priced car manufacturers at the present time can scarcely afford to spend very much for better carburetors or for new tooling equipment to produce changes of construction which would give better efficiency. To me it appears that a general improvement will come only when forced by a pronounced increase in the price of fuel. The situation is somewhat different with regard to trucks and all the makers of the better class of trucks are really interested in obtaining the most efficient operation possible.

The various means of increasing fuel efficiency being applied in the industry, which I have been able to observe, may be subdivided under three heads: Lowering the fuel consumption by change of engine cycle, by improving the mechanical efficiency and by improvements in carburetion and manifold design.

### Changes Affecting the Engine Cycle

Under changes in the engine cycle would come raising the compression, with some special means of avoiding detonation. Raising the compression seems to improve the fuel efficiency even more at part throttle than at full load, possibly because it not only gives a greater expansion ratio but also in the former case reduces by a greater percentage the volume of exhaust diluents in the attenuated throttled mixture.

The methods of avoiding detonation are as follows:

1. Delayed intake valve closing, which requires careful experiment to avoid loss of power and give proper speed graduation.

2. Injection of water as used on some tractor motors, which is an annoyance because the water consumption is almost equal to the fuel consumption.

3. Injection of cooled exhaust as proposed by Ricardo. I have had little success with this latter method with our

heavier fuels which seem to burn inevitably with a carbon residue, because introduction of exhaust increases very rapidly the carbon deposits in the cylinder. I know of no instance of successful use of this method.

4. Control of the carburetor throttle according to speed in such a way as to restrict the charge slightly at low speeds, when detonation is most apparent and objectionable. This method is somewhat similar to that of delayed intake valve closing and is being experimented with by a few companies at the present time.

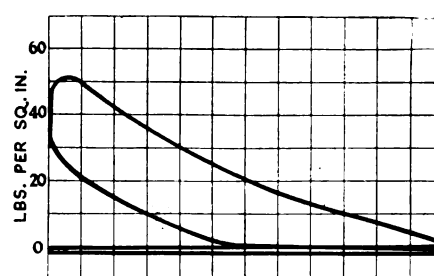
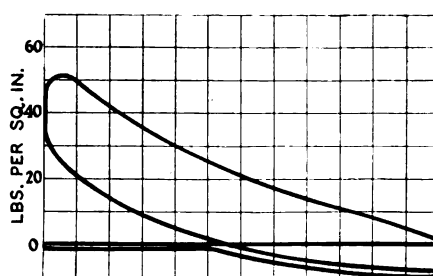
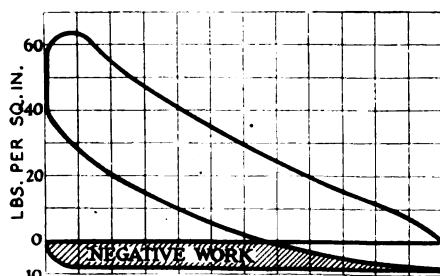
Another change affecting the nature of the indicator diagram is in the use of some method of control other than the carburetor throttle, that will avoid the suction pumping loss. I refer to the loss on a part load indicator card as indicated in Fig. 1. The most obvious way of eliminating this loss is by reducing the torque by early closing of the intake valve, giving a card as shown in Fig. 2, or late closing of the valve, giving a card as shown in Fig. 3. Instead of actually shifting the camshaft timing a motor driven rotary valve might be placed in the intake manifold. (See Fig. 4). This pumping loss is appreciable on the average car only below 25 miles per hour smooth level road driving and I doubt whether this complication would justify itself.

So far I have observed no definite improvements in engine operation due to changes which should affect the turbulence of the mixture in the cylinder. That is, we know of no especially successful application of the knowledge recently gained regarding this phenomenon.

### Mechanical Improvement

The most obvious step to raise the mechanical efficiency of the motor in average driving is the use of the four-speed gearbox. I have heard of few passenger car makers who are changing to a four-speed gearbox on this account, but have heard that certain makers of truck transmissions are planning to bring out an increased number of gear changes. Simplification of the gear shifting operation has received some attention and is worthy of more.

Reduction of the engine friction can be best brought about by careful manufacture, with improved lubrication, and with modified piston design, whereby quietness when cold can be obtained along with free running when hot. There is some activity in regard to pistons, but I think the engine makers are now more pressed to reduce their costs than to improve their construction. There is without doubt a very considerable percentage of loss in the



Indicator cards showing effect on pumping loss of valve timing at a load and engine speed equivalent to about 20 m.p.h. level road driving



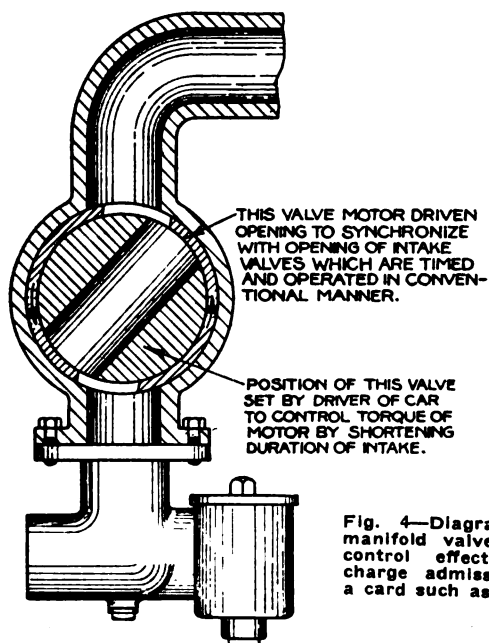


Fig. 4—Diagram of rotary manifold valve arranged to control effective time of charge admission and give a card such as that in Fig. 2

drive of many cars, which could be eliminated by better design. Part of this loss is in transmitting the power from the wheels to the road, when the roads are rough; for instance, on one car I occasionally drive, the rear axle is hung in such a way that the car cannot go over a bump without sliding the wheels, or suddenly decelerating the car or the engine flywheel; actually a little of each seems to take place. I am inclined to believe that a number of the axles in use to-day have considerably more friction, with the weight of the car on them, than we think; at least there is a very great difference in the drawbar pull per ton required to move different cars.

#### Improvements in Vaporization and Distribution

The application of exhaust heat and maintenance of adequate mixture temperatures, as outlined in the recent S. A. E. Fuel Committee Report, seems to give practically the full efficiency possible with present engines, under steady running conditions after the engine is warmed up. In cold weather, however, there are long periods when the manifold temperature is not adequate and at such times there is considerable fuel waste. Also, with the manifold

design recommended in the S. A. E. Fuel Committee Report, there is a small percentage but considerable amount of fuel going to the motor in the liquid state, as brought out by Mr. Dorris' paper and the discussion following it at the recent Summer S. A. E. Meeting. Mr. Dorris has shown one way of taking care of this.

We are just completing experiments with a fuel heater to be connected between the intake manifold and the carburetor. This device separates the unvaporized fuel from the mixture and throws it down into a separate chamber on a thin copper floor over the exhaust. The fuel then comes out of this chamber as a white and greasy fog. As might be expected, there is considerable saving in fuel, no crankcase dilution and reduced carbon deposit, but the most noticeable effect is that the engine fires very much more smoothly under adverse conditions such as usually exist in the average car after the unskilled driver has had it, while, for example, improperly spaced ignition points, slightly leaking valves, etc. With this system the engine operates satisfactorily on heavier fuel than kerosene, except for the trouble of detonation. As pointed out at West Baden, with this system there is no problem of distribution or of proper manifold size; the intake manifold can be cast in the cylinder block as large as desired and of any contour that will make a smooth external shape. Before heavy fuels can be regularly used, however, we must solve the problem of detonation, also of special means for starting.

Regarding the carburetor as a metering device, there is scarcely room for pronounced further improvement. Some engineers seem to be quite definitely convinced that the coming development is toward higher motor speeds and smaller displacements and that this will change the trend of carburetor design. Irrespective of the carburetor proposition, I believe this idea is wrong, but in any case, I am quite sure that so long as the present type of motor is continued, there will be room for detail improvements only in the better types of carburetors now used. The carburetors used on some of the lower priced cars could be considerably improved.

I know of but few makers who have made any effort toward furnishing replacement parts to improve the fuel efficiency on cars already out. This is a very important matter and it is unfortunate that so few manufacturers have given attention to it.

F. C. MOCK, Engineer,  
Stromberg Motor Devices Co.

## Distribution of the Automotive Vehicles in Surplus War Materials

THE Bureau of Public Roads of the U. S. Department of Agriculture has made the following statement of allotments and deliveries of trucks, Fords and other cars from surplus war materials to the several States, and retained by Department of Agriculture to June 1, 1921:

State	Total Vehicles Allotted	Trucks Delivered	Fords Delivered	Other Cars Delivered	Total Vehicles Delivered	Per Cent Delivered
Alabama	562	439	55	3	497	88
Arizona	366	277	22	3	302	88
Arkansas	450	389	40	1	430	95
California	816	601	75	14	690	85
Colorado	465	377	40	5	422	91
Connecticut	163	128	15	3	146	90
Delaware	44	50	7	5	62	..
Florida	307	235	33	5	273	89
Georgia	722	580	133	10	723	..
Idaho	326	271	24	8	303	93
Illinois	1,172	910	110	23	1,043	89
Indiana	722	561	81	10	652	90
Iowa	776	596	65	4	665	86
Kansas	770	606	81	5	692	90
Kentucky	520	404	49	6	459	88
Louisiana	364	278	36	7	321	88
Maine	260	177	25	3	205	79
Maryland	234	208	15	5	228	97

Massachusetts	355	201	23	2	226	57
Michigan	776	656	76	11	743	96
Minnesota	760	502	54	6	642	85
Mississippi	480	378	46	6	430	90
Missouri	910	680	69	11	760	84
Montana	535	397	42	4	443	83
Nebraska	570	439	63	8	510	89
Nevada	345	218	20	6	244	71
New Hampshire	112	96	10	2	108	96
New Jersey	320	299	56	13	368	..
New Mexico	430	344	29	0	373	87
New York	1,333	1,014	124	12	1,150	86
North Carolina	610	471	76	5	552	91
North Dakota	410	299	30	4	333	81
Ohio	992	774	96	21	891	90
Oklahoma	620	455	43	4	502	81
Oregon	424	304	28	6	338	80
Pennsylvania	1,229	837	113	23	973	79
Rhode Island	62	45	3	2	50	81
South Carolina	385	303	41	5	349	91
South Dakota	435	324	46	4	374	86
Tennessee	606	462	75	7	544	90
Texas	1,567	1,176	127	34	1,337	85
Utah	304	238	22	1	261	86
Vermont	122	96	7	2	105	86
Virginia	530	390	48	10	448	85
Washington	390	202	37	7	246	63
West Virginia	286	224	21	6	251	88
Wisconsin	680	459	47	15	521	77
Wyoming	326	229	24	4	257	79
Agriculture	2,000	1,336	368	72	1,776	89
Totals and averages	27,983	21,115	2,770	433	24,318	87

# Overcoming Organized Labor Opposition by Fairness

The British coal strike has shown the difficulty of industrial adjustment where completely organized forces are opposed to each other. Similar development may occur here unless broad-minded, fair methods prevail among employers. A shop closed against union men is not an open shop.

By Harry Tipper

**T**HE reports of the end of the British coal strike indicate that for a time, at least, the question of nationalization of mines and the national pooling of wages is out of the way in that country. It would be a mistake to suppose, however, that the question is definitely shelved. The adherence of the main body of the miners to their leaders through the stress and difficulty of this strike is an indication of the solid character of the union organizations and the probability that the compromise accepted is accepted as an interim agreement only.

Meanwhile the strike in some of the other mines, difficulty with various portions of the textile trades and other agitations show the general tendency of the labor unions to continue their demands and to force the manufacturers into giving up more or requiring the public to pay more. Although there was no insistence among the leaders of the coal miners for a nationalizing of mines in this particular strike, the attempt to enforce a national pool for wages was so definitely in that direction that it must be considered a part of the same program.

The settlement indicates that the subsidies will be continued for three months in less amount, so that the people of Great Britain are paying for the settlement of this strike in the form of taxation for the support of the coal mining industry. These elements of the situation in Great Britain are of interest to us because they show the difficulty of adjustment and the tendency to industrial disruption in a completely organized industrial country where the forces of organization are opposed.

Despite the employment of the Whitley councils and the settlement of many minor strikes through this machinery, the difficulties of agreement between unions and employers' groups are not reduced by the complete development of both sides into organized groups frankly and definitely opposed in their ideas and methods of treatment. These things indicate also the tendency of strongly organized groups to continue their pressure upon government without respect to the economic conditions or the effect of their actions upon the economic development.

Considering the depressed state of trade in Great Britain, the number of people without employment, and the general hardship to be endured among many sections of the populace, one would be inclined to think that the pressure of demand would decrease and the groups would tend to come together for the time being in the common necessity for the reduction of costs and the enlarging of production.

When the organized forces reach practically their maximum of development with their programs of development thoroughly worked out, the momentum required in the course of this definition exerts a pressure on the leaders to continue their movement without regard to its present effect. To a much larger extent than we realize, the development of British commerce in the next few years and the political attitude to be taken in international questions depends upon the settlement of the political industrial program and the position of the labor party in regard to it.

Under the present conditions of the United States, we are likely to over-estimate the effect of the economic conditions upon the organized groups of workers and their development. The development of the open shop movement is a case in point. Where the open shop has been established and continued so that it is in advance of the trade union and is organized with the spirit and practice of square dealing, it offers good hope for the future. In many cases, however, the open shop is merely a means of escape from the union and a means of throwing the union out of the shop.

In discussing this matter with a friend of mine the other day, he informed me that he had come out for the open shop at the beginning of the year and was obliging all his workers to give up their union cards. "Why do you want them to give up their cards?" I asked. "Nobody can work in my shop and belong to a union," he said. "It's an open shop." This man really thought he was running an open shop, whereas he was just operating a shop closed to union men, and in so doing he was adopting the policy of the union, but turning it against the union.

Methods of this kind do not destroy the organization of workers. Men do not organize for insignificant reasons and they do not lightly reject their possibilities of organization. In times of distress they may subdue their desire or give up the idea entirely because of their fear of starvation. Unless they have confidence in the manufacturers and the management to give them a square deal, they will organize just as soon as there is any advantage in doing so, and they will organize more strongly as the necessity grows.

We do not want to reach a stage in this country representing the highly organized condition now existing in Great Britain. It would be unfortunate if we were obliged to adopt such clumsy and cumbersome machinery for the settlement of disputes. It would be a very great misfortune if we were to

arrive at the place where the organizations were so definitely opposed and equal in strength as to make settlement impossible.

Both these eventualities are possible in this country. If we succeed in diverting the industrial organization into other channels, it will be because of the intelligence, understanding and spirit of fairness among the manufacturers so that they manage their shops with equal justice to all concerned, whether they are members of unions or not, with some real understanding of the workingman's difficulties and ideas and with some comprehension of his fundamental necessities.

With those standards in view sufficient progress will be made in a few years to prevent the further development of separate organizations as the industrial prosperity grows. Unless intelligence of this kind is used, returning prosperity will show an increase in the number

of unions and in the membership of those unions, whether they be trade unions or unions of another character.

The leaders of the workers must come out from among the executives or from among their own ranks. They have leaders from among their own ranks who have been of value and visible usefulness to them. Temporarily they are not able to control the situation and are willing to accept what is necessary. This, then, should be used by the management of industry to show the workers there are leaders in industry capable of leading the whole establishment, including the workers, worthy of their confidence and trust, and more intelligently concerned with their future. This sort of leadership is the best guarantee against the conflict of trade union against manufacturers' group so painfully apparent in the difficulty experienced in Great Britain.

## Effect of Gasoline Quality on Engine Performance

WITH the present design of aviation engines and the means of vaporizing and distributing the fuel now available, commercial low test automobile gasoline does not give satisfactory performance. Detonation obtained with the compression ratios now in use precludes the use of straight, low test fuels unless anti-detonating compounds are mixed with the fuel. For this reason it would appear impractical to use commercial, low test automobile gasoline in present types of aviation engines, except in emergencies.

These conclusions are the result of experiments at McCook Field, which are interesting in view of the fuel situation, particularly as bringing out the fact that present-day gasoline is responsible for rather low engine efficiency. As is well known, the fuel ordinarily used in aviation engines normally has a much lower average boiling and end point than fuels commercially available for general automotive purposes. Distillation curves of the domestic aviation gasoline and commercial automobile gasoline are shown in Fig. 1. The domestic aviation gasoline is the fuel used in the army air service as standard for ordinary

flying, but is not composed of as low boiling fractions as those which go to make up the army air service fighting gasoline. The results of the comparative tests which were made on a standard, twelve-cylinder Liberty engine are clearly brought out in the accompanying curves plotted in Fig. 2.

In making the tests, a 5 hr. run with aviation gasoline was made, after which a similar run using the low test gasoline was attempted. This could not be completed until 6 per cent of anti-knock compound, consisting of Xylidine, was mixed with the fuel. The net results of the run are shown, as far as power is concerned, in the curves. After the torque stand runs were completed, an inspection of the pistons, cylinders and valves were made. The carbon deposit on the pistons was heavier than is usually obtained with domestic aviation gasoline. The most objectionable characteristics of the low test fuel is its pronounced tendency to detonate with compression ratios which do not cause detonation with ordinary aviation fuels. A notable increase in carbon deposit and in crankcase dilution was also found with the low test fuel.

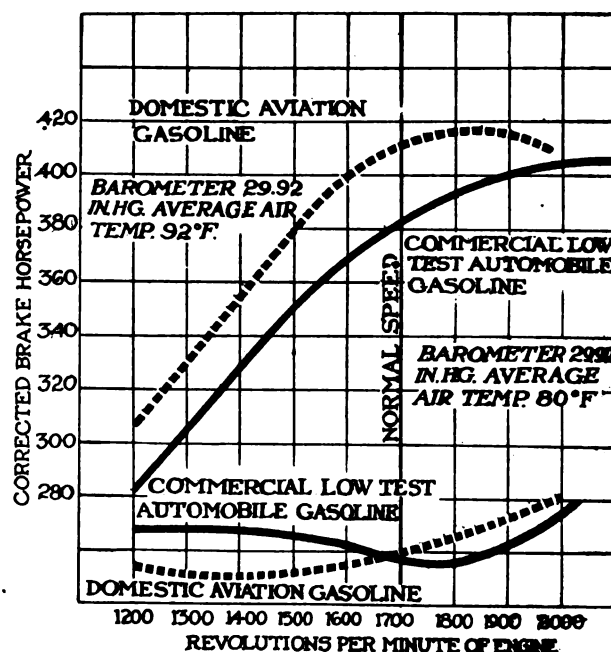
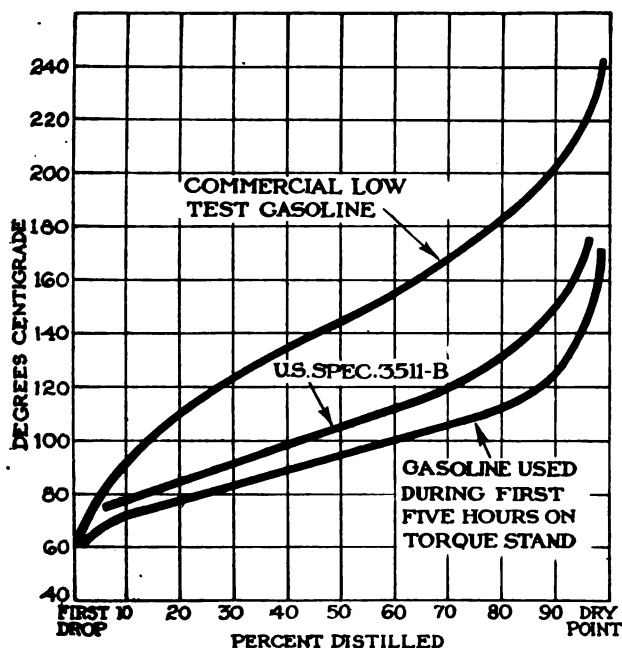
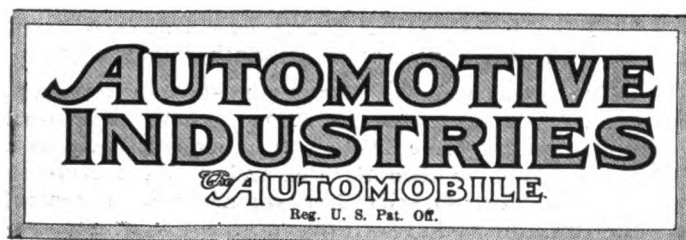


Fig. 1 (Left)—Distillation curves of commercial automobile gasoline and two grades of gasoline used in aircraft engines. Fig. 2 (Right)—Power and fuel consumption curves, showing performance of Liberty twelve-cylinder aircraft engine using commercial automobile gasoline and domestic aviation gasoline. Results corrected to standard temperature and barometric pressure



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## Selling Transportation

THE future of the truck lies in its record of performance as an economical transportation unit. Manufacturers must educate their dealers to sell transportation. Before they can do this the manufacturers themselves must study carefully the factors involved in transportation analysis. The more quickly this is done, the better will be truck progress.

Many of the trucks that have simply been sold as trucks are piling up transportation records unfavorable to the industry. At least they have not been performing as efficiently as if they had been sold after a careful analysis of specific transportation needs.

In a city of 100,000 population in New York, for instance, a recent survey of department store motor hauling showed some interesting facts. All of the six large department stores in the town had motorized their delivery to some extent. But in only one case out of the six had there been made any analysis of routing delays, loading problems, operating costs and the relation of such factors to one another.

The records being made by the trucks of the other

five stores would not show truck performance in its best light. It is to the advantage of the manufacturer to study the problem of selling transportation.

## A Factor in the Tax Situation

BUSINESS men recently have had placed before them some very startling lessons in economics. The railroads, for instance, have learned that it is possible to erect a rate barrier that will stop shipments of certain commodities. Many other lines have learned that it is quite possible to price an article at a figure that the public simply will not pay.

So it comes to general knowledge that there are other points to be considered in Federal taxes than the mere amount of the tax paid. Along with the popular demand for lowered Federal taxes comes a proposal for a bonus to be paid to the soldiers in the world war. The amount of this bonus will, of course, increase the amount necessary to raise in the form of taxes within the next few years. But there are other points to be considered, and these are well pointed out in a recent letter written by Secretary of the Treasury Mellon to Senator Frelinghuysen. Any transaction that amounts to well over \$1,000,000,000 is certain to have a very important economic bearing on many lines of business. This subject is well worth close study on the part of those interested in business in a big way.

## Effect of Racing Engines of Small Displacement

THE announcement in last week's AUTOMOTIVE INDUSTRIES that the 1923 Indianapolis race will be confined to cars fitted with two-litre (122 cu. in.) engines has been coupled with the suggestion that similar practice may be later reflected in the design of American cars, since it has already had a similar effect in Europe. We are inclined to doubt the probability of such an effect in this country for several reasons.

In the first place, an engine of this size is suitable for propelling only a very small and light car, a smaller car, in fact, than has ever proved popular in this country. Most of the European cars with engines of this size are in reality diminutive automobiles, many of them with narrow track and small passenger-carrying capacity. Even then frequent gear changing is necessary. It is, furthermore, a difficult and expensive job to build a light car that will stand up on any but the best of roads. By light car we mean a car comparable to the cars with engines of 100 to 125 cu. in. displacement, or thereabout, such as are now quite popular in England.

In the second place, the use of so small an engine involves relatively high engine speed and large gear reductions in order to give the car the requisite ability and road speed, and to build a successful high-speed engine requires a much higher grade of workmanship and much more care in balancing, as well as lighter and more expensive materials, than it is possible to employ in large quantity production of cars designed to sell at a low price. To be really successful a car

of the class referred to must be capable of meeting the competition of the larger and more rugged car produced in quantity at a lower price. The fact that the car is economical in tires and fuel will not offset a much higher first cost, especially if, as is often the case, servicing is more expensive.

In the third place, there is reason to question the claim sometimes made for the efficiency of small high-speed engines as compared to the larger and slower speed types of engine. It is probable that the friction losses are greater, relatively, in the higher speed type. It seems probable also that by a proper selection of gears in the final drive, the larger and slower speed type can be made to operate under more favorable load conditions, and consequently at higher efficiency than the higher speed job. In any case it does not necessarily follow that, because the engine is small and capable of a high rotative speed, it is relatively more efficient.

Members of the Bureau of Standards staff, in a paper read at the recent S. A. E. meeting, presented some data tending to show that larger and slower speed engines are more efficient than the higher speed type, even when the difference in weight of engine and car, in favor of the latter type, is taken into consideration. There is need for further experimental evidence along this line, however, for there is no doubt concerning the desirability of more economical cars, due regard being given, of course, to first cost as well as to operating cost.

## Understanding Sales Prospects

**T**HERE has been considerable discussion recently concerning territorial analysis and more accurate determination of future sales possibilities. The purpose of such studies has been, not only to stabilize production, but also to permit the establishment of fairly accurate quotas by which to measure dealer performance. The effect of such efforts on the dealer should be considered. An incident recently occurred which illustrates the good effects of such studies on both dealer and manufacturer.

This manufacturer has done extensive work in commercial research and merchandising analysis. On the basis of these studies he has re-established dealer territory boundaries along scientific lines. The process of readjustment is still under way.

The other day one of the big dealers made application for more territory. He claimed that people from a certain near-by town were coming to him for cars, and that he could not sell them because they were in another dealer's territory. The other dealer, he claimed, was not adequately handling the business.

We happened to be present when this big dealer was discussing with a factory executive the matter of increasing this territory. It was refreshing to listen to the line taken by the conversation. The talk was a discussion; not an argument. The dealer was forced to outline his side of the case in concrete terms on the basis of accurate merchandising facts. He knew that the factory executive had made a careful merchandising analysis of the territories involved; that the factors of population, property values, regis-

trations, incomes, etc., had all been considered. To present his case the dealer had to understand thoroughly all these factors concerning his own territory, to begin with. He had to study carefully the sales possibilities of his own and the adjoining territory and to arrange the results of that study in logical sequence.

We don't know whether or not the dealer got the extension of territory. But it is certain that if he did not get it, he knew that it was refused on the basis of sound sales facts.

When it is possible to discuss such matters on an intelligent basis, good feeling and co-operation are enhanced, and each party to the discussion knows that he has won or lost on a fair and honest examination of fundamental facts. Merchandising studies are beneficial to both dealer and manufacturer. In this case, for instance, whether the dealer got the additional territory or not, he had dug up and understood many valuable facts about his own territory which will be of advantage in future selling.

## What Mr. Babson's Figures Told

**D**URING the recently somewhat gloomy months there was much attention given to the figures of Roger W. Babson. These figures added fog to the gloom. There were a few hardy men who dared to say that they did not believe all that Mr. Babson said of the future. Recently these men may have been fooled into the belief that they were right and Mr. Babson was wrong, but not so. Mr. Babson now comes forward with the true story of what his figures have revealed in the future. He is quoted as follows in a Chicago dispatch to a New York paper:

Automobiles built of a composition of cotton and operated with coal dust for fuel are a possibility, according to Roger W. Babson, statistician, who is visiting here.

"The principal factor in the decline of the automobile business has been the increase in the price of gasoline," he said. "The car of the future will be run by other fuel. Already the use of coal dust has passed the experimental stage.

"Lighter cars must be manufactured to cut down the cost of production and maintenance. A composition of cotton, formaldehyde and glue is being used to produce a material that may solve the problem."

It is possible that Mr. Babson, like Admiral Sims, may say that the thought is more of the newspaper's reporters than his own, but we hope not. It is so clear and concise a solution of the problems of the automotive industry that we hope he will stand by it and prove it with more figures.

When this solution is proven, the industry's only concern will be as to whether the coal miners are going to strike and how much cotton the planters will plant, and how high the speculators and middlemen will force the prices of the two essential commodities. Of course there will be the railroad problem, but we have that now. How much easier of solution are these two problems than the present one of wondering how much oil there is in the earth and how well the oil refiners are going to prepare it for the engine.



# Business Puts Pessimism to Rout

## Trade's Evils Less Than Omens of Good

### Outlook Points to Certain Revival As Favorable Signs Loom on Horizon

By James C. Dalton

NEW YORK, July 11—There are two outstanding facts about the status of automotive industry as the middle of July approaches:

Business is considerably better than many persons within the industry think it is.

Business is very much better than people in general outside the industry think it is.

Governor Harding recently told the members of the National Automobile Chamber of Commerce that the worst thing about a pessimist was that he usually was pessimistic at the wrong time.

The impression seems to be almost universal among those who have not followed the situation carefully that the automobile trade is suffering from a bad case of the doldrums. The Guaranty Trust Co., for example, the second biggest bank in the United States, in its survey of general conditions for June, has this to say:

"A decline in the demand for automobiles, accompanied by numerous recessions in prices, is reported. The slackening of demand is affecting both truck and passenger car output. About one-third of the companies actively engaged in the production of passenger automobiles in the United States have revised prices downward since April. The recessions in prices have been proportionately larger for the lower-priced cars than for those selling at higher prices.

"A reduction in the demand for automobile tires, corresponding in a measure to the lessened demand for automobiles, has affected the activity of a number of rubber companies. In accordance with curtailment of production schedules, workmen have been laid off.

"Earlier in the year there was a considerable increase of business in the automobile and tire industries, an increase which resulted in exaggerated expectations concerning the immediate future of these industries."

#### Summary Far from Facts

This summary could not have been much further from the actual facts in relation to June. There was a falling off in sales at retail the latter half of May, but it was not reflected in the factories. Sales in June were larger than for any month of the year thus far, and

it was one of the largest Junes in history. There has been no reduction in demand for tires and all the large factories increased their production schedules last month.

"Earlier in the year" there may have been some "exaggerated expectations" concerning the future, but they were not shared by well informed men in the industry. On the contrary, actual conditions as they have developed warranted greater optimism than was felt in most quarters.

It undoubtedly is true that there would have been a sharp slump in sales if prices had not been cut. They were cut, however, and a flood of orders followed.

While it is certain there would have been a slump in sales if prices had not been reduced, it is equally certain that there will be a slump unless prices are stabilized in the very near future. No person to whom money is an object is going to buy an automobile unless he has some assurance that he can't get it \$150 or \$200 cheaper a month from now.

#### Reasons for Reductions

Two well known companies in the same class have cut their prices twice in a month. The first company to reduce felt an immediate stimulus in its business. The sales of the second stopped. Then the second company cut, but still sales didn't start, and it made a second cut. Then the sales of the first company slowed up and it made a second cut.

There were many reasons why automobile prices should have been cut, but there is every reason in the world why they should not be cut every two weeks. Such a price war would be ruinous. It would do more than anything else possibly could to check sales. When a man buys even a pair of shoes and then finds that he could have bought them \$1 or \$2 cheaper a week later, he instinctively feels that someone has made a fool of him, and this engenders a certain amount of animosity toward the maker.

#### Signs Point to Business

Dog days usually are dull in a business way, but this year they will afford the tired business man and manufacturer an excellent opportunity to scan the industrial horizon and figure out intelligently what's going to happen two or three months from now.

The signs are on the horizon now and it doesn't require superhuman intelligence to read them. The favorable omens greatly outnumber the portents of evil. The fundamentals upon which business and trade rest are stronger than they have been in eighteen months. They point to a gradual but none the less certain business revival in September or October at latest.

There was foolish optimism a year ago and there is needless pessimism now.

## Detroit District's June Output 169,041

### Steady Upward Trend in Demand Shown by Increased Production at Plants

DETROIT, July 11—Evidence of a steady upward trend in automobile demand, influenced in great measure by price cuts, is shown by increased production for June in Michigan factories. The output aggregated 169,041, an increase of 24,440 compared with May. Production of 108,962 by Ford against Ford output of 101,897 in May is responsible for a third of the increase, but there was a step-up in nearly all factories, particularly Dodge and Buick. Increase in output of Hudson-Essex, Maxwell, Paige, Packard, Studebaker, Chevrolet, Hupp and Olds also were marked, and slight improvement was shown in practically every factory in the district.

Dodge, which built around 450 a day the greater part of June, swung into capacity production during the latter days of the month, and official announcement is made that an average of 600 cars will be run off assembly line daily for the balance of the year. Olds Motor Works turned out 3100 in June against 7175 in May.

Packard went up about 200 in the month, Hudson about 100, Essex about 200, Paige 400, Hupp 250, Chevrolet about 1500, Studebaker about 1000 and Maxwell more than 1600. Buick went more than 6000 ahead of May.

#### Working on Full Time

Packard, which built 1000 cars and 180 trucks in June, is working full time with slightly less than 50 per cent of the peak force, but officials say if present demand continues, a step-up in production will be imperative. Oldsmobile officials report steadily increasing business and prospects for an exceptionally big demand in July.

General Sales Manager Hutchinson of Hupp Motor Car Corp., said the factory had orders on the books for more cars for July delivery than were turned out in June, with daily demand showing a decided upward trend. The same is true of Paige, at which plant the June production was 400 greater than May.

President McAneeny of Essex Motors said Hudson and Essex factories were turning out 140 cars daily at the present time and would continue that production indefinitely, the output being based strictly on sales requirements, which for the last four weeks have been climbing steadily.

# Set \$40,000 Sales Promotion Fund

## Jobbers Make Plans to Stir Up Buying

Section by Section Development Likely Under Specially Engaged Promotion Director

MACKINAC ISLAND, MICH., July 11—A sales promotion campaign intended to broaden the outlet for products of the automotive equipment industry by educating jobbers, jobber salesmen and dealers in improved merchandising methods was authorized by the Automotive Equipment Association, which adjourned its summer convention here to-day.

The association appropriated \$40,000 for the undertaking, \$15,000 of which will come from the treasury and the balance from assessments on members, including both manufacturers and jobbers. A permanent committee was appointed to map out the campaign and to employ a sales promotion director and assistants to do the actual work.

On the sales promotion committee, which is to be permanent, were appointed Robert A. Stranahan, president of the association and president of the Champion Spark Plug Co., Toledo; N. H. Oliver, Metal Specialties Co., Chicago; L. R. Safford, McQuay-Norris Mfg. Co., St. Louis; Howard M. Dine, vice-president of the association and head of the Dine-De Wees Co., Canton, Ohio; W. W. Lowe, Electric Appliance Co., Chicago. The first three are manufacturers, the remaining two jobbers. The committee expects to meet in Chicago in the near future and get under way the plans for the new work.

### Campaign in Sections

The sales promotion probably will be developed section by section throughout the country with the director and his assistants personally presenting the idea to groups of jobbers and their salesmen, and the latter carrying it on to their trade. Presumably there will also be literature supporting the personal work of the staff.

The sales promotion idea met with the unanimous approval both of manufacturers and jobbers, who realized that sales of automotive equipment and consequently factory production were limited by lack of aggressive and intelligent merchandising in many dealer establishments. The jobbers frankly confessed also that they would like to have the educational work applied to their own selling organizations. They believed that the right sort of effort would not only make better merchants of dealers and garagemen already handling accessories but through exposition of the opportunity for profit would induce others in auto-

## SCRIPTURAL SIGNS NEW DANGER MARKS

UNIONTOWN, PA., July 11—Instead of the usual danger signals at points in the mountains that require careful driving of motor cars, there now have been placed scriptural warnings. No one seems to know their source. The signs are wooden ones, 3 feet by 2. At the most dangerous curves on the national pike between here and Cumberland are warnings, "Prepare to Meet Thy God," and similar cheerful quotations from the Bible that have an appropriate bearing.

motive merchandising and service lines to take up equipment selling.

The membership showed so much enthusiasm over the sales promotion plan that an additional \$25,000 for the coming year was unofficially promised.

In connection with the proposed sales promotion work, the association went on record favoring payment by retailers of commissions on accessory sales over and above the regular salaries of employees making them.

It was tentatively decided to establish a permanent traffic bureau for the association with a full time staff. A traffic man is now giving part of his time to the work at Chicago headquarters and has already saved members considerable in trade overcharges. The bureau probably will be established at the annual meeting in November.

A code of fair trade practices, for the guidance of both manufacturers and jobbers, was adopted with 35 clauses.

The meeting was attended by delegates representing 133 manufacturers and 99 jobbers.

## 13,759 Buick Owners Receive Cars in June

DETROIT, July 11.—Buick Motor Co. delivered 13,759 cars into the hands of owners in June. Shipments last month were 3800 more than those of the entire first quarter and represented actual retail sales at the rate of 530 cars daily compared with peak plant capacity of 600 cars a day.

E. T. Strong, general sales manager, said that Buick figures for June disprove the assertions that the automotive industry is through with big figures. "They are evidence that the industry has earned the right to the title of one of America's greatest industries," he said, "and that the spirit of pessimism prevalent in some quarters did not faithfully represent the sentiment of the public.

## Steel and Wage Cuts Bring Cheaper Cars

Cleveland Manufacturers Declare Some Did Not Get in on Low Prices

CLEVELAND, July 11—Cleveland automobile manufacturers as a rule say that it is too early yet to prophesy what results will follow the cut in prices of steel recently made by the United States Steel Corporation.

Some of the producers say they have been buying at the new market price of steel for the past two or three months, and that the public announcements of price reductions are but confirmation of prices of which they have had the benefit.

Manufacturers who buy their bodies expect a reduction in costs as do others who purchase parts and assemble cars. These manufacturers are getting in touch with concerns from which they buy, in an endeavor to ascertain just where they will stand in the near future in the matter of prices for parts.

### Some Not So Lucky

Still another class of manufacturers has not been obtaining steel at the new prices. They say the result should lower costs as they have been purchasing above the new price levels.

One manufacturer pointed out that there is evidently some rivalry between the independents and the United States Steel Corp. The independents some months ago were quoting higher prices than the corporation, and as a result the plants of the latter were kept running with a larger output than were those of the former. Then the independents cut to a point below the corporation and now the latter has gone below the independents. The steel situation is likely to bring developments even more beneficial.

The cut in steel prices, coupled with a general reduction in wages of approximately 15 per cent in all local automobile plants since the first of the year, together with price reductions have tended to get the industry back to normal.

It was developed that local manufacturers who convert steel into their machines have been buying closely, and have been playing for price reductions, while practically all have been asking for the benefit of price reductions on material delivered on contracts made before the lowering of values. This is relied on to keep inventories down to near where they should be.

The Stearns Co. has made more cars this year than it did in the same period a year ago. The store room is empty  
(Continued on page 93)

## Highway Prospects Brighter in Mexico

### American Delegates Return With Optimism After Conference With President Obregon

SAN ANTONIO, TEXAS, July 11—Prospects are bright for the improvement of the proposed Mexican highway from Laredo, Texas, to Mexico City, the capital of the southern republic, as an international extension of the Meridian Highway across the United States. This optimism was brought to San Antonio by delegates of the Meridian association, who have just returned here after a promotion trip along the proposed route. Conferences with local and State officials were held at each of the larger Mexican cities, and at Mexico City the delegates were in conference with President Obregon and Señor Faustino Roel, present head of the Mexican Department of Communications and Public Works.

"We found the people of Mexico overcoming their difficulties with a smile," D. E. Colp, vice-president of the Meridian association and manager of the truck department of the Nash South Texas Motors Co. here, declared. "The country is fast returning to normal. The Government has five big road projects under construction and it expects to keep building until the Republic has a good system of highways. The Mexicans realize what the tourist business means to any country and they are correct in assuming this will be large if proper highways are built. President Obregon discussed the highway problem at length with us and told us that the Government was caring for many of its people by giving them work on the highways.

"All the road work in Mexico is being done by hand, no machinery being used. Nevertheless, the work is fine and costs only about one-fourth what it would in this country. The roads are being built 20 ft. in width, to carry all kinds of traffic."

#### Hold Official Conference

Conferences with the State governors, chambers of commerce and local business men were held at Monterey, Saltillo, San Luis Potosi, Queretaro and Mexico City. Agricultural organizations likewise were represented at the conference, and provisional officers of the Meridian Highway Association were elected after each conference. At Monterey, Señor Carlos Cantu was named president; Señor Antonio Lopez at Saltillo; E. B. Turnbull at San Luis Potosi, and Señor Lorenzo de Vicento at Queretaro.

At Mexico City, it was decided that a general conference of all the highway committees of the several states would be called within a few months, probably in September. Then, the Mexican organization could be so perfected that the active work of locating and improving the highway might be gotten under way.

The delegates were taken from Mexico

City by automobile to Cuernavaca, in the State of Morales, over a recently completed highway some 45 miles in length. The State of Morales is famous for the revolutionary activities some years ago of Emiliano Zapata. The visitors, however, found conditions so peaceful that the hotels at Cuernavaca did not even have keys for their doors.

"Everywhere new business activities were manifested," a report of the trip declares. "Commercial enterprises were being reconstructed and a general feeling of peace and prosperity prevailed everywhere."

The delegation included all members of the Texas State Highway Commission, with officials representing the Meridian association, State organizations of Texas, Oklahoma, Kansas, Nebraska and the Dakotas. Accompanying Mr. Colp were G. A. MacNaughton, treasurer of the association, of San Marcos, Texas.

Letters and a committee also have been received by the association asking that a similar tour be arranged over an eastern route from Brownsville, Texas, through Tampico to the Mexican capital. Mr. Colp hopes to organize such a tour.

### Daimler Firm Settles Dispute; Work to Resume

LONDON, June 22 (By Mail).—An official announcement was made last night in Coventry to the effect that the Daimler company's employees had decided to accept the company's proposed terms and that it is anticipated that production will be resumed very shortly.

The trouble which has resulted in the Daimler plant being practically closed down for several weeks arose from the fact that the Engineering Trades Union held out in refusing to allow the company's employees to accept the revised terms of payment which the majority of the staff had in a ballot voted in favor of accepting. The dispute has, therefore, not been between the company and its employees, but between the latter and their union officials. One of the latter in a statement last night said: "We have arrived at some arrangement with regard to future prices for work, and if the Daimler company have work the men will be employed, but we do not anticipate any large amount of employment in the near future." This rather indicates the truth of what has been suspected, namely, that the company has not been very concerned at the stoppage, owing to the fact that the falling off of sales would not have enabled them to keep in full swing at any event.

#### URGES FRENCH AIRPLANE FLEET

PARIS, June 21 (By Mail).—Deputy Paul Benazet has introduced a bill into the French Chamber of Deputies which proposes to establish a fleet of 1000 airplanes suitable for war, but which can be operated commercially and therefore at little cost to the Government. The author of the measure called attention to the large and extensive aviation personnel of the Government.

## Spring Business Fair in Dominion

### U. S. Consul, Reviewing Outlook, Says Improved Sales Assure Better Business

WASHINGTON, July 12—Pointing out that there has been a fair spring business for automobiles in the Canadian market, Consul Felix S. S. Johnson, Kingston, Canada, prepared a report with regard to the present outlook for the sale of automobiles in that country.

"Discussion of the automobile market is connected frequently with the buying power of the farmers," it is stated, "and in view of the heavy reductions of the prices received by farmers for their products it has been thought that the automobile market would naturally be curtailed. Prices are not yet back to the 1914 level, and that is not expected, unless the industry is prepared to suffer crippling losses. Reviewing the outlook for the automobile sales, it can be said that while it is proved the recent price reductions have been made to meet competition, it is equally true that this should have the effect of bringing the price of cars down to the reduced buying power of the country, which has naturally decreased very sharply during the last six to nine months.

"The industry has plainly entered the competitive area for the first time in its last three years. It is going to be a struggle to get business and the race is likely to go to the strongest. During the abnormal demand of 1919 and 1920 the automobile producing capacity of the country was vastly expanded both by additions to plants by old companies and through formation of many new companies. Some of the new companies are making their bow to the buying public at a time when competition may go to the length of forcing weak or high cost companies to do business at a loss. In fact, broadly speaking, the May price cuts have probably eliminated the great bulk of profit which was still left in the industry. These price cuts were not based on a scientific revision in accordance with lower steel, lumber, leather and parts. They were purely competitive and were designed to get business in a greatly curtailed selling market."

#### OPEN TRACTOR DEMONSTRATION

FARMINGDALE, L. I., July 12—A demonstration of farm power operating machinery was started to-day in this town by the Farm Implement and Farm Power Machinery Development Association, co-operating with the State Institute of Applied Agriculture. The demonstration will include plowing, cultivating, planting, harrowing, threshing, wood sawing, hauling and road grading. There will be about 25 tractors in operation varying in size from 1½ up to 45 hp. Several farmlight plants and water systems as well as a number of stationary engines will also be exhibited.

## Rubber Plants Near Peak of Production

75,000 Tires Manufactured Daily at Akron As Normal Business Looms

AKRON, OHIO, July 11—A survey of the rubber industry in Akron shows that practically all companies have climbed back to a position averaging 75 per cent of peak production attained in April, 1920. Over 75,000 tires are being manufactured daily in the rubber metropolis and all companies report orders on their books, both from dealers and automobile manufacturers, to keep their factories running at present pace through July and August and possibly September.

Dealers' sales of tires are heavier than they were a year ago, tire manufacturers assert, while automobile manufacturers have sent in heavy original equipment tire specifications for July and August, and also have given notice that they anticipate equally as heavy orders in September.

Goodyear, the largest and the hardest hit of the Akron tire companies during the industrial depression, has been one of the first to stage a spectacular "come-back." Having liquidated its losses through refinancing involving \$88,000,000, and through re-organization of the entire company, Goodyear has experienced a steady climb back to a position closely approaching normal, and with the addition of 3000 men during the past two weeks, now is operating on a basis of 86 per cent of peak production.

Goodyear's peak was 31,181 tires daily, obtained in April, 1920. To-day the Goodyear factories in Akron and Los Angeles are making a total of 26,700 casings daily and 30,500 tubes. The Akron factories are operating on a production ticket of 23,200 casings and 27,000 tubes daily, and are running on a basis of three eight-hour shifts daily, and six full days of operation a week, with approximately 11,000 men employed. The company reports dealers' sales steadily climbing, and far in excess of dealers' sales for the corresponding weeks of last year, and also reports that automobile manufacturers have placed heavy July and August orders for original equipment.

That the Goodyear factories will continue to operate on the present basis, and may possibly increase production within the next two months, is freely predicted by officials of the company.

### How Business Increases

The Firestone Tire & Rubber Co. is operating on a basis of more than 70 per cent of peak production which was 28,000 tires a day, attained in April, 1920. Firestone has lengthened its two daily shifts to nine hours each and is operating on a production basis of 20,000 casings and 23,000 tubes daily.

The B. F. Goodrich Co. has not materially increased production within the

## COSTS JAPANESE \$10 TO OWN CAR ALL YEAR

PONTIAC, MICH., July 11—Two hundred Japanese are riding in one Oakland touring car which they each call their own, through a co-operative idea established by a Japanese company. The firm was organized with an initial capital of \$150,000 and the first purchase was 55 Oakland touring cars. These have been sold to 11,000 Japanese under the plan by which the company operates.

Each stockholder pays \$10 and in return receives a one year's interest in an Oakland touring car. The year has been divided into days and hours and a specific time allotted for each stock holder to take a ride. For instance, a man is notified that his time will be from, say, every Thursday from 11 o'clock to 3. The arrangement nets the firm \$2,000 for each car sold and gives the Jap automobile enthusiasts the satisfaction of being a car owner for the very modest investment of \$10.

past few weeks, continuing on a basis of about 15,000 casings and 16,000 tubes daily.

### About Labor Turnover

Every Akron tire company reports a much higher degree of efficiency among factory operatives than a year ago when abnormal wages were paid tire builders and when Akron was in the throes of prosperity and wanton extravagance. Whereas the factories previously averaged about a tire a man per day, they are now showing more than a tire and a half per man in many departments, while the general average of increased efficiency, as reflected in production records, will exceed 40 per cent. Workmanship is better, factory managers report, and in re-employing men a higher grade of workmanship has been gained in general.

Labor turnover to-day is almost nil in Akron. A year ago when jobs were plentiful, when several Akron factories enforced a \$6 daily minimum factory wage, and when every rubber company was calling for men, the labor turnover in some instances reached a mark in excess of 30 per cent. But to-day, manufacturers state, conditions are in sharp contrast, and labor turnover has been reduced until it has become negligible, through each factory operative's desire to hold onto his job as long as possible. The weeding process also employed in practically all factories, has conducted greater individual and collective efficiency. Rubber companies which have put on men in blocks of several hundred or a thousand, have picked them carefully from the many applicants, and at the same time have used many of them to replace careless workmen.

## Four Duesenbergs in Grand Prix Race

U. S. Will Be Represented for First Time in Fourteen Years in French Classic

INDIANAPOLIS, July 11—American interest in the French Grand Prix which will be run at Le Mans July 25 will be centered in the four Duesenberg cars which will face the starter. It is the first time in 14 years that an American entry has appeared in the European racing classic.

The Duesenberg entries have not been made by the company which manufactures the car but rather by Americans interested in racing who believe that the American machines can carry off the honors. The funds necessary to send the four Duesenbergs abroad were subscribed by Richard Kennerdell, chairman of the contest board of the American Automobile Association; Albert Champion, president of the Old Timers' Club; Barney Oldfield and others.

The drivers who will pilot the cars in the Grand Prix are thoroughly familiar with them and have previously driven them in races. Joe Boyer and his mechanic Erne Olson sailed for France early last month and Jimmie Murphy two weeks later. The other pilots will be Guyot and Inghibert, French veterans who are taking the Duesenberg against the best racing car drivers of Europe.

Among the cars and drivers entered are: Ballot, De Palma; Sunbeam, Rene Thomas; Talbot, Dario Resta; Ballot, Chassagne, and Sunbeam, Boillet.

The Grand Prix this year will be the first since 1914 because of the war and the first at Le Mans since 1906. It is a road race of 321 miles, 10 miles to a circuit over level dirt roads with many dangerous turns.

All the Ballot cars will be equipped with Goodyear tires.

## Fiat Car Not to Start in Grand Prix Races

PARIS, June 29 (By Mail).—Fiat will not start in the French Grand Prix race at Le Mans on July 25. This decision has been taken by the leading Italian firm after having paid entry fees amounting to \$7100, but without any explanation being given as to the reason for the withdrawal. The Grand Prix cars have been on the road for some time and new eight cylinder engines have been built and tested, it is declared, with good results.

### TOOL FIRM GOING TO POLAND

ROCHESTER, N. Y., July 11.—Stockholders of the Rochester Auto & Tool Co., a \$75,000 corporation here, owned principally by residents of Polish descent, have voted to remove the equipment of the plant to Jaslo, Poland. The plant has been in existence two years.

## U. S. Gives Goodyear Aircraft Contract

### Akron Plant Will Be Busy One Year Making Balloons and Dirigibles

AKRON, O., July 11—Regardless of the outcome of the present spirited controversy now current in congressional circles as to the comparative advantage of aircraft and heavily armored battle-ships as America's first line of defense, both the army and navy are to have more lighter-than-air ships, orders for three large dirigibles and 38 observation balloons having just been placed by the Government with the Goodyear Tire & Rubber Co. of Akron.

The Government orders just received will keep the Goodyear aeronautical factory, which is the largest in America, busy for the next year, officials state.

Two patrol and scouting airships of 180,000 cu. ft. gas capacity each, will be built for the navy and will be delivered early next spring. A dirigible of similar size but of a special Goodyear design, will be completed for the army in November. All three ships will be officially tested at the Goodyear-Akron air station at Wingfoot Lake.

The military airship for the army will embody many new features of design which will make it the most modern aircraft in either arm of the Government service. It will be the first dirigible in American to have its motors in the car instead of in separate power units. Two propellers will be driven by bevel gears at a two-to-one ratio with transmission placed on outriggers instead of the motors driving direct to the shaft. This will allow the engine to run while the propellers are idle by throwing out the clutches, and will permit the propellers to be reversed—a new feature to permit greater facility in landing. Either motor can drive both propellers in the event one motor develops trouble. With both motors inboard they can be overhauled in flight much easier than on the outriggers, as in the present type of dirigible.

The army ship will be 170 ft. long and 45 ft. in diameter. It will be powered by two 125 hp. Aeromarine motors operating at 1600 r.p.m. Owing to the special reduction gear the propellers can be held down to 800 r.p.m., giving greater efficiency at higher speeds. The ship will have a speed of 60 m.p.h. and a "ceiling" of 10,000 ft. The car will be entirely enclosed and will house a crew of six, although three men can operate the ship in peace-time. The ship will be used for border patrol. The navy ships will be used for scouting.

### \$826 MELBOURNE CYCLE PRICE

WASHINGTON, July 12.—The average price of a motor cycle in Melbourne, Australia, is \$826, according to advice received by the Bureau of Foreign and Domestic Commerce. In 1911 it was \$315, and in 1914, \$365.

## TRACTORS MAY TAKE PLACE OF CITY MULES

INDIANAPOLIS, July 11.—The small tractor is assuming a new role in this city. The use of tractors is believed to be one method of getting the city out of a serious predicament. At the present time the board of sanitary engineers uses mules and horses in the ash and garbage collection departments. In casting about for a place to house all the animals the board found a suitable location in West Indianapolis, a part of the corporate city. Citizens of that section have protested to the point of beginning legal proceedings to dis-annex the entire section from the city, thus forestalling any municipal barns in the section. As a result the board is conducting a series of experiments with small tractors, which if successful probably will mean the elimination of every horse and mule from the department. Officials of the sanitary commission say the experiments so far have been satisfactory and it is likely that within 90 days the entire department will be motorized.

## U. S. Trade Board Cites Rubber Firm to Court

WASHINGTON, July 11.—Upon application for the issuance of a complaint the Federal Trade Commission has cited the Diamond Holfast Rubber Co. of Atlanta, Ga., in complaint of unfair competition in the manufacture and sale of automobile accessories and repair materials in interstate commerce. It is alleged that this company marketed its products in such a way as to pass them off as those of the Diamond Rubber Co., a subsidiary of the Goodrich company.

Further allegations are made that the respondent has marketed its products in containers with labels which feature the word "Diamond" and so closely resemble the labels of its competitor, the Diamond Rubber Co., in typographical arrangement, color scheme and general appearance as to cause confusion in trade. Thirty days are allowed for the filing of an answer after which time the case comes for trial on its merits, Aug. 9.

The Federal Trade Commission dismissed its complaint of unfair competition against the Super Tread Tire Co., South Bend, Ind., for failure of proof. The complaint alleged that the respondent circulated advertisements imputing that its rebuilt tires were new.

### RECORD SHIPMENTS FOR JORDAN

CLEVELAND, July 11.—In June the Jordan Motor Car Co. of Cleveland produced and shipped over 200 cars more than in any month in their history. May also was a peak month showing a 26 per cent production gain.

## Tire Firms Cut Down Fabric Obligations

### Goodyear and Firestone Progress Rapidly in Liquidations—Ease Contract Burdens

AKRON, July 12.—Considerable progress is being made by the larger tire companies in liquidating contracts for fabric which have been hanging fire for several months. Goodyear, which had contracts for 60,000,000 yd. of fabric, has taken delivery of approximately 10 per cent. Firestone is rapidly reducing its commitments and recently was compelled to refuse orders for certain grades of tires because they could not obtain sufficient fabric in time. Goodrich is taking delivery more slowly than the other large companies and does not expect to liquidate present contracts before 1922.

Various expedients have been adopted by tire companies to ease the burden of high priced fabric contracts inasmuch as there have been no cancellations. In some cases deliveries have been taken for from 25 per cent to 50 per cent of the contract at the original quotation and the remainder at the market price. Other companies are taking goods at the market price to be paid for on the usual terms and are giving long term notes on the difference due on high priced contracts. Some companies are understood to be buying cheap fabric in the open market to average costs.

Smaller tire companies which did not have large commitments either for crude rubber or fabric because they lacked the financial resources of the larger factories are in a much better position in regard to supplies and are taking advantage of the low prices on both these materials.

## Injunction Halts Use of Overland for Tires

TOLEDO, July 11 — Willys-Overland Co. has been granted an injunction against the Akron-Overland Tire Co. restraining it from the use of the name Overland in its corporate title or in any use in connection with its product. The order was handed down in the United States Circuit Court of Appeals in Philadelphia.

The injunction is interpreted to give in effect to the creator of a trade name in an industry the sole right to use that trade name in connection with any article which is commonly accepted as an accessory to the product which originally bore the trade name.

### PLAN RUBBER PRICE CONTROL

NEW YORK, July 12—A dispatch from London says the British Rubber Growers' Association has passed a resolution recommending producers to take immediate steps to reduce by 50 per cent the output of the association's membership. It is preparing a scheme for creating a selling organization with a view to control of prices.



## President Assures Tax Law Revisions

### Harding Allays Business Apprehension by Summoning Senate and House Leaders

WASHINGTON, July 11—Because of the apprehension existing among business men, President Harding has given assurances that the internal tax laws will be revised. Reports have been current for some time that Congress would continue its dilatory tactics until it would be necessary to reenact the tax laws without substantial change. Apparently, business men and industrial leaders had good grounds for this supposition. The President, however, knew that American business men would rise in righteous wrath in event the Administration's program for tax revision was side-tracked by the legislative branch of the Government. He is cognizant of the fact that many firms will be forced to the wall before the end of the calendar year, unless the inequities of the existing law can be removed. The Chief Executive has given serious consideration to the tax problem and, as a consequence, summoned Senate and House leaders for conferences as to the most expeditious way out of the difficulty.

The Senate has made one or two efforts to recess for the summer because of climatic conditions in Washington. At least, the climate is given as the excuse for a holiday, but the real reason is quite obvious—Congressional elections are scheduled for next fall and it is necessary to put their political machines into operation at an early date. The debate on the tariff bill closes July 21 in the House and then the House Committee on Ways and Means will take up the consideration of the revenue bill, for this measure must, under the law, originate in this committee. It is doubtful if there is one man in Congress who could safely predict the revision which the Senate and House will make in the tax laws. The Senate Committee on Finance will study the permanent tariff bill as passed by the House. It will not be held up in this committee because they have very definite ideas as to what they want in tariff legislation. It is quite certain that this committee will make many drastic changes in the House bill. The President has told the Congress to pass the tariff bill and revise the internal revenue laws without delay. He has suggested that lesser legislation should be pigeon-holed until the regular session.

### Harding Wastes No Time

It now appears that the Administration has put the quietus on the plans of Congress for bonus legislation. The President wasted no time in making known his desires on the subject. He took the bit in his teeth, so to speak, and called personally at the Capitol for conferences with legislative leaders. He told them very quietly but firmly that

the proposed enactment of the soldiers' compensation bill would be a rash move at this time and something which the Administration could not countenance in justice to the American taxpayer. Secretary of the Treasury Mellon stressed the fact that the bonus will cost the country \$2,200,000,000 in addition to the four or five billion which is required annually to conduct the ordinary process of government. The program of economy in governmental expenditures, which the present Administration adopted and has given admirable proof of its intentions to carry out, would have been shattered. One of the encouraging features of the situation is the fact that the bonus bill is not strictly a party matter, for Democrats, as well as Republicans, agree with the President that bonus legislation should be postponed.

### Chamber Opposes Bonus

The Chamber of Commerce of the United States is opposed to a bonus at this time. They state that the minimum amount that would be paid out by the Government under the proposed bonus bill exceeds the total annual cost of government for the fiscal years of 1915 and 1916. Secretary Mellon has said "I should be derelict in my duty to the country and to the veterans if I failed to give this warning of the inevitable financial consequences of the bill. This is not a time to impose several billion dollars of new liabilities on an already over-burdened treasury. It seems particularly inappropriate to give present consideration to the measure when we still have before us the pressing problem of revising the internal tax laws and finding sufficient revenue to meet the existing requirements of the Government. It would involve grave dangers of renewed inflation, increased commodity prices and unsettled business conditions."

## Survey Shows Slight Drop in Employment

WASHINGTON, July 12.—Analysis of employment conditions after an industrial survey by the Federal Employment Service, shows a slight decrease in the number of workers employed in the automobile industry during June.

According to the Federal Employment Service "detailed examination of the present returns indicates clearly the fundamental causes of the protracted industrial depression and the mounting tide of unemployment.

"Continued unsatisfactory conditions of transportation," it says, "with freight rates in many instances considered almost prohibitive, lack of anything like a normal foreign market, the present low value of farm products, stagnation in iron and steel, high costs of construction and general dullness of the retail trade stand out prominently as leading factors in the situation.

"Industry generally is optimistic and while the likelihood of a dull summer in most lines is fully recognized, the tendency is to count on improvement."

## Race Drivers Like Smaller Engines

### Speed Kings Believe 122 Inch Maximum Will Mean Industry Development

INDIANAPOLIS, July 11—Race drivers in Indianapolis are unanimously in favor of the new ruling of officials of the Indianapolis Motor Speedway to the effect that in 1923 cars entering for the 500 mile race will have to keep the piston displacement at 122 cubic inches as a maximum. The displacement in European cars would mean two litres. "Howdy" Wilcox stated to-day that it was his belief the action on the part of the Indianapolis race course officials would aid materially in developing the motor industry in this country. Louis Chevrolet, who designed two successive winners on the local course, also is in favor of the smaller displacement. Officials of the Duesenberg, while interested in the announcement, said that because they expected to retire from the racing game, they were not sufficiently interested to make any special experiments from a racing standpoint.

With the announcement of the reduction in displacement, Jean Chassagne, who was in the Ballot plant in France for some time and is said to be familiar with the creations contemplated and experiments tried, declares that before two years have passed the smaller engines will be making the speed the larger engines do. He said two two-litre cars now were being perfected in the Ballot and road trials prior to the Grand Prix in Le Mans showed them to make 95 miles. He believes that in another year the company will have perfected an engine that will compare in speed with those of larger displacements.

"Howdy" Wilcox is enthusiastic over the change. He said to-day that while the races might be uncertain the first year, yet some startling surprises would be recorded with the smaller engine. He like the others believed the second year would see the small engine on a par with the larger one. He is expecting a reduction of weights also. At the present time the minimum is about 1650 lbs. and he expects this to be reduced to about 1400 lbs. He says the small engine will produce as much speed eventually and the lighter car will enable the drivers to make some wonderful showings.

This is the fifth time that the Indianapolis track has reduced the engine sizes.

### START PROBE TO SOLVE THEFTS

NEW YORK, July 11.—District Attorney Lewis of Kings County will soon start investigating alleged collusion between owners of automobiles insured against theft and the thieves who steal them. The movement has been precipitated by the statement of an alleged thief who said he had taken the car in question under agreement with the owner so that he might collect insurance.

## Franklin Official Honored by Friends

**John Wilkinson, Inventor of Air-Cooled Motor, Has 20th Anniversary at Syracuse**

SYRACUSE, July 11—John Wilkinson, vice-president and consulting engineer of the H. H. Franklin Manufacturing Co., inventor of the first valve-in-head, four cylinder, air-cooled motor in America, the product of whose genius has developed into the world-known and esteemed Franklin automobile, made in the largest industry in the city, was guest last night at a reception to commemorate the twentieth anniversary of his start in the business and presented with a beautiful silver loving cup.

It was an intimate affair, this gathering at the showrooms of the E. W. Lawton sales agency, unusual in a city that is never slow to acknowledge and pay tribute to genius of her native or adopted sons, marked by expressions of regard and esteem of Franklin car owners and citizens of Syracuse generally. Among the crowd that heard sung the praises of the inventor and listened to him as with characteristic modesty he bestowed equal credit on the vision of H. H. Franklin and Alexander T. Brown, both of whom were present, were co-executives, salesmen, mechanics from the plant, leaders in the business and professional life of the city.

### Mayor Is a Speaker

Mayor Harry H. Farmer, William Allan Dyer, president of the Chamber of Commerce, and Frank H. Hiscock, chief judge of the Court of Appeals, were speakers introduced by S. Earle Ackerman, sales manager of the Franklin company, who paid tribute to the ingenuity of the inventor, his persistence in the face of obstacles, and praised him for the wonders he has wrought that have brought incalculable benefits to the city through creation of one of the great industries of the country.

Mayor Farmer represented the municipality officially. He referred to the wonderful advertising given Syracuse as the home of the Franklin car, greeted as a product of real merit in far off Japan, Alaska or the Antipodes and produced in a factory that has grown to be the largest of the many diversified industries here. He hoped Mr. Wilkinson would be spared in present vigor to participate in the celebration of the fiftieth anniversary which the mayor predicted as an even greater occasion than that of last night.

To Judge Hiscock was delegated the honor of speaking as the personal friend of Mr. Wilkinson, whom he has known since the flaxen-haired boyhood of the inventor to whom all paid tribute and has watched his career with a pride he made no effort to conceal in his remarks. John Wilkinson is one of those men who has been able to create something to

make life happier and more comfortable for his fellowmen, at least to have made a blade of grass grow where nothing had grown before, if he had not strictly complied with the scriptural recipe for blessedness by making two grow where one grew previously.

Two inventors whose names are inseparably linked with Syracuse it was his privilege to know quite intimately, Judge Hiscock said. First was the late John E. Sweet, who was so constituted he would rather put out a first class engine and sell it for what it cost him than to strive for the material returns alone, and the other was Mr. Wilkinson.

Sketching briefly the latter's career and paying tribute to his genius, industry and perseverance, Judge Hiscock wove into his informal remarks many little personal touches that revealed Mr. Wilkinson in a new light to some of those who do not know him so well, and also paid tribute to the confidence of Mr. Franklin and Mr. Brown in his invention, and the wise management that has built up the great industry making one of the best motor cars in the country.

## Reorganize Van Wheel; Make Extensive Plans

SYRACUSE, July 11.—The Van Wheel Corp. has been reorganized and is getting ready to go ahead in a much larger way. The new officers of the corporation consist of T. G. Meacham, president; J. W. Vanderveer, vice-president, and R. T. Wennstroom, treasurer and secretary. Meacham was formerly vice-president and general manager of the New Process Gear Corp. of Syracuse, now the New Process Gear Division of the Willys Corp. and is also president of the Meacham Gear Corp. Vanderveer is the inventor of the Van wheel and was also vice-president of the present company previous to the reorganization. Wennstroom was formerly comptroller of the H. H. Franklin Mfg. Co., and vice-president of the Walker Body Co. of Amesbury, Mass.

The corporation manufactures the "Van" hollow spoke cast metal wheel for both trucks and passenger cars. The truck wheel is of malleable iron, cast in four sections and electrically welded, which gives a true and concentric wheel.

### RUBBER FIRM FILES ANSWER

CLEVELAND, July 11.—The Columbia Tire & Rubber Co. of Mansfield has filed in the Federal Court here an answer to bankruptcy proceedings brought against it. All allegations are denied and a request is made for dismissal of the petition. The answer declares there is no merit to the claim of the Brighton Mills Co. for a large amount. Denial is made that the company is insolvent or that its funds were transferred to the Farmers Savings & Trust Co. It is asserted that only plant and equipment, not including quick assets amounting to nearly \$500,000, were transferred. The company asserts that after deducting all indebtedness the net assets amount to nearly \$1,000,000.

## Cameron Takes Over Sandusky Tractor

**Production of Engine Will Be Continued at Bridgeport Plant—Orders Are Steady**

NEW YORK, July 11—Cameron Motors Corp. has acquired the Dauch Mfg. Co., manufacturer of the Sandusky tractor at Sandusky, Ohio, and will continue the tractor business alone for the present, later adding production of the Cameron car. The plant containing 100,000 ft. of manufacturing space was said by President Cameron to be ample for the proposed needs of the company.

The tractor will be a light farm tractor similar to the one now turned out and the trade name Sandusky will be continued. The new product, however, will be equipped with a Cameron 4-cylinder air cooled engine and will sell at about \$425. These will be distributed through the dealer organization built up by the Dauch company, which numbers about 300 members.

Production of the Cameron engine will be continued at the Bridgeport plant of the Liberty Mfg. Co. under contract with the Cameron company. The rest of the tractor will be assembled at Sandusky. There will be no changes in the factory organization until complete plans are worked out covering production and sales.

Decision to manufacture the tractor only, for the present, was said by Cameron officials to be due to the unusual demand for this machine at this time. There are ample orders ahead and production will be speeded up to keep abreast of sales, but it is not expected to get into full production for at least a year.

## French Aviation Firms Are Now Consolidated

PARIS, June 25 (By Mail).—Three of the biggest French aviation companies: Astra, Nieuport and the Compagnie Generale Transaerienne have united their forces, with a capital of \$5,600,000, nominal exchange. The present offices and factory of the Nieuport company will constitute the headquarters of the new group, of which the general manager will be Marcel Thomas, at present with the Astra company, and chief engineer M. Delage, of the Nieuport company. The new group will be interested in both airplanes and airships, and has in hand an order for two hundred planes for the Japanese Government.

### PREST-O-LITE OFFICIAL DIES

INDIANAPOLIS, July 12—Announcement has been made of the death of Lewis N. Miller, 27 years old, assistant purchasing agent for the Prest-O-Lite Co., which occurred yesterday after an illness of several weeks. Mr. Miller served in the quartermaster corps of the United States Army.

# June Shipments Beat April or May

## Second Quarter 60% Same Period of 1920

### Report to N. A. C. C. Shows Surprising Production Record by Industry

NEW YORK, July 13—Shipments of automobiles for the month of June, as reported by the National Automobile Chamber of Commerce were 8 per cent larger than for May and virtually the same as in April. They reached 60 per cent of the mark set in June, 1920.

Carload shipments in June approximated 19,200, there were 18,000 driveaways and 3700 machines were shipped by boat.

Figuring boat shipments and driveaways in carload equivalents, shipments for the second quarter of this year nearly doubled the first quarter and were 61 per cent of the second quarter of 1920. Shipments for the second quarter of last year, excluding Ford, were 311,505. Shipments for the same period this year, therefore, were 190,018.

The figures since Jan. 1 by months compared with the same months of 1920 are:

	Carloads			Boats	
	1920	1921		1920	1921
January .....	25,057	6,485	Driveaways	1920	1921
February .....	25,505	9,986			
March .....	29,326	16,287			
April .....	17,147	20,187			
May .....	21,977	18,608			
June .....	22,516	19,200*			
1920	1921	1920	1921	1920	1921
29,283	3,185	....	93	....	93
43,719	7,507	....	99	....	99
57,273	9,939	....	75	....	75
64,634	14,197	....	1619	....	1619
74,286	15,193	....	2381	....	2381
60,746	18,000*	8350	3700*	....	....

\*Partly estimated.

These official figures demonstrate conclusively that the automotive industry is running on a better basis than almost any other in the field of manufactures. It proves also that the pessimism which prevails in many quarters is not well founded.

## Steel and Wage Cuts Bring Cheaper Cars

(Continued from page 87)

to-day. This means that the company has found a ready market for its products. George W. Bocker, president, says that June was an excellent month, with the factory running at capacity. He expects a satisfactory volume of business in the next six months. July has started off satisfactorily, with the factory operating at capacity.

Alexander Winton, whose keen intellect and executive capacity coupled with engineering skill, built up the Winton plant and established a reputation for the establishment, is devoting more time to production, with results that are satisfactory. Production in June was the greatest in any month of the year, and July promises to be about as good as June. The company plans to manufacture more cars in the next six months than it did in the first half of the year.

Jordan produced 30 cars a day in June and the schedule for the present month is about the same. M. S. Jordan, president, and Paul Zens, secretary of the company, left for Detroit Monday, July 11, for a conference with concerns from which they purchase parts and bodies. The reduction in the price of steel caused them to go to ascertain what benefits they may obtain from it.

At the Chandler and Peerless plants statements were made that factory operations were satisfactory, and business was good.

## Coast Sales Figures Prove Big Recovery

SAN FRANCISCO, July 12—The rapid recovery of the automotive industry on the Pacific Coast, and the steady return to normal were well illustrated at the end of June by figures issued by the State Motor Vehicle Department. These figures cover the entire State, but San Francisco dealers also declare that approximately the same proportion of increase holds good for Nevada and Arizona and for export trade as well, though not quite so strongly for sales in the states of Washington and Oregon.

The figures given out for the first four months of 1921, with comparisons for the same period of 1920, are as follows:

	1920	1921
Automobiles .....	421,982	540,339
Trucks .....	29,326	30,757
Trailers .....	1,699	2,456
Motorcycles .....	16,243	14,427

Conditions in the automotive industry in the East Bay section—Alameda, Oakland, Emeryville and Berkeley—are reported good by Manager Wert of the Oakland office of R. G. Dun & Co., in his summary for the closing week in June.

"Market conditions affecting retail sales of automobiles have fluctuated considerably in the past month. Some cars have had an unusual sale, while others have been slow. At present, sales are a little more active, due to recent price reductions. As a whole, conditions in the retail automobile field are quite satisfactory, and all the dealers seem to hold an optimistic air."

Some of the individual statements of sales and conditions, made in good faith by the dealers, show that Wert is too conservative.

## Cleveland Reaping Price Cut Harvests

### July Sales Get Start Well Ahead of Average of Several Years

CLEVELAND, July 11—Price reductions will make July this year a good month for the local retailer of automobiles, according to statements made by several dealers, who were visited at the close of the week July 9.

The first week of July started off with sales well ahead of the July average for several years. July long has been regarded as the first month of declining sales, but this year every dealer visited noted a stimulation of sales.

They accounted for this with the statement that price reductions are responsible. Many have been holding off buying new cars, waiting for price reductions. They have been encouraged to hold off by slight cuts here and there, but now that practically every car sold in Cleveland has been reduced in price and cuts have been very substantial, the buyer has become convinced that he will not profit by further delay. With the vacation days ahead and some of the best days for driving cars coming the car lover has come into the market with a rush.

"People are just beginning to realize that their dollar now will buy a hundred cents on the dollar of value in motor cars," said F. E. Stuyvesant, Hudson and Essex distributor. "This is true when judged by pre-war price standards."

The Barnes Motor Co., which has the Dodge agency, noticed no let-up in the demand for cars during the first week of July. The Chevrolet agency had a similar report to make with reference to the first week of July. New cars are moving easily, while used cars are harder to dispose of at this agency.

The Auburn agency will set a new record for July unless there is a complete upset in the outlook established by sales in the first week of the present month.

The Buick agency did as good business the first six days of this month as it did the first week of June. So did the Oakland, Overland, Willys-Knight, the Jordan, Peerless, Stearns, Templar and Franklin agencies.

## STOCKHOLDERS ORGANIZE

FORT WAYNE, IND., July 12—A. L. Jones, real estate dealer, has been named as president of the Revere Corp., a company organized among the stockholders of the Revere Motor Car Corp., of Logansport, for the purpose of purchasing the property of the defunct concern.

## South Africa Happy Over Sales Outlook

### Peace Treaty Progress Important Factor—Tractor Sales Promise New Records

JOHANNESBURG, SOUTH AFRICA, June 10 (By Mail)—The prospects for a good winter and the news that the matter of the Peace Treaty in Europe had become more settled has made country business very much brighter. Salesmen are all bringing in more optimistic reports, and better still, good sales records. The prospects for the second half of 1921 are very bright and distributors are looking forward to the gradual return to normal—normal in the sense that sales have been slack in the country districts. City conditions have not undergone much alteration and the steady demand remarked last month still continues.

Competitions and runs to stimulate interest in automobiles are being continually held in the different provinces and there is no doubt that they are having an effect. The reduction in the price of gasoline has been welcomed by dealers and the supply is now able to cope with the demand. The portion of South Africa that has felt the depression least is Rhodesia and conditions there have been fairly good. At present that country shows signs of being able to absorb large numbers of cars, and in proportion to the population is well supplied. As this territory is opened up the field for cars and trucks there will be very large.

#### Talk Better Roads

The automobile is becoming more recognized as the future means of transportation in this country and although prejudices against it are dying hard the internal combustion engine is gradually coming into prominence. The question of better roads—in consequence of more modern methods of transportation being adopted—is receiving the attention it deserves and the press has taken up a firm attitude on the point. In view of the estimates passed by the Provincial Council of the Transvaal cutting down expenditure on highways, the matter is being pressed more strongly and the general opinion is in favor of modern methods of road construction and maintenance.

The year 1921 is going to be the tractor year for this country and associations for the promotion of tractor sales have been formed in the large centers with results that are very gratifying. Trucks are being used for logging work in Natal and Cape Province over bad roads, and the results given are satisfactory. Figures showing the relative efficiency of ox traction as against the truck have been published in the daily press, and the mechanical vehicle scores heavily.

Great uneasiness is being felt by the motor trade in connection with taxation proposals. Up to the time of writing nothing definite has materialized.

## JULY SALES HEAVY IN WESTERN CITIES

NEW YORK, July 14—Dispatches received to-day by AUTOMOTIVE INDUSTRIES from correspondents in Salt Lake City, Des Moines, Denver and Dallas state without exception that automobile sales in the territories of which these cities are centers have shown an increase for the first two weeks of July over the corresponding period in June. The increase was particularly marked in the Des Moines territory.

### Normal July Business in New York District

NEW YORK, July 14.—Passenger car sales, which ran high throughout June in the Metropolitan territory, have dropped considerably during July up to date and the majority of dealers expect the falling off for the month to be more or less comparative with that which prevailed in normal years before the war.

Oldsmobile, Scripps-Booth and one or two other cars which had price reductions late in June after the novelty of most of the competing reductions had worn off sold better during the first two weeks in July than in previous months. However the normal run of cars, including the strongest sellers, have showed considerable dropping off in day by day sales.

The indications are that the July sales record will be considerably below June but nothing subnormal as July goes in New York city with a great many people in the automobile owning class out of town on vacations.

Notable sales records were made during June. Dodge sold at retail within the limits of New York city more than 400 passenger cars and 100 trucks. It is said that this has not been equalled except in cases where distributors included sales in outlying territories in their New York reports.

Nothing has developed to indicate that there will be any severe curtailment of buying during July and August. Dealers generally expect business to be slow but in this respect they will just be going back to normal conditions prevailing before the rush for cars in the past two years.

#### WINFIELD LAND PRICE LOW

PHILADELPHIA, July 13. — Judge Thompson in United States District Court here has set aside the sale of the Winfield Barnes Co. real estate holdings, consisting of a lot at Erie Avenue and Twentieth Street, 240x340 ft., and five buildings, which were bought at auction Monday by Morris & Kirby, attorneys for an unrevealed client, for \$73,500. The court ruled the sum to be inadequate. The sale at auction of personal property of the company including valuable machinery and equipment in 742 parcels to many purchasers was affirmed.

## Ohio Sales Improve as Car Prices Drop

### Buying Starts Anew in Columbus Territory—See Continued Good Business

COLUMBUS, July 12—There is quite a noticeable increase in sales with the passenger car dealers of Columbus and central Ohio since the price readjustments have taken place. Apparently the public was waiting for the reductions in price and with the announcements late in May and early in June, buying which had been held up for some time was started anew. As a result nearly all of the local agents and jobbers have been having a much better volume of business with prospects for the remainder of the summer extremely good.

It is the consensus that things will gradually improve in this section. The unemployment situation is not as bad as formerly and more of the factories are in operation. In some cases the output of manufacturing establishments has been increased and the financial as well as the business depression is being relieved to a certain degree.

The worst feature of the trade is the slowness still shown in the farming communities. Farmers are not having a good season as far as the wheat crop is concerned, which together with low prices is curtailing their purchasing power. This is shown in the less number of orders received for automobiles, principally passenger cars. The truck business in farming communities has suffered from the same cause.

Truck dealers are still having a slow business and little improvement is expected for the time being. Mercantile establishments are not disposed to increase their business equipment under existing conditions and consequently they are playing a waiting game as far as the purchase of trucks is concerned. Commission men and wholesale grocers are probably the best prospects at this time, and some trucks are being absorbed in those lines of industry. Haulage firms have sufficient equipment when the shrinkage in business is considered and they are not in the market to any extent. With the revival of business which is confidently expected in the fall a better demand for trucks is anticipated.

The repair business at the various shops and service stations in the Buckeye Capital is fairly good. Owners are coming in with their cars for minor repairs but generally they are postponing the general overhauling. Parts business is quite good, according to local agents.

#### CANADA SHOWS IMPROVEMENT

OTTAWA, ONT., July 11—During the fiscal year ending June 30, 1921, Canada exported vehicles, motor cars and parts to the value of \$2,591,995 to Australia, against \$2,119,955 for the previous 12 months.

## Verlinden Is Sued by General Motors

**Former Olds President Alleged  
to Have Loaned Self \$490,000  
Without Consent**

DETROIT, July 11—Suit was filed in Federal Court here to-day by the General Motors Corp. against Edward Verlinden, former president of the Olds Motor Works, to recover \$490,000 alleged to have been loaned to himself from Oldsmobile funds on deposit in Lansing, without the knowledge or consent of General Motors officials. Refusal of Verlinden to return the money upon demand of General Motors officials when the loan was discovered resulted in Verlinden's immediate dismissal, according to the petition filed in court.

The petition says Verlinden was employed as general manager of the Oldsmobile division under the usual written manager's contract providing for a salary plus a bonus on net earnings of the Olds division. The General Motors Corp. portion of the annual bonus was payable in stock of the parent corporation and held for a period of years in the custody of corporation in accordance with a written uniform plan. It is alleged Verlinden disputed deductions for depreciation in inventories and plants made by corporation accountants in order to reduce them to the market value, and also demanded, the petition says, that bonus shares of stock being held for him be delivered to him immediately although under corporation plan dividends during the period of retention of stock are paid to managers and employees whenever declared to other stockholders.

### Attorneys Issue Writs

Writs of garnishment against any and all funds to the credit of Verlinden in any Lansing bank were issued at the request of attorneys Stevenson, Carpenter and Butzel for General Motors. The suit resulted, it is alleged, from the action of Verlinden as assistant treasurer in countersigning a check on April 20. The check was drawn by Olds Motor Works division and payable to him against funds of the company in the City National Bank at Lansing for amount sued for. The check is said to have borne the notation "loan to Edward Verlinden." The petition recites denial of the plaintiff that it had knowledge of or authorized Verlinden to loan himself money for any such purpose or any other purpose.

### Counsel Justifies

#### Verlinden's Loan

DETROIT, July 11—The action of Edward Verlinden, former manager of the Olds Motor Works and vice-president of General Motors Corp., in drawing a check against the Olds account for \$490,000, is justified by E. C. Shields, attor-

ney for Verlinden, as accruing to Verlinden under the interpretation of his contract existing before the du Pont interests acquired control of General Motors.

In a statement covering the steps which led to the suit against Verlinden, in which the corporation asks restitution of the money, Shields declares there is a discrepancy of more than \$61,000,000 between the statement of 1920 earnings issued to stockholders, and the statement upon which President Pierre S. du Pont asked the Olds manager to adjust his contract bonus.

Owing to the unusual growth of the Olds division under Verlinden's management, the statement says, the manager was given a special contract under which he received a percentage of the earnings of the whole corporation. This contract was in force in 1918 and 1919 while W. C. Durant was General Motors head. During those years Verlinden's compensation under the contract was based upon net earnings without any special offsets, and he drew the amount from the Olds Motor Works account as he did in 1920.

### Profits Are Shown

At the end of 1920, however, the statement declares, President du Pont informed him that the profits of the corporation after deducting several charge-offs and write-downs, was \$32,000,000. At about the same time, the statement claims, the annual statement of the corporation for the year 1920 was issued showing net profits of \$93,150,308.

Part of a letter from President du Pont to Verlinden is quoted in the statement in which the executive says that, "it is possible that the profits of the several divisions of the corporation used as a basis for computing your compensation may appear out of line with the spirit of your compensation contract." Following receipt of this letter and several conferences in which he objected to the du Pont interpretation of his contract, Verlinden drew the adjustment check.

The statement says the manager immediately informed President du Pont of his check and advised him that he would pay the corporation as soon as the stock should be delivered to him. He contends that it was part of his contract that the stock of the General Motors Corp. that was held by the company in his name would be delivered to him whenever he or the company should sever connection with it. This stock, the statement asserts, has not been delivered to him.

Concluding, the statement says: "The whole controversy arose over special write-offs and write-downs which Mr. Verlinden claimed were not justified under the terms of his contract, and which Mr. du Pont persisted in making."

### OLD TIMERS GET NEW EMBLEMS

DETROIT, July 12.—Membership buttons in the Old Timers' Club are now being issued to accepted members by F. Ed. Spooner, secretary.

## Look Only for Minor Revisions of Taxes

**No Grounds for Assuming U. S.  
Treasurer Will Alter Original  
Recommendations**

WASHINGTON, July 12—It is believed that the Treasury's program for tax revision will contain only a few minor changes due to the movement of economic forces since Secretary of Treasury Mellon submitted his original recommendations to Congress last spring. There is no ground for assuming that the Treasury will recede from its previous declarations regarding the automobile industry. Just now the Advisory Board of the Treasury Department is comparing the fiscal needs of the Government with the estimated yield from the proposed tariff schedule and proposed tax rates.

The House Committee on Ways and Means will undertake the study of tax revision about August 1, when it is expected that the tariff bill will be sent to the Senate. The Senate Finance Committee conducted hearings on the internal revenue legislation for several weeks last spring under an arrangement with the House Committee on Ways and Means, in order to expedite the passage of the revenue law. Because of this action, the Senate Committee will be in a position to dispose of the House tax bill without long hearings and the whole measure should be enacted before September 15, provided the Congress quits bickering over various items.

While the Treasury has made no public announcement of its plan, it is known that Secretary Mellon is dependent upon the advice of Professor P. S. Adams, Chairman of the Tax Advisory Board of the Treasury. Prof. Adams is known to favor the replacement of the excess-profits tax by a tax on the undistributed profits of corporations; the repeal of existing sales or consumption taxes on fountain drinks, "luxuries" and medicinal articles, and the introduction or increase of a few miscellaneous taxes, chiefly on articles of widespread but not absolutely essential consumption, selected largely on ground of administrative convenience.

## Ford Cuts Inventory \$33,000,000 in Year

BOSTON, July 11—The Ford Motor Co., Inc., under the laws of Delaware, has filed with the Commission of Corporations of Massachusetts the following statement, dated April 30, 1921:

	1921	1920
Real estate.....	\$71,329,719	\$85,649,727
Machinery .....	46,459,046	41,661,137
Merchandise .....	63,848,157	96,859,012
Cash & acct. receiv...	86,995,166	62,499,027
Securities .....	10,361,963	18,921,608
Accounts payable.....	44,993,755	15,958,116
Notes payable.....	3,892,386	35,112,974
Surplus .....	182,877,686	165,679,132



## White Celebrates 20th Anniversary

### Branch Managers Dine Brothers and Recall Early Days of Industry

CLEVELAND, July 11—Windsor T. White, chairman of the executive board, and Walter C. White, president of the White Co., were given a dinner to-night by the branch managers met in annual conference and to celebrate the twentieth anniversary of the White brothers in the manufacture of motor vehicles. All of the branch managers of the United States and Canada together with a few invited guests were present.

During the dinner J. S. Hathaway, manager of the Boston branch, and who in years of service is the dean of the branch managers, having been connected with the sale of White vehicles since the company started, presented the brothers, on behalf of the branch managers, with a miniature of the first White steam Stanhope built 20 years ago. It is a complete miniature made one-fifth size, and having every detail worked out with the exception of the internals of the power system. Fred S. Bonton of Cleveland, who purchased the first steam car built by the Whites on April 27, 1901, was among the guests and told of early experiences.

#### Colonel Clifton Speaks

Col. Charles Clifton, president of the National Automobile Chamber of Commerce and whose connection with the Pierce-Arrow Co. dates back 20 years, told of his close friendship with Windsor T. White from the days of the now famous New York-Pittsburgh Mud-lark Tour in the fall of 1903. Colonel Clifton was the only representative of the manufacturing industry present.

George Urquhart, manager of the White San Francisco branch, who presided as toastmaster, in introducing Hathaway suggested some early reminiscences which resulted in an intimate sidelight on business ethics as expressed by Windsor White to Hathaway 20 years ago. He emphasized as a cardinal principle, "We can stand for an honest failure but cannot stand for a dishonest success."

Windsor White in his family talk to the group added interest by drawing attention to two old employees whose years of service date to the early days of the late Thomas White, organizer of the White Sewing Machine Co. One of these employees has been in the White service for 43 years, and the other for 40 years. They have already served under three generations of the Whites. Length of service does not all go to the employees, as the average years of association of the branch managers present with the company was 12 out of a possible 20 years of representation.

Roland H. White, president of the Cleveland Tractor Co., and the third of the brothers, who withdrew from the

White company at its reorganization and started tractor development, was one of the guests. David Beecroft, president of the Society of Automotive Engineers, and directing editor of the Class Journal Co., spoke on some future aspects of the industry.

### Jacoby Named Head of Mitchell Motors

NEW YORK, July 13—William L. Jacoby, an efficiency engineer and industrial expert for A. G. Becker & Co. for the past ten years, has been elected president of the Mitchell Motors Co., Inc., Racine, Wis. He succeeds D. C. Durland who has returned to the General Electric Co. with headquarters in Chicago. Durland remains a director of the Mitchell company.

Mitchell Motors is controlled by Becker & Co. and Ladenberg, Thalman & Co., of this city. Jacoby was placed in charge of the company's affairs because of his ability as an industrial executive. He has directed in the past many of the industrial enterprises in which Becker & Co. have acquired an interest. His home is in Chicago.

The retirement of Durland is understood to have been voluntary and the position he has taken with the General Electric is considerably more important than the one he relinquished.

The Racine company is coming back rapidly and its sales for June were the heaviest for any month in nearly two years. Sales for the first ten days of July went ahead of the June record for that period. The outlook for the company is decidedly encouraging. Its inventory has been reduced to normal proportions and material reductions have been made in its obligations.

#### DISBROW NOW A MANUFACTURER

CHICAGO, July 13—Louis Disbrow, racing veteran, has entered the field of spark plug manufacture. He is vice-president and engineer of the Victory Co., of Milwaukee, making a plug in standard sizes and with metric extensions, and will make his headquarters at 2118 Michigan Avenue, this city, where sales headquarters will be maintained. He is also representing the Dow Chemical Co.'s line of pistons and hose clamps.

#### WHOLESALE GAS PRICES DROP

NEW YORK, July 12—Wholesale prices on gasoline have now decreased about 28 per cent since Jan. 1, the price in 30 principal cities averaging to-day 21.1 cents a gallon. The lowest quotation is 15 cents a gallon at Kansas City, Mo., and the highest 26 cents at Seattle. Prices have declined only 2 cents a gallon in California and Washington since Jan. 1.

The New York wholesale price to-day is 24 cents, a drop of 7 cents since Jan. 1. In San Francisco the price is 25 cents, a 2 cent drop. Chicago is selling at 18 cents, New Orleans at 19.5, a 9 cent drop in each case.

## Creditors Favorable to Denby Bond Issue

### Certain More Than 75 Per Cent Will Agree to Plan for Work- ing Capital

DETROIT, July 13—Creditors of the Denby Motor Truck Co. at a meeting yesterday showed an inclination to join whole-heartedly in the plan of the creditors' committee to issue bonds and first preferred stock in settlement of claims and for raising the necessary capital.

Twenty-five per cent of the merchandise creditors signed up at the meeting and those not present are sending in signed agreements by mail assuring favorable action by 75 per cent, according to members of the committee, which permits the plan to become operative.

The plan of the committee is to issue 100,000 class A first mortgage bonds to be used in the discretion of the directors for imperative current needs as working capital; 200,000 class B first mortgage bonds to be prorated among creditors, which is equal to about 25 per cent of the total indebtedness, and first preferred stock in an amount sufficient to cover the remainder of all claims, this stock to have priority over all existing stock, both preferred and common. The present preferred stock, of which there is \$228,100 outstanding, would become second preferred. There also is outstanding \$474,930 common.

Seventy per cent of the present stockholders have deposited the holdings with the Security Trust Company to be voted favorably on the committee plan which will become operative automatically when 75 per cent of the stockholders' and creditors' claims have agreed.

### Durant Men in New York Will Discuss Policies

NEW YORK, July 11—Chiefs of the various divisions of Durant Motors are here this week for conferences with Durant on questions of general policy. Among those in New York for the meeting are T. W. Warner, Edward Verlinden, who will have charge of the main Durant plant at Lansing, and D. A. Burke, who developed the Sheridan.

Rapid progress is being made in building up a dealer organization, particularly in the East, where the work is under the direction of M. D. Leahey. Dealer relations are being established in the central territory by Verlinden and on the West coast by E. M. Steves, general sales manager for Durant Motors of California.

#### JENKINS SUCCEEDS HAMPTON

NEW YORK, July 13—Uncertainty concerning the successor to E. H. Hampton as manager of the assembly plant of the Ford Motor Co. at Buenos Aires, Argentina, is cleared up by an announcement of the company that H. S. Jenkins is in charge of the Argentina branch.

## NEW CAR PRICES

## APPERSON REDUCES CARS

KOKOMO, IND., July 12—Reductions ranging from \$250 to \$750 have been made, by the Apperson Bros. Automobile Co. on open cars in both its Standard and Anniversary models. The Standard 4-passenger is cut from \$3,500 to \$3,000, and the 7-passenger from \$3,500 to \$3,250. The Anniversary 4-passenger is reduced from \$4,250 to \$3,500, and the 7-passenger from \$4,250 to \$3,750.

## ELCAR PRICES COME DOWN

ELKHART, IND., July 11—Elkhart Carriage & Motor Car Co. has reduced prices on all models of Elcar in announcing its 1922 line. In the open cars the De Luxe models are reduced from \$1,700 to \$1,595, the Standard models are priced at \$1,385, and the lighter models are reduced from \$1,300 to \$1,195. In the enclosed cars the 3-passenger coupé is reduced from \$2,500 to \$2,395 and the sedan from \$2,600 to \$2,495.

## ALL HOLMES MODELS CUT

CANTON, OHIO, July 11.—Holmes Motor Car Co. has reduced prices on all models \$400. The four and seven-passenger models are reduced from \$3350 to \$2950, the coupe from \$4250 to \$3850, and the sedan from \$4550 to \$4150.

## KLINE CUTS OPEN CARS

RICHMOND, IND., July 11—Prices on Kline open models have been reduced \$200 by the Kline Kar Corp., the new prices on the roadster and touring models being \$2,090. The enclosed car prices are continued as formerly.

## HAWKEYE TRUCKS REDUCED

SIOUX CITY, IOWA, July 11.—Prices on Hawkeye trucks have been reduced from \$265 to \$645. The 1½ ton is cut from \$2365 to \$1850, the 2-ton, \$2915 to \$2650, and 3½-ton, \$4345 to \$3700. Under the new management plans as inaugurated two months ago, the company reports a gradual increase in business.

## CUT PRICES ON KLAXON HORNS

NEWARK, N. J., July 11.—Prices on Klaxon horns have been reduced on all models, the price change ranging from 75 cents to \$3. In the future push buttons and wires will be furnished only with the Klaxon 20. With models 6, 6-Deck, 6-MC and 5 this equipment will cost 75 cents list, and with models 12 L and 12 S, will cost \$1 list.

## PORTAGE FILES ACCOUNTS

AKRON, OHIO, July 11.—Schedules in bankruptcy showing liabilities of \$5,438,993 and assets of \$5,074,337 have been filed in the United States district court at Cleveland by the Portage Rubber Co. of Akron, the papers being signed by M. S. Long, president. The company was thrown into the hands of receivers May

31, George D. Bates and John W. Maguire being named receivers. Maguire is vice-president and general manager of the company.

Notes and bills amounting to \$3,444,320 constitute the largest items in the liabilities listed. Unsecured claims totaling \$1,743,353 are also listed. Among the company's assets are listed real estate at \$660,994, stock in trade \$834,384, and machinery and tools \$1,889,880.

Leland Denies Lincoln  
Refinancing Reports

DETROIT, July 11—W. C. Leland, president of the Lincoln Motor Co., made the following statement to-day in reference to persistent reports of a reorganization and refinancing of the company:

"Our factory was closed last week for inventory and reopened this morning as it was announced it would do when we shut down. There is absolutely no truth in reports of any reorganization of this company or any change whatever in management. Any report that there is a big refinancing plan under negotiation also is absolutely false."

Sixty per cent of the normal force will be at work, he said, and about seventeen cars will be built daily.

## HARVESTER TRACTORS DOWN

CHICAGO, July 12—International Harvester Co. to-day reduced prices on three of its tractor models. Titan 10-20 is cut from \$1,000 to \$900, International 8-16 \$1,000 to \$900, and International 15-30 from \$1,950 to \$1,750. Each of these models is equipped with friction clutch pulley and angle lugs. The new prices are effective at once. In the case of the International models the price is the lowest ever quoted. With the equipment now included on the Titan the price too is lower than ever before. In announcing the new prices the company declares that all war time advances are wiped out and the products placed at a more favorable price than ever before.

## DUESENBERG ELECTS OFFICERS

INDIANAPOLIS, July 13—Reorganization of the Duesenberg Automobile & Motor Co., Inc., has been completed by the election of the following officers: President, B. A. Worthington; vice-president and general manager, L. M. Rankin; secretary and treasurer, F. A. Reilly; chief engineer, F. S. Duesenberg; assistant chief engineer, A. S. Duesenberg; assistant engineer, E. J. Porter; sales manager, Harry W. Anderson; purchasing agent, George H. Beilstein.

## CORBITT TRUCK REDUCED

HENDERSON, N. C., July 11—Corbitt Motor Truck Co. has reduced prices on all models from \$200 to \$500. Reductions on the 1-ton are from \$2,400 to \$2,200, the 1½-ton, \$2,800 to \$2,600; the 2-ton, \$3,500 to \$3,150; the 2½-ton, \$3,650 to \$3,300; 3½-ton, \$4,500 to \$4,100, and 5-ton, \$5,500 to \$5,000.

## METAL MARKETS

MATURE reflection of the situation brought about in the steel market as the result of the downward revision in "official" prices can not help but convince the automotive purchasing agent that henceforth steel values will sail a more even course. It was only natural that announcement of the price changes should be followed by the question when the next cut in prices will eventuate, this on the ground that steel price levels are still 50 per cent higher than they were before the war. Leaders in the steel industry took particular pains to anticipate this question by accompanying announcement of the price changes with a showing that, eliminating the compulsory increment of prices as the result of the advance in freight rates and wage scales over those of 1913, steel prices now rule lower than they did before the war. This is only another way of saying that further reduction in prices must wait upon a lowering of freight costs and wage scales.

At the present there is no representative demand for steel. Hand-to-mouth buying is looked for to continue for some time, except perhaps by the railroads which are now expected to lead the way in committing themselves as buyers by contracts, once the financial arrangements with the Treasury, now under way, are completed. When, however, a sufficiently large demand develops from sources other than the railroads to warrant the placing of contracts for deferred deliveries, buyers will naturally bethink themselves of contracts that will protect them in the event that reductions in freight rates and wage scales will make further shading of prices possible. Good, although perhaps slow progress is being made in the matter of deflating wage scales. Of special interest to the automotive industry in this connection is the 10 per cent cut in wage scales assented to by the Amalgamated Association of Iron, Sheet and Tin Workers at its conference with the Western Sheet and Tin Manufacturers' Association in Columbus. For the time being the smaller interests among the "independents" will endeavor to secure what business offers at the "stabilized" prices announced by the larger interests. It is not likely that this program will be altered, unless the slight quota of orders which the small mills have at this time should be still further curtailed. All in all, the outlook for the entire steel industry is growing brighter and slow gains in orders are looked for by even the most confirmed pessimists of a few weeks ago.

Pig Iron.—With sales of retail proportions, values continue plastic. Malleable has been sold at \$21.50, Buffalo, furnace.

Steel.—The full-finished sheet price, in keeping with the general reductions on sheets, is now at 4.70c. for 22-gauge auto-body stock. Full-finished sheet makers in the Youngstown district have a fair amount of orders on hand. Some inquiries for strip steel have been put out by Detroit passenger car builders. Prices for hot-rolled and cold-rolled strip steel appear to be still in the making. Inquiries for bolts and nuts are more numerous in spite of the fact that most of the passenger car builders are reported to have large stocks on hand.

Aluminum.—So far market quotations have not been assisted in the least by the possibility of the tariff on aluminum being adopted as recommended by the Ways and Means Committee. Consumers appear to incline to the view that the aluminum schedule will come in for so much criticism in the House that it will be altered.

## FINANCIAL NOTES

**Timken-Detroit Axle Co.**, in a comparative balance sheet as of Dec. 31, shows assets for 1920 as \$21,494,863, as compared with \$22,697,214 for 1919. Cash on hand Dec. 31 is shown as \$671,151 and inventories total \$10,932,521. The cash position represents a reduction of about \$800,000 from the year previous and the inventories are about \$700,000 more. The company's surplus is \$9,866,662, as compared with \$10,175,580 in 1919. A \$100,000 reserve for contingencies is set forth.

**Firestone Tire & Rubber Co.**, in a comparative balance sheet as of Oct. 31, shows total assets of \$107,404,200, as compared with \$73,753,598 in 1919. In the 1920 balance inventories are set out as \$45,163,710, an increase of \$21,000,000 over 1919. Cash and government securities total \$5,198,060, approximately the same total as the year before. A surplus of \$33,880,757, depreciation reserve of \$8,098,495 and \$3,151,750 reserve for inventory loss are set forth.

**Herschell-Spillman Motor Co.**, in a comparative balance sheet as of Dec. 31, reports assets of \$3,857,452 as compared with \$2,409,297 for the year previous. Cash is set forth as \$120,337, and inventories \$1,402,318. The inventory total for the year before was \$553,003, and the cash \$586,798. The surplus for 1920 was \$35,527 as compared with \$71,610 for the year before. Reserves are carried totaling \$122,819.

**Lee Rubber & Tire Corp.** reports current earnings running well ahead of dividend requirements. Decreased production records for the first quarter of the year have been followed by record production in the second quarter, which is continuing. Total bank debt is declared to be \$500,000 and cash on hand is said to exceed that amount. Inventories are declared to be normal.

**Buda Co.**, in a comparative income account dated Dec. 31, shows gross sales of \$8,721,884 for 1920, as compared with \$7,432,287 in 1919. Net income for 1920 was \$329,261, as compared with \$405,789 in 1919. The balance sheet dated Dec. 31 shows total assets of \$5,826,617, in which inventories total \$2,413,840 and cash \$309,778. Surplus and undivided profits total \$1,834,905.

**Falls Motor Corp.**, in a balance sheet as of Sept. 30, 1920, shows total assets of \$3,461,256, in which is included cash of \$161,303 and an inventory of approximately \$800,000. The surplus of the company is \$35,933. Accrued dividends total \$98,210, accrued wages \$15,796 and accrued taxes \$41,544.

**Kelsey Wheel Co.** reports business at a rate which indicates earnings on a par with the \$1,916,000 net profits of 1920. The balance sheet as of Dec. 31 showed total assets of \$22,680,911. The company is supplying the Ford Motor Co. with a large part of its wheel requirements.

**Mitchell Motors Co.**, in a comparative balance sheet as of Dec. 31, shows assets of \$8,846,208, as compared with \$8,667,794 for 1919. Cash is shown as \$82,339 and inventories as \$5,188,761. The company's surplus is \$3,952,129 and reserve for contingencies \$142,750.

**H. H. Franklin Mfg. Co.** paid a dividend of 50 cents a share on common stock on July 11. Forty per cent of employees are now stockholders. Profits for the first five months of 1921 are estimated to be in excess of \$775,000 after taxes.

**Wright Aeronautical Co.** reports orders ahead, which indicate a gross business for the year in excess of \$2,500,000, and declare

earnings will approximate \$1.38 a share, as in 1920, after charges and allowances for development expenses.

**International Harvester Co.**, through Vice President Legge and Treasurer Ranney, declare the company is not contemplating any new financing. Not much change in the affairs of the company in a monetary sense is expected this year.

**Flak Rubber Co.** directors have deferred action on dividends on both first and second preferred stock. The last disbursement on the second preferred stock was 1½ per cent on June 15, and on first preferred 1½ per cent on May 1.

**Ajax Rubber Co., Inc.**, through its board of directors, has declared that no new financing is contemplated and that the company was in no need of additional funds. The business outlook is reported better than for months.

**Republic Motor Truck Co., Inc.**, in an income account for the March quarter, shows net sales as \$797,163, profit after sales costs of \$143,778, gross income of \$174,163, and a deficit after expenses, charges, etc., of \$367,808.

**Fisher Body Corp.** has declared a dividend of 1½ per cent on its preferred stock, to be paid Aug. 1. A dividend of \$2.50 a share will be paid at the same time on the no par common stock of the company.

**United States Rubber Co.** has passed payment of the quarterly dividend of common stock due at this time. The regular quarterly dividend on the first preferred will be paid July 30.

**Wright-Fisher Bushing Corp.** has gone into receivership, the Security Trust Co. of Detroit being appointed to take over the affairs of the company.

**Hale & Kilburn Corp.** report American Body Corp. sales from Aug. 11, 1920, to Dec. 31, 1920, as \$8,523,875. Net income after all expenses was \$269,457.

**Hupp Motor Car Co.** declared the regular quarterly dividend of 2½ per cent on the common stock, payable August 1 to stock of record July 15.

**Electric Storage Battery Co.** has declared regular quarterly dividends of \$3 on both the common and preferred stocks, payable Oct. 1.

**Federal Rubber Co.** has omitted the quarterly dividend of 1½ per cent on first preferred stock due at this time.

## Toledo Plants Re-employ 8288 Men During June

**TOLEDO, July 15.**—The employment situation in Toledo has been greatly relieved in the last month mainly by the awakened activity at the plants here which are associated with the automotive industries. Out of 26 cities of the country showing a gain, Toledo was third, with 15.6 per cent betterment in June.

The report of the Merchants' and Manufacturers' Association here shows that during the month Toledo plants requisitioned 13,738 men, of whom 8288 were vehicle workers, and most of them taken back to work by the Willys-Overland Co.

In addition to this number of automobile men there were put to work 485 textile workers, 1533 iron and steel workers, 1987 clay, glass and stone workers and 1408 miscellaneous employees.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

**NEW YORK, July 12.**—The reserve ratio on the Federal Reserve System declined slightly from 60.8 per cent to 60 per cent. This was largely a result of the \$37,441,000 increase in Federal Reserve notes in circulation, as well as the \$27,364,000 increase in deposits. Gold reserves increased \$15,875,000 and total discounts \$29,801,000.

Money was in somewhat larger supply on the local money market last week following the mid-year disbursements. Call money had a slightly narrower range at 5½ per cent to 6 per cent, as compared with 5 per cent to 6 per cent the previous week. The ruling rate was 5½ per cent although on the "outside" market some trades were made at lower rates. The larger supply of funds also had an effect on the quoted rates in the time money market. Six per cent was quoted for all periods from 60 days' to 6 months' as against 6½ per cent for 60 days' and 4 months' paper and 6 per cent to 6½ per cent for 5 and 6 months' paper a week ago. The market, however, was quiet and transactions were not made on a large scale. In the commercial money market 6½ per cent to 6½ per cent was quoted for 60 and 90 days' indorsed bills receivable and 6 months' prime bills as against previous rates of 6½ per cent to 6½ per cent.

The significant feature of the industrial world last week was the action of the United States Steel Corporation in reducing prices, following the lead of the Bethlehem Steel Corporation. The two price reductions now made since April by the Steel Corporation from the price maintained from March 21, 1919, to April 12, 1921, the level established by the Industrial Board, range from \$8 to \$25 per ton for steel products. The present prices are now about 29 per cent below the "Government prices" during the war, and 17 per cent below Secretary Redfield's Industrial Board prices. In addition, the Steel Corporation also abolished the time-and-one-half wage scale for overtime work. These two decisions should have a beneficial effect toward putting the steel industry on a readjusted basis. The industry is now working much below normal as compared with the general level of activity in the industrial field throughout the country. The present rate of operation was estimated to be about 20 per cent of capacity.

## SPEED REFINANCING PLANS

**NEW YORK, July 12.**—Marked progress in the plans for refinancing the Willys-Overland Co. were made at a meeting of the bankers' committee today. It is expected that details of the plan will be announced in the near future. The basis of the refinancing plan will be the issuance of first mortgage bonds, the proceeds of which will be used to take up the floating debt.

## MEN OF THE INDUSTRY

Charles Hendy, Jr., identified for the past fourteen years with the Ford Motor Co., has announced his connection with Simplex Corporation of Chicago, manufacturers of Theftproof Auto Locks. Mr. Hendy was for many years in charge of the Denver plant of Ford Motor Co., and for the past two years has been manager of the Chicago plant. He acquires a stock interest in Simplex Corporation and becomes vice president and general manager. To date, Simplex Corporation has devoted its output to extra locks, but under Mr. Hendy's management will actively push its factory type lock for standard equipment.

A. G. Selberling of the Haynes Automobile Co. at Kokomo, Ind., has been named chairman of the special committee of the Kokomo Chamber of Commerce to co-operate with the board of directors of the Howard County Automotive Trade Association in putting on an automobile show and industrial exposition next September. At a meeting of the Automotive Trade Association results of the co-operative used car market, which was held recently, were discussed. So successful was the market that it has been decided to hold another some time the latter part of July or the first of August.

Albert R. Erskine of South Bend, the managing head of the Studebaker corporation, has been named as one of the members of the interstate harbor commission of Indiana and Illinois, created by an act of the last session of the General Assembly. The commission is to investigate the feasibility of the construction of a proposed interstate harbor in Lake Michigan in the Calumet district of Indiana and the Chicago district of Illinois. Two members are to be appointed by the Governor of Indiana, two by the Governor of Illinois and one by the Secretary of War.

C. P. Raney, who has been assistant manager of the Miller Tire Repair School since June, 1919, has accepted a position as Akron branch manager for the Western Rubber Mold Company. Mr. Raney has had nine years' experience in the rubber industry. In 1913 he was tube inspector of one of the Akron companies. This work was followed by a position as department foreman. He later became an industrial engineer for another of the large tire companies.

Frederick C. Horner, formerly transportation engineer of the Packard Motor Car Co. of New York, has sailed for England, where he will spend a year studying various transportation matters. He will make London his headquarters during his work abroad, and plans to spend some time in Scotland and on the Continent. He intends particularly to study carefully the operating program of the London General Omnibus Co.

Mr. Robert D. Black, who was formerly assistant sales manager of The Black & Decker Mfg. Co., of Towson Heights, Baltimore, Md., has been appointed manager of the company's Philadelphia branch office. Mr. Black succeeds Mr. W. C. Allen, who has been made a special factory representative, with headquarters at the Company's Cleveland Branch Office.

Herschel C. Smith, formerly deputy state highway engineer of Oklahoma, has been appointed assistant professor of highway engineering and highway transport at the University of Michigan, from which institution he graduated in 1913. Last June he

received the degree of Master of Science in Highway Engineering and Highway Transport.

F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, has gone to Canada for a three-weeks' vacation, after a month's trip through the Middle West, in which he visited many truck plants which are non-members of the chamber.

H. L. Dunn, purchasing agent for the Handley-Knight Co., has tendered his resignation, to take effect Aug. 1. He has not announced his plans for the future.

Charles L. Derrickson, of the McQuay-Norris Mfg. Co., St. Louis, has been discharged from the hospital after a serious illness of four months.

## INDUSTRIAL NOTES

Franklin Automobile Co. announces that from January 1 to June 30 it produced and sold to dealers 5382 cars having a retail value of \$17,784,000. This represents 82 per cent of the number turned out and sold during the corresponding period last year. In June 1938 cars were shipped. On June 24 the production schedule was increased from forty cars daily to forty-three.

Lincoln Motor Co., starting with fifteen distributors in November, 1920, has increased the number of distributors and dealers to 138. Sales reflect the contracts. Each month of the second quarter has bettered the entire first quarter's business.

Rhode Island Machine & Tool Co. of Woonsocket has been licensed to manufacture high pressure greasing devices under the Bassick patents, and patent litigation between the two companies has been withdrawn.

Samson Tire & Rubber Corp., Los Angeles, is operating on a 24-hour daily schedule to meet heavy sales demand for its product.

Root and Van Dervoort Corp. produced 450 cars in the first half of the year, as compared with 767 in all for 1920.

## N.A.C.C. Directors Get Reports on Activities

BUFFALO, July 13—Several subjects of interest to the industry were discussed by directors of the National Automobile Chamber of Commerce at a meeting here to-day at the Hotel Lafayette. One of them was a greater degree of co-operation with automobile dealers throughout the country. In this connection a report was made on the conference held here yesterday between committees representing the N. A. C. C. and the National Automobile Dealers' Association. Directors were asked to adopt a definite plan for co-operation with Secretary of Commerce Hoover in assembling industrial statistics and promoting foreign trade.

The directors also took up the program for promoting "safety first" plans on a national scale including the use of a \$5,000 fund to be given in prizes to school children for essays.

Alfred Reeves, general manager, stated that reports submitted at the meeting showed that the automobile business is 10 per cent better off than any other industry.

Directors who attended the meeting were R. E. Olds, Charles D. Hastings, Alvin Macauley, A. J. Brosseau, John N. Willys, H. H. Rice, H. M. Jewett, W. L. Pulcher, Thomas Henderson, J. Walter Drake, W. E. Metzger, Roy D. Chapin and C. C. Hanch.

## Detroit to Have Annual Convention of M.A.M.A.

NEW YORK, July 12—This year's credit convention of the Motor and Accessory Manufacturers' Association will be held at the Hotel Statler, Detroit, Wednesday, Thursday and Friday, Sept. 14, 15 and 16. Tentative plans call for a comprehensive and vital program of papers and discussions, built around the central theme: "Bringing the Automotive Industry Back to Normal."

Detroit was selected this year because of its convenience to the great majority of the 400 companies affiliated with the association. Speakers of national importance from the automotive industry and from industrial, banking and governmental circles will be scheduled for the program. The annual credit convention of the M.A.M.A. is usually regarded as one of the industry's most significant gatherings, for there the credit managers, financial directors and general executives of the unit and equipment manufacturers exchange comments and experiences on current conditions and future prospects for the automotive field.

## Rubber Association Men Study Proposed Tariff

NEW YORK, July 12—General Manager A. L. Viles of the Rubber Association of America will take up immediately with President Harry T. Dunn and directors of the association, a study of the 10 to 35 per cent duty on tires proposed in the permanent tariff measure now before Congress.

Probable effect of the proposed increase of 25 per cent in the duty on foreign made tires will be discussed and a policy determined upon. Though it is recognized that no high tariff protection is needed now, Viles said there were some tire makers who thought competition would develop as production methods improved abroad.

Probability of retaliatory action by importing countries will be considered as having an important bearing on the future of the tire industry in this country, Viles said.

## AUTOMOTIVE CORPORATION SUED

TOLEDO, July 15—Ten residents of Cleveland filed suit in Common Pleas Court here this week to recover money paid to the Automotive Corporation for stock. They claim that false representations were made by agents of the company.

# Calendar

## SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair, conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28-Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park, Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

## CONVENTIONS

Sept. 14-15-16—Portland, Ore., Credit Convention Motor

and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## RACES

July 25—Grand Prix, Le Mans.  
Labor Day—Uniontown, Pa., Autumn Classic.

## Bosch Magneto Adds Battery Ignition System

BRIDGEPORT, CONN., July 12—The American Bosch Magneto Corp. has announced the addition to its line of electrical equipment of a battery ignition system. This system is not intended to displace the magneto ignition system, which will be continued, but to supplement and complete a line which, according to the announcement, is intended to satisfy every electro-mechanical need of the automotive industry.

The battery ignition system comprises a timer-distributor and a coil. The distributor is made in two types, the so-called "compensating" or automatic advance type, and a type suited for manual control. Both systems are provided for 4, 6 and 8 cylinder engines. The coil, arranged for mounting on the engine side of the dash or on the engine, as desired, is inclosed in a tubular case with molded ends, and is assembled with a single through bolt in the axis of the coil. The coil is said to be dust- and waterproof. A ballast coil is provided to adapt the system for operation on either 6 or 12 volts.

## Fort Wayne Druggist Buys Rubber Company

FORT WAYNE, Ind., July 12.—David S. Vesey, trustee in bankruptcy, has accepted the bid of \$90,000 cash made by Henry J. Bowerfind, president of the Fort Wayne Drug Co., for the property and equipment of the bankrupt Fort Wayne Tire & Rubber Mfg. Co. The bid will now have to be accepted by the referee in bankruptcy.

Several other bids were made for the property at the trustee's sale. Among these was a bid of \$90,000 by the stockholders of the concern, but as this bid was for part down and the rest on time payments the bid was not accepted. A Chicago concern bid \$95,000 on time for the plant and a Cleveland company \$110,000 on time, but these bids were also turned down because of the time element in the payments.

The total indebtedness of the local concern is about \$200,000, outside of the

amount put in by the stockholders, of course. The total appraisement of the property, including claims, was \$263,000. The plant owns two and a half acres of ground and a three-story, 100 by 150 ft. building. The building and land were appraised at \$160,000 and the equipment at \$100,000.

The appraisement is considered quite high on the basis of present costs. The machinery and stock were purchased at a time when prices were highest and the building was erected during the era of high building costs.

The sale is considered a pretty good one from the basis of creditors as the amount realized will allow the concern to pay creditors about thirty-three cents on the dollar. Recently a tire plant at New Castle was sold by the referee in bankruptcy and it paid the creditors only twenty cents on the dollar.

## GOODYEAR RUBBER IS SUED

BOSTON, July 11—Suits were entered in the Federal Court here to-day against the Goodyear Tire & Rubber Co. of Akron, Ohio, alleging infringement of patent rights in the manufacture of certain automobile tire treads. The treads are alleged to be copies of a wheel invented some years ago for use on street railways to break up snow and ice.

The plaintiffs are Catherine M. Moyglan, administratrix of the estate of John A. Casey of Newburyport, inventor of the street railway wheels, and Emil H. Daniels, of Tampa, Fla. The court is asked to restrain further production of the treads and to assess damages covering the past six years.

## INVENTS ROTARY VALVE ENGINE

NEW YORK, July 11—Eugene Bournonville, the head of the Bournonville Welding Co., one of the pioneers in the development of welding, has invented a rotary valve engine and has manufactured about half a dozen of these at a plant in Hoboken, N. J. It is understood that Bournonville will also manufacture a car in which this engine will be used and the car will be known as the Rotarian. The company will manufacture under the name of the Bournonville Rotary Valve Motor Co.

## Durant Gives Contract to Continental Motors

DETROIT, July 13—A contract for several thousand four cylinder engines for Durant Motors, Inc., has been placed with the Continental Motors Corp. Work on their construction will be started Aug. 1. The Continental plant now is being tooled for production of the motors which will be of a special type. The output will be increased steadily until it reaches 150 a day. The motors will be shipped to the Durant plant in Long Island City, the factory under construction at Oakland and the main plant in Lansing.

It is understood that negotiations have been virtually completed by Durant Motors for its supply of axles and frames although contracts have not been formally signed. The axles probably will be made in Detroit and the frames in Milwaukee.

## Plan Two Tractor Shows in the West This Winter

CHICAGO, July 12—Definite decision to hold a tractor show in Minneapolis, Jan. 30 to Feb. 4, inclusive, and to hold a show week in Kansas City during the winter, was made by the national demonstration and show committee of the National Implement & Vehicle Association at a meeting here to-day. The Kansas City event will not be held in any central building but each manufacturer will convert his Kansas City headquarters into a display room with general co-operation in publicity and other features to attract visitors into the city from the Mid-West agricultural territory.

## URGE A. E. F. TRUCK PROTEST

NEW YORK, July 11.—The National Automobile Chamber of Commerce has requested members to communicate with the House Ways and Means Committee at Washington, urging approval of the Graham resolution. The resolution imposes a 300 per cent duty upon reimported material originally designed for use by American Expeditionary Forces.



JUL 25 1921

# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

Vol. XLV  
Number 3

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, JULY 21, 1921

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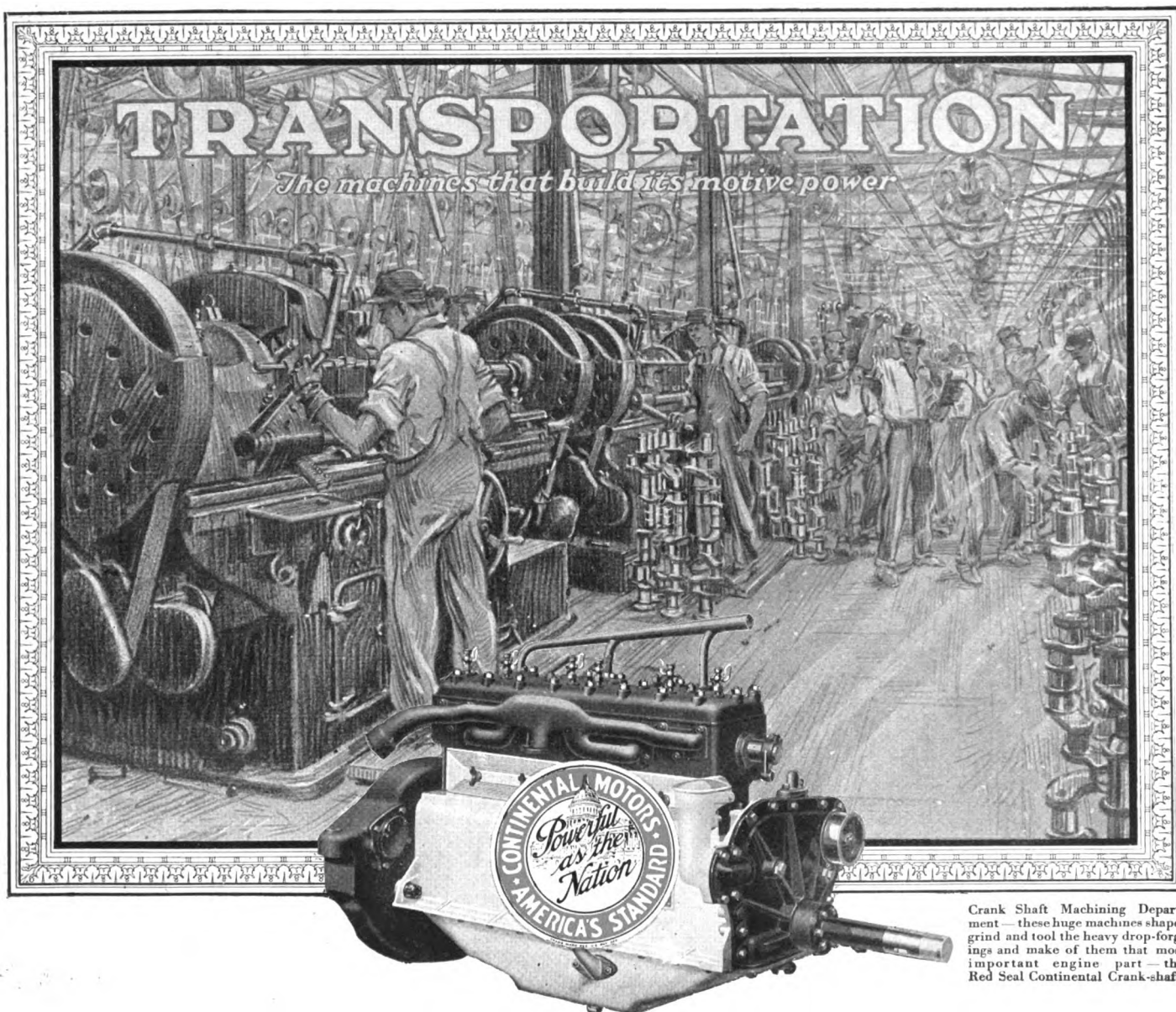
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# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, JULY 21, 1921

No. 3

## Value of Automotive Statistics Is in Proper Analysis

An industry as new as that of automotive transportation has not defined its position precisely, hence its figures can be used intelligently only by a proper understanding of the factors affecting them.

By Clyde Jennings

**F**IGURES in the hands of the amateur statistician, or the non-statistician who does not inject an understanding of all factors into their application, are about as dangerous to the business world as high explosive bombs would be to an army if intrusted to inexperienced air pilots. The fact that torpedoes used for signals in railway traffic are constantly collecting a harvest of boys' fingers, does not lessen the fact that these torpedoes are extremely useful as railway danger signals.

These remarks are called forth by the current use of certain alleged automotive figures to prove various things.

The fact that automotive statistics are used as proving conclusively, without a due regard to other factors, the future trend of the business is a considerable indictment of the persons who so use them.

Automotive figures, when correctly interpreted, are a valuable guide for the future, but when used alone, without a due consideration of the daily shifting conditions, they are especially confusing. No capable student of the automotive industry to-day will contend that the percentage of development of the last years will be continued. Neither will this same student admit that the industry is near its peak of development. These conclusions are obtained by studying the automotive vehicle in connection with the peo-

ple who use it. No study of the industry can be worth while that does not place facts as they exist above the theory of a few years ago.

It is more than passing strange that one of the favorite amusements of statisticians is (and has been for several years) a study of the saturation point of automotive vehicles. The writer has been a publicist for a number of years, but he does not recall ever having read a serious article on the saturation point of any other sort of transportation—which includes railroad cars, horses, mules, baby carriages and some other equipment.

When railroad cars are idle the answer is that business is below normal. When motor trucks are idle the answer is that there are too many trucks. No one apparently concerns himself as to why horses, mules and baby carriages are idle. The proper answer is, of course, that the truck being a freight vehicle will be active or idle just as there is freight to haul. Early last year there was an immense quantity of freight to be moved and all trucks were at work and there was an active buying of trucks. A freight slump came on, some trucks went idle and the buying demand fell off. This demand will come back when freight movement comes back to normal.

Now a few words about the passenger car. A good many people have been worrying themselves because

there are more passenger cars in use than there are families of more than \$2000 incomes, as shown by some ancient income tax records. A reason for this worry is shown by listing the average expenditure of the theoretical family, which leaves no place for the support of a motor car.

There are two obvious errors in this reasoning, both of which any man can prove by mentally reviewing facts with which he is familiar.

First: Income tax records are not and never have been an accurate guide to the available incomes of the families of this country. It is a very well-known fact that few farmers are listed in income taxes, while they live in circumstances quite comparable with the city man who is listed at \$5000 a year. A farmer may handle actually less than \$1000 a year and still be quite well off and have more money for personal expenses than a man who is well up in income, but without other sources of income. Income is a very poor measure of buying ability, unless one knows well the ability of the buyer, and what is behind the income. All of us know well families that practically live off of a flock of chickens, or off of a garden that the family cultivates as recreation, and which find no way into an income tax return. Also each of us knows some housewife who buys twice as much with the family income as another housewife. Some families are poor on a \$2000 income, while others ride in motor cars and go to picture shows.

So far as we have been able to find in reading several hundred articles on the saturation point, no one has ever taken these facts into consideration.

#### Incomes Earned by Use of Cars

Second: In the estimate of an arbitrary figure that governs the ownership of a motor vehicle, we have never seen the point made that a good many men whose income is rated at \$1200 or thereabouts, earn this income because they are the possessors of a motor vehicle. Is any one of these amateur statisticians prepared to say how many second-hand motor cars, sold for something like \$300 each, have been turned into taxicabs and jitneys and are earning a living solely because they own this vehicle?

There is in New York a family that recently was comparatively wealthy. After the crash a high powered, expensive motor car was the sole possession, aside from household furniture. But the housewife was a resourceful woman. She has not only been supporting the family but has accumulated some savings from the operation of this vehicle at good prices for well-to-do visitors in the city.

Again, corporations are seldom counted when it comes to the ownership of motor vehicles, and yet some of them own thousands of the kinds of vehicles that are not usually thought of in this connection. Think, for a moment, of the low-priced roadsters that are owned by corporations and which are operated daily by men who do not come into the high ranking income class.

Another instance of error: The Delaware registration list reveals that one man in that State caused to be registered at one time 11 motor vehicles. Later some others were registered. These vehicles were for use of his family and for the business of his estate. This man also has at least two cars registered in New York. All of these vehicles are for the individual use of himself and his family.

A few years ago one of the favorite arguments for a limitation of the ownership of motor vehicles was that the farmer would have nothing to do with them. The amateur statistician apparently has not yet realized the extent of farm ownership, which is not in the slightest

comparable with income taxes. A farm hand, who is given house rent, a garden plot, the use of a cow and a few other favors by his employer in addition to his \$50 a month, is a very legitimate motor car owner, if he patronizes the used car market, keeps down the initial investment and does his own repairing.

Recently there has been an epidemic of depreciation figures—most of which are entirely out of reason. The source of these was apparently with the railway statisticians who are well able to average depreciation of their own products. The circumstances are entirely different. All railroad equipment is handled by hired men and under given conditions. Its ownership is a matter of accurate record. The workmanship involved in the building is about the same. There is a condition easily averaged under the long period covered by railroad equipment since it has been fairly representative of the population.

But with motor cars it is different. The source of supply is vastly different and the workmanship is different. Also the various vehicles are not always used for the purpose for which they were intended and the conditions under which they are used is as different as the condition of the several highways over which they are used, plus the handicap of the ability and temper of the driver.

The real facts concerning the depreciation is that it is not an average in keeping with the life of the vehicle. Here, again, figures have been used without understanding. It is true that mathematics have shown that the life of a vehicle is 5.3 years with the figures now available. One difficulty with these figures is that they do not cover a long enough period. Even approximate figures on national registration are not available before 1912 and those of us who have had to do with the compilation of registration figures know how faulty these figures are. That these figures are inadequate every person who has had to do with them knows perfectly well. They are probably more, much more in error, than the production figures. Here is an instance which shows that some knowledge is required to properly use these figures:

#### Orphan Cars in Kansas

The recent statement of the Secretary of State of Kansas shows that there were in that State during the last registration year more than 1000 cars which were orphans in 1913 at the latest. In other words, the factories which made these cars quit operations in 1913. Also there are in Kansas 200 cars which have no manufacturer. These cars were built by mechanics for their own amusement and their own use of parts of wrecked cars and parts from other sources.

Recently a banker's statistical company estimated that there were 500,000 motor vehicles in this country that were not registered in any State. This figure may sound surprisingly large, but the more attention that is paid to this feature, the more the student is inclined to believe that the figure is quite conservative.

The effort is not made here to assert that automotive figures are not worth while. They are, decidedly so. The point is that they must be used with some understanding and the person who uses these figures must have a fair knowledge of the source of them before he uses them. Last fall some persons within the industry became quite excited over a pamphlet published by a weekly paper seeking automotive advertising as to the replacement market. The fact that this job of chart making was based on only part of the figures of the industry apparently made no difference as to its acceptance. Just why it was so widely accepted has never been explained. The



fact that the export figures were not mentioned in this pamphlet should have shown that it was made without thought or knowledge of the field.

Depreciation of automotive vehicles as a whole is a peculiar topic and when the final word is said there are many factors that will enter into the compilation.

First, there is such a great variety of vehicles, used in so many different ways that an average is very difficult without some intimate knowledge of the subject. The low figure for the average life of a vehicle is undoubtedly due to the hard use given to the light, low-priced vehicles, which probably are 50 per cent of the total registration. But should these be allowed to determine the depreciation for the entire industry? That is quite another question and one that must be carefully considered. Frankly, it would appear that an accurate average is almost impossible.

The state of mind of the users of the 9,000,000 vehicles is a factor to be considered in this connection. It would not be possible in railroad statistics to entirely cut out wreckage of equipment for one year. But that is what happened with the automotive industry in 1918. That year there were 8000 more vehicles at the end of the year than at the beginning with all of the production added. The observing student of the industry did not see anything extraordinary about this, as he was well aware of the vehicles in the used vehicle dealers' stocks and of the vehicles that are allowed to remain in shelter during an entire year without registration. When a season comes along that vehicles are in great

demand and new vehicles are not available, then a lot of these vehicles that had been set aside are brushed up, oiled and put into use. And be it said to the credit of the builders, that these ancient vehicles give excellent service when they are called upon.

The object of this effort is not to belittle such statistics of the automotive industry and of automotive vehicles as are available. It is merely an effort to prove that the person who interprets these statistics must be a person of understanding and that he must draw on his knowledge of the industry as well as the statistics available. There are well-defined sciences of probability and of correlation, by which it is possible to interpret statistics into working figures. This industry is new and overturning of regularity within the industry during the war has done much to make our figures extremely difficult to apply to regular business.

The growth of the industry, its wonderful industrial romance and its unparalleled success has made it a target for all manner of marksmen. Most of these marksmen have had not the slightest knowledge of their ammunition. This fact has been well known to the close students of the industry and they have been cautious about putting forth figures and especially conclusions. But where those who knew the industry best hesitated, those who knew the industry least have not feared to enter. The result is that there are reams and reams of statistical pages about our industry that, if they were only entertaining to the public, would do no harm, but they are read by many who accept them as meaning something.

## Axle Anchorage of Cantilever and Quarter-Elliptic Springs

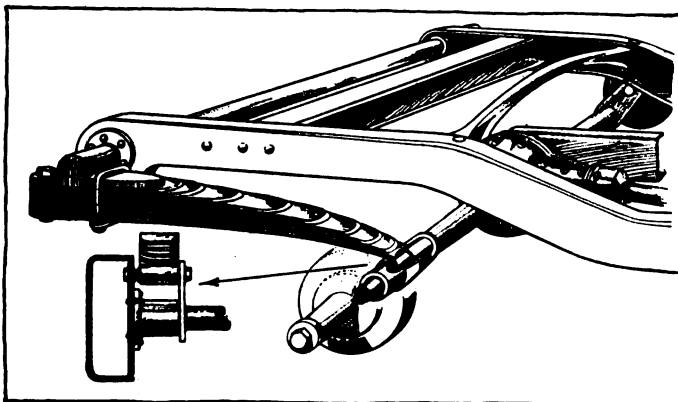
A POINT worthy of consideration in connection with the anchorage on the rear axle of cantilever and quarter-elliptic springs occurs in the Bugatti light car, which is said to have extraordinary road-holding qualities. One feature of this car's suspension is the peculiar mounting of the quarter-elliptic springs on the frame. The thick ends are attached to the rear end of the frame while the thin ends project forward. The thin ends of the springs are attached to pivot pins mounted in front of the vertical center line of the axle as the accompanying sketch indicates. By this arrangement the rear weight of the chassis is imposed on the driving axle in such a manner as to balance, to a large extent, the driving torque.

When, as is usual practice, cantilever or quarter-elliptic springs are mounted immediately above or below the center of the axle, the road wheel, when it comes down to the ground after surmounting a bump, momentarily decelerates and reacts upon the driving axle, causing the

latter to turn backward slightly and "kick up" the front end of the torque tube. This in turn tends to lift the front end of the car, diminishes the load on the front axle springs, intensifies the rear axle load and sets down the rear springs so that these are trebly punished by load, impact and torque, all this occurring at a moment when the front springs are relieved and thus intensifying fore and aft pitching.

In the case of the Bugatti, when the wheel with its backward reaction on the axle comes down to earth, at that moment precisely the load also comes down on to the axle with its forward reaction. Thus one balances or tends to balance the other, with the result that the front end of the chassis is not lifted, the rear springs are not excessively flexed, rebound is less and pitching fore and aft does not occur.

The foregoing is, at all events, the explanation put forward by a critical user in England, and as already suggested the possibility of there being advantages worth having in the Bugatti arrangement makes it desirable that further experiments be made.



Spring mounting on Bugatti light car

THE use of cast iron blocks for road construction is advocated by a metallurgical concern in France which induced the Municipality of Lyons to reconstruct an experimental stretch of road with such blocks a year ago. The results are said to have been good under heavy traffic, and it is reported that the system would be largely adopted if it were not for the difficulty of providing the necessary funds. The surface is first prepared with a layer of concrete about 4 in. thick, on which is placed the same thickness of neat Portland cement, carefully leveled to receive the cast iron blocks. The blocks are laid with spaces between them, and they are bound together with concrete, which is carefully rammed in to combine with the cement bed before the latter sets.



# A New Form of Air Cleaner

Performance characteristics of the Stewart air washer; and a description of test methods and apparatus employed in the examination of this class of automotive apparatus under a wide range of conditions.

By P. S. Tice\*

**W**HILE the obvious prime function of an air cleaner is that it shall remove the greatest possible percentage of foreign matter from the air drawn through it, there are other important considerations involved in the design of this class of apparatus. Chief of these latter is that the cleaner shall cause a negligible throttling of the engine intake. A further important point, if the cleaner is a wet one (properly a washer), is that the consumption rates of the water shall be reasonably small.

It is somewhat outside the purpose of the present discussion to go extensively into the relative merits of wet and dry types of air cleaners. However, experimental evidence shows that: (1) A given high standard of cleaning efficiency is attainable with less intake throttling in the wet than in the dry type cleaner; (2) in the wet type cleaner, accumulation of dirt removed from the air neither increases the throttling of the engine nor reduces the cleaning efficiency of the washer, and (3) use of a wet type cleaner results in a valuable humidification and cooling of the air supplied the engine.

In the design of the Stewart air washer, shown in section in Fig. 1, it has been sought to combine the maximum in cleaning efficiency with negligible intake throttling and minimum water consumptions.

## Water Consumption and Cleaning Efficiency

When the study and development of air washers was undertaken it very early became apparent that the usual high rates of water consumption in wet type cleaners resulted from failure to remove entrained water globules from the air stream. Furthermore, such entrained liquid is charged with the materials it is sought to remove from the air; and, if liquid thus passes out

of the washer with the air, the purpose of the washer is defeated to just the extent that this water loss is permitted. For these reasons the washer design under discussion has been developed to a point where no entrained water globules pass out of the washer with the air stream. Realization of this condition conserves the water supply and contributes materially to the high cleaning efficiency attained.

Referring to Fig. 1 it is seen that the washer as a whole is divided by a partition into a reservoir chamber and a washing chamber. The former is provided with a large filler opening and has two points of communication with the washing chamber—a water passage by way of the spring-seated flap valve which forms a part of the drain fitting, and an air vent tube rising to a point above the level of the liquid in the reservoir chamber.

When the filler cap is removed the flap valve closes automatically and the reservoir can be charged with water. Upon screwing in the filler cap, the flap valve is opened and water flows into the washing chamber, fills the glass trapping jar and rises to a height which submerges the lower end of the vent tube mentioned above. The filler cap being seated air-tight upon its gasket, water stops flowing to the washing chamber when the lower end of this vent tube is sealed by the rise of liquid, and flow is resumed only upon loss of liquid from the washing chamber sufficient to break the liquid seal of the vent tube. The vent tube thus determines the height of liquid in the washing chamber and serves to maintain a substantially constant level in it.

## Water Spraying

Within the washing chamber is mounted a symmetrical air duct having two throats formed in it, both throats standing below the water level and each being provided with a set of water entrance holes or jets. The

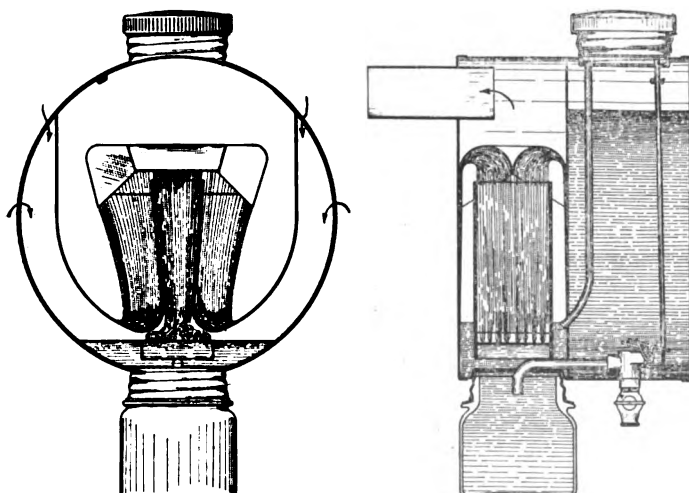
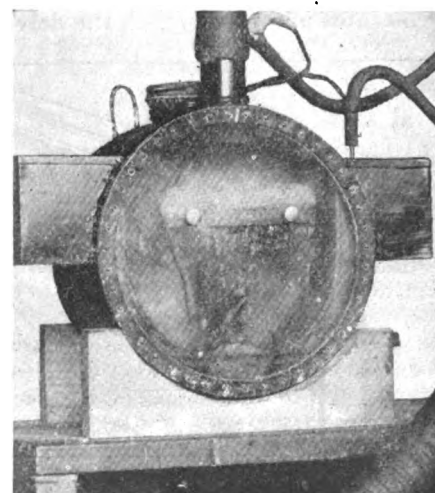


Fig. 1—(left)—Sectional views of the new Stewart air washer showing paths followed by the washing water, and method of controlling the water level. Fig. 2—(right)—How the sheet of water looks as it runs down the washing chamber wall. This view resulted from a three-minute exposure, with air passing at the rate of 4200 cubic feet per hour



\*Engineer in charge of Carburetor Division, Stewart-Warner Speedometer Corporation.

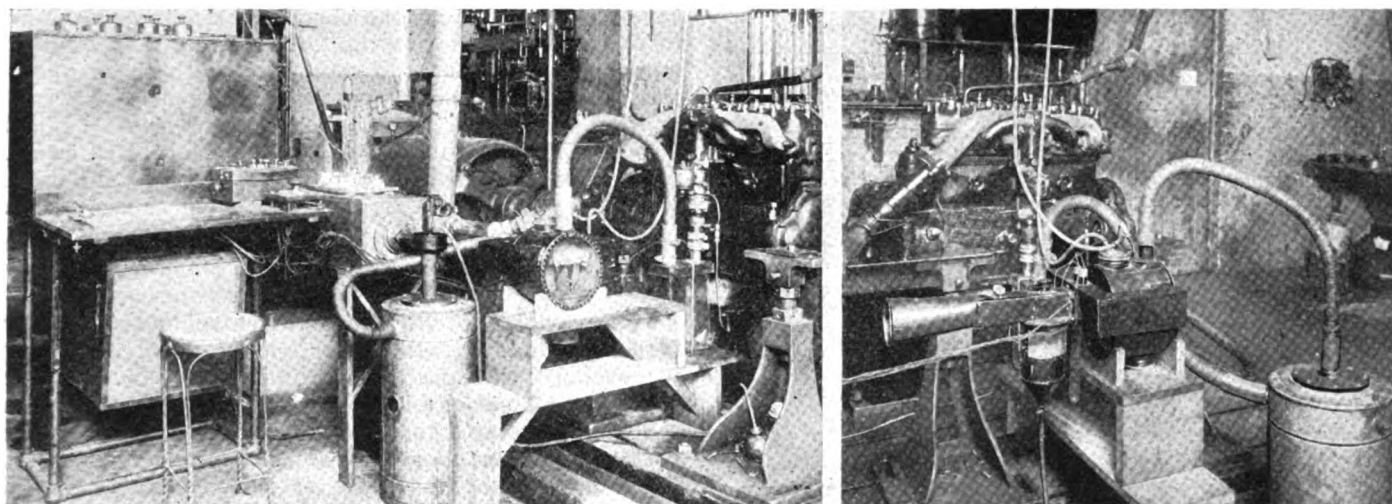


Fig. 3—(left)—General view of the apparatus set-up used in determining the effects of atmospheric humidity and temperature upon performance of the washer. Fig. 4—(right)—The set-up for examining the cleaning efficiency, showing the special entrance duct with its dust dispensing chamber, and the drum containing the vacuum sweeper bag

air duct is so proportioned that the least pressure throughout the washer exists at the water jets, thus applying a head or pressure difference across the jets, just as in a carbureter. This effective head is, of course, augmented by the gravity head due to the height at which liquid stands in the chamber above the jet holes in the air duct wall.

Air being drawn through the duct encounters sheets of water spray in the duct throats, establishing very intimate contact between water and air, with the result that foreign materials in the air stream become wetted and are taken into suspension in the water.

As the air charged with water spray leaves the common vertical member of the air duct, it encounters a deflector plate so formed and mounted with relation to the duct that all the water globules are forced into contact with the concave surfaces of the deflector. It will be noted that the end walls of the washing chamber engage tangentially with the discharging edges of the deflector. For this reason, the film of water established on the deflector remains unbroken and passes down the end walls in continuous smooth sheets, without splashing, and with none of it again becoming entrained. The photographic view in Fig. 2, of a washer with a celluloid end wall, shows very clearly the nature of the water flow on these walls. This view was made with an air flow rate of 4200 cu. ft. of free air per hour.

#### Circulation of Water

Water returned to the bottom of the washing chamber from the deflector carries with it the dirt, which settles out into the trapping jar, from which it can be removed as required. The washing chamber water is continuously recirculated as above, bringing the dirt down with it; and the water lost by evaporation is made up by fresh water admitted from the reservoir as required.

To drain the whole washer, the drain cock is opened with the filler cap in place. If one desires to clean the trapping jar without losing the contents of the reservoir, the filler cap is removed, thus closing the flap valve between the two chambers. Opening of the drain cock then permits only the contents of the washing chamber to run out, down to the level of the end of the tube extending into the trapping jar, as seen in Fig. 1. The jar can then be removed without spilling any of the dirty water.

A very complete experimental examination has been

made of this air washer, for the purpose of determining its cleaning efficiencies and pressure losses at various rates of air flow, its rates of water consumption with respect to temperature and humidity of the atmosphere and its effects upon the humidities and temperatures of the air delivered to the engine under various atmospheric conditions.

The apparatus used in this work included an orifice type air meter, and electric heater for controlling the temperature of the air entering the washer, a humidifier for controlling the water vapor content of the air entering the washer, a trap for removing from the air stream any water globules carried from the humidifier in entrainment, special passages soldered to the air intakes of the washer with provisions for wet and dry thermocouples and a large glass chamber interposed between the washer and the engine. The last mentioned chamber was made of glass so that should any water be carried over from the washer, it could be instantly detected. This glass chamber also contained wet and dry thermocouples for determining the humidity and temperature of the air leaving the washer. A Leeds and Northrup potentiometer indicator and a Hinkley 4.00 x 5.25 x 4-cylinder engine completed the set-up, as shown in Fig. 3.

For determining the cleaning efficiency of the washer, a dust-dispensing member was attached to the washer entrance. This portion of the apparatus, shown in Fig. 4, consisted of a horizontal passage through which the air was drawn into the washer. Secured to its under side and opening into it, was a chamber having a steep conical bottom, into the apex of which a small stream of compressed air could be introduced. A quantity of dust placed in this lower chamber could thus be dispensed into the air stream in a thoroughly distributed state, and at any rate desired. A large size Hoover vacuum sweeper bag, which had been proven to have a dust-retaining efficiency of 100 per cent under the conditions of the tests, was mounted in a large galvanized iron drum, and was interposed between the washer and the engine intake with connections so made that the air from the washer passed from the interior of the bag into the drum and thence to the engine.

Observations of the following quantities were made in each run:

- A—air weight in lbs. per sec.,
- t—temp. deg. Fahr. of air at air meter,
- H—barometric height, mm. Hg.,

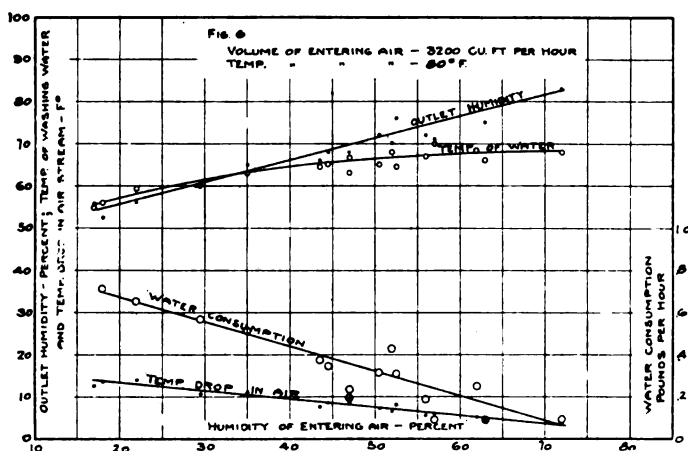
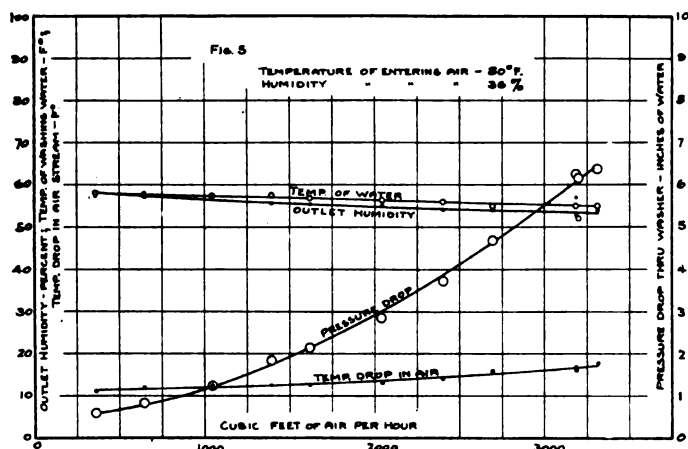


Fig. 5—The variations in outlet humidity, temperature drop and pressure loss, with change in the rate of air flow through the washer. Fig. 6—Effects upon water consumption, temperature drop and outlet humidity, of change in atmospheric humidity at the washer entrance

DB<sub>1</sub>—dry bulb at washer entrance,

DB<sub>2</sub>—dry bulb at washer exit,

WB<sub>1</sub>—wet bulb at washer entrance,

WB<sub>2</sub>—wet bulb at washer exit,

t<sub>w</sub>—temp. deg. Fahr. of water in washing chamber, and

h—pressure drop through washer in inches of water.

From these quantities were computed the relative humidities, water consumptions and temperature drops shown graphically in the curves.

### Method of Conducting Tests

In all of the test runs observations were recorded only after all temperatures had remained constant for one minute or longer. Three groups of runs were made:

(1) With temperature and humidity of entering air at constant values, and with the quantity of air varied, to determine the relationships between quantity of air aspirated and changes in humidification, pressure drop and temperature drops in both air and washing water.

(2) With the weight of air and its temperature at the washer entrance at constant values and its humidity varied through wide limits, to determine the effects of the humidity at the washer entrance upon outlet humidity, water consumption and temperature drops in both the air and washing water.

(3) With the weight of air and its humidity at the washer entrance at constant values and its temperature varied through wide limits, to determine the effects of temperature at the washer entrance upon outlet humidity, washer consumption and temperature drops in both air and washing water.

A fourth set of runs was made, in which, at each of

several air flow rates, the cleaning efficiency was found by dispensing a known weight of dust into the air stream entering the washer and comparing with these quantities the weights of dust passing the washer. Any dust passing the washer was caught in the sweeper bag discussed above; and its weight was determined by careful weighings of the bag before and after a run, the differences between these weights being taken as the weights of dust that had passed the washer.

### Quantity of Air Varied

In the runs involving constant entering air temperature and humidity, with the weight of air varied, Fig. 5, it develops that the change in outlet humidity with change in air velocity is very small. This is also true of the temperature of the washing water, and of the temperature drop in the air stream. It can be argued from these curves that increased air velocity causes, in this washer, a very nearly sufficiently finer division of the liquid to counterbalance the effect of reduced duration of contact between the air and water. The entering temperature and humidity selected and maintained in this group of runs (80 deg. Fahr., and 36 per cent) approximately represent average summer conditions in the Middle Western States.

The pressure drops through the washer are seen to be relatively very small, considering the intimacy of contact established with the water and the high values of the cleaning efficiency, as shown in Fig. 8.

In none of the runs here reported was it possible to detect the carrying out of water from the washer, in entrainment in the air stream. As a matter of fact, except for the sheets of water running down the end walls of the washing chamber from the deflector, the interior walls of this chamber remained absolutely dry under all conditions.

### Entering Humidity Varied

Maintaining the entering air temperature at 80 deg. Fahr., as before, and operating at about the maximum quantity of air, the entering humidity was varied from 18 per cent to 72 per cent, Fig. 6, with the result that the humidity at the washer outlet is shown to vary directly with that at the entrance. The temperature drop in the air stream varies, of course, inversely with the entering humidity, at a constant entering air temperature. The water consumptions found are represented wholly by the amounts evaporated, since none was carried over in entrainment. The water consumption rates found are comparatively very low, considering average wet cleaner practice, in spite of the much greater humidifications accomplished in this washer.

### Entering Temperature Varied

Operating with the same air quantity as before, and with an entering humidity of 40 per cent, the temperature of the entering air was varied from 72 deg. to 108 deg. Fahr., Fig. 7. In these runs both the temperature of the washing water and the temperature drop in the air stream are shown to be direct functions of the entering air temperature; while the curve of outlet humidity at first rises sharply, but rapidly flattens out. The water consumption curve is very interesting, as showing what really low values may be expected in service, under average conditions with respect to entering humidity. At the entrance temperature of 80 deg. Fahr. the consumption is .40 lb. per hr., at an air rate of 3200 cu. ft. per hr., corresponding to open throttle at about 1100 r.p.m. of the engine used. With a water reservoir capacity in the washer of one gallon (that employed in this

size of washer), it is seen that continuous operation for approximately 20 hours will be secured on one filling of the reservoir.

In the determinations of the cleaning efficiencies only the lightest and most difficult removable materials were employed. These were flour dust, thoroughly distributed in the entering air by the means discussed under the heading "Apparatus," and the finer of the sweepings from one of a new cement floor. This latter material is largely made up of extremely impalpable particles which remain in suspension in still air for great lengths of time.

In Fig. 8, showing the cleaning efficiency curve, it is stated that the average rate of dust supply was .858 lb. per hour. This is true, as an average for all four runs. But that point at an air rate of 2840 cu. ft. per hr. resulted from a rate of dust supply of 1.86 lb. per hr., which is enormously in excess of any service rate. The points of particular interest in this plotting are the high average cleaning efficiency, the small variations in cleaning efficiency with wide changes in the air flow rate, and the negligible effect upon cleaning efficiency of wide variations in the rate of dust supply.

The data here presented shows that a minimum cleaning efficiency of 97 per cent can reasonably be expected in service, with an entirely reasonable water consumption, and with an almost negligible restriction of the engine intake. At the same time the humidification and cooling of the air in its passage through the washer constitute obvious advantages for heavy duty service.

A group of ten of these air washers has been in experimental operation on a fleet of Diamond T trucks engaged in cement road building in central Illinois; and over a period of sixty days use the mean dust removal per car per ten-hour day has been approximately 4.4

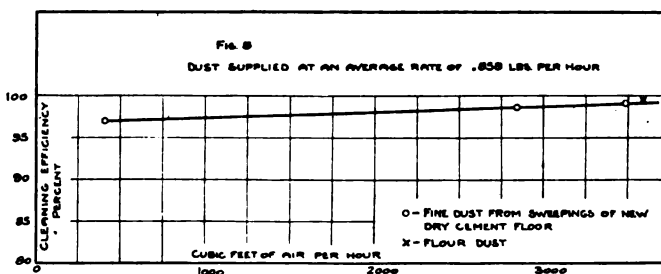
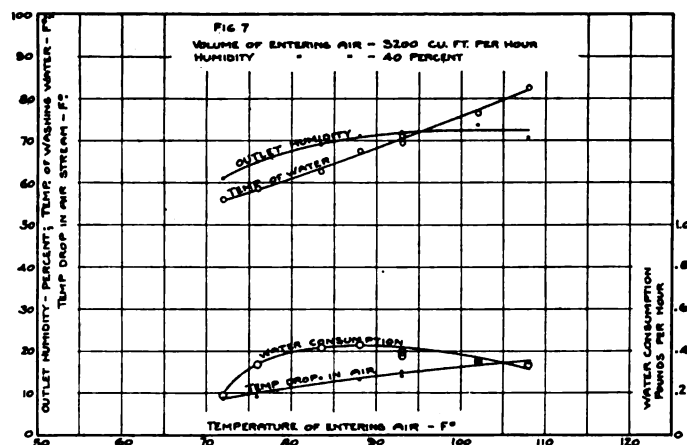


Fig. 7—How the temperature of the entering air affects water consumption, outlet humidity and temperature drop in the air stream through the washer. Fig. 8—Variation in cleaning efficiency with change in air flow rate, using very fine dust thoroughly distributed in the air stream entering the washer

cu. in., with a mean water consumption per car per day of somewhere between .5 and .6 gallon.

## Cushion Tire for Heavy Trucks

A NEW type of truck tire has been marketed by the Firestone Tire and Rubber Co. known as the Firestone Giant Cushion tire. The new design is a development of the small cushion tire and the giant single groove solid. It will be made in sizes suitable for all sizes of truck from  $\frac{3}{4}$  ton to  $7\frac{1}{2}$  tons. One advantage over plain

solids claimed is that the tire will stay livelier until it is worn out. This tends to lessen the power required to move the truck, and it also reduces the tendency of the edges of the tire to break off due to abuse by operators. The tire is designed in accordance with S.A.E. standards.



Bowen grease or oil gun for chassis lubrication

Firestone giant cushion tire

## A Pressure Lubricating System

A SYSTEM of chassis lubrication whereby either grease or oil may be forced to the bearings under high pressure has been evolved by the Bowen Products Corp. It comprises one grease or oil gun and three types of dust-proof connections—straight, 45 deg. and 90 deg. The elbow connections are made for greater convenience in applying the gun to bearings which would be more or less inaccessible with the straight connection. All three connections are made in a number of different threads, and adapters are furnished for use on spring bolt heads and other similar places. For places where the lubricant is apt to be thrown out by centrifugal force the connection is fitted with a ball check valve.

For convenience in lubricating, the connectors are made with revolving caps, which make it possible to operate from any position. These caps are fastened to the connection and are easily snapped open and closed with the tip of the gun. These caps cannot be lost, and their use obviates the need of cleaning the connections each time the gun is used.

Among the claims made for the system are that it can be operated with one hand, will handle all grades of oil and grease, is quick and convenient and cleans as well as lubricates.

# Brake Lining Tests at the Bureau of Standards

**Trials of numerous samples under a variety of conditions show a wide variation in coefficient of friction and other characteristics. Some linings prove far more durable than others under identical test conditions.**

**T**HE Bureau of Standards in co-operation with the Motor Transport Corps and the Society of Automotive Engineers has been engaged for several months in making tests of brake lining materials primarily with a view to developing a standard testing method which would enable purchasers and manufacturers of such linings to intelligently determine what specifications these linings should be required to meet.

A report on the work accomplished to date was recently made at a meeting held at the Bureau and attended by representatives of many of the prominent brake-lining manufacturers.

Director Stratton of the Bureau opened the meeting with a short address in which he assured those present of the desire of the Bureau to co-operate with manufacturers in just such work as has been done on brake linings. Dr. H. C. Dickinson, under whose direction the brake-lining tests are conducted, stated that the Bureau has been engaged since December, 1919, in brake-lining investigations intended to determine the best procedure for the series of tests originally proposed. The Bureau has completed a large portion of the program which it was decided at that time to follow.

Mr. Von Ammon, who has been in immediate charge of the work, then made a report from which the following is abstracted:

The primary tests were intended to determine the durability of the brake lining in two types of runs, the first in which the temperature of the brake drum is kept approximately constant by the use of cooling water and the second, a severe service test, in which the temperature of the drum is allowed to rise to equilibrium with constant power absorption. Means for determining the coefficient of friction under various conditions were also to be provided and certain other less important tests were to be made.

The testing apparatus adopted for the purpose was described in *AUTOMOTIVE INDUSTRIES* for April 7, 1921. The two brake-lining samples used in each test are 2 in. wide,  $\frac{1}{4}$  in. thick and 11 in. long, each covering 90 deg. of the circumference of the 14-in. steel drum employed. The samples are secured to the steel shoes by means of 8 tubular brass rivets. The samples furnished by the manufacturers included practically all linings now in the market as well as a number in course of experimental development.

## Coefficient of Friction

During the long time run with cooled drum the coefficient remains more nearly constant than in hot tests. The average values were near .40, in some as low as .30, while in a few samples only were the averages over .50. The extreme values were approximately .28 and .60.

During the severe service run, hot tests, there was in most cases a marked drop in the value of the co-

efficient resulting from evaporation and carbonizing of impregnating materials. This is followed by an increase in the coefficient which, during the remainder of the run, shows less variation. During the latter period the average coefficient for most linings was found to be from .45 to .50; a few linings showed an average value nearer .40, while others showed nearer .60. The extreme values found during short periods were .75 and .12, the lowest values being reached during the first part of a run as referred to above.

The influence of oil on the coefficient of friction was determined on the water-cooled drum. New samples saturated with oil, and with oil constantly supplied showed a coefficient between .10 and .20. After discontinuing the supply of oil the coefficient rose in 15 to 30 min. to values between .20 and .30 and were then steadily maintained.

## Durability Tests

A large number of tests with water-cooled drum were conducted with various drum speeds and various power inputs. In some cases the linings tended to cut the drum and steel particles became imbedded in the lining and added to the scoring. Even with low unit pressures metal was sometimes found imbedded in the lining after one to three hours' running. It was found that if conditions of load and speed are so chosen that no linings in commercial use gather metal the time required for a test will be inconveniently long or if shortened will result in so small a wear that the conditions of wear and change of coefficient of friction at the heart of the lining will not be sufficiently well shown.

In order to determine the best condition of speed and power absorption in the hot, or severe service test, a considerable number of trials were made at various speeds from 300 to 1000 r.p.m. with power inputs varying from 4 to 10 hp. The combination of 6 hp. and 600 r.p.m. promise to be the most satisfactory while limiting the test to a reasonable length of time. A majority of linings required a test period of between 3 and 7 hrs. The maximum run was 16 hrs. for an experimental lining.

In all severe service tests there is, very soon after the load is put on, more or less smoke and the impregnating materials evaporate or burn out to a varying extent. The condition of the drum at the conclusion of a run was always good, but in many cases there accumulates on the drum a coating of varying quality. With some linings this coating was smooth, with others rough, sometimes both at different times.

## Supplementary Tests

Tests for determining the oil and water absorption were made by submerging specimens of lining in the liquid. It was found that oil absorption amounted from 7 to 30 per cent by weight, and the water absorption from



4 to 27 per cent. It was found that the change in thickness resulting from absorption is too small to cause linings to drag under any normal condition of use.

Some linings show a tendency to stick when allowed to cool on a hot brake drum. With a few samples allowed to cool in this manner it was found necessary to apply from 0 to 36 ft. lb. to overcome the sticking, some rubber linings showing the higher values in these limited tests, while with the woven linings tested the dry carbonized impregnating material seem to form a coating which prevented sticking.

#### Discussion

Mr. Carson of the Johns-Manville Co., pointed out that in such composite materials as brake linings, consisting of asbestos, cotton, wire and impregnating compounds a uniform coefficient of friction cannot be expected in any case. The coefficient is certain to vary as wear exposes

new layers. The more homogeneous the material is the more uniform the coefficient will be. Neither maximum nor minimum should be taken, but rather average values from the main portion of the run.

He was strongly of the opinion that test conditions should be so chosen as to eliminate the picking up of metal in the cold test by reducing the power absorbed, while keeping speed the same as for the hot test.

It was agreed that the performance tests should form the foundation on which all specifications should be built. It was also felt that specifications should not prescribe in detail the amounts of various materials, such as asbestos, cotton, etc., entering into the make-up or methods of manufacture of the linings.

Mr. Burton offered continued co-operation of the Motor Transport Corps with the Bureau of Standards and the S. A. E. Standards Committee in developing specifications along these lines.

## Centrifugal Castings

**I**RON castings made in metal molds rotated at high speed while the casting is being poured and cools have been made for some time for piston rings and other engine parts. According to *Engineering*, London, the first patent covering the casting of materials under centrifugal pressure was taken out by Eckhart in 1809. Many efforts to establish the process on a manufacturing basis have met with failure.

Stokes Castings, Ltd. of Mansfield, England, are now producing such castings on a considerable scale, the average output for the last few months having been at the rate of 2000 castings a week. Most of the castings are for internal combustion engine work, mainly piston ring pots and cylinder liners. Satisfactory machining qualities are said to be obtained without annealing the castings. Factors determining the qualities of the castings are the mixture, pouring temperature, die temperature, speed, etc.

*Engineering* states that the quality of the castings obtained is a marked metallurgical advance over the material cast in sand molds or stationary chills, and graphite plates are practically eliminated. For piston ring castings made by the centrifugal process it is claimed that the dirt and slag inclusions inevitable with any sand casting process, are squeezed out by the centrifugal force. Another advantage claimed is that the rings cut from the pot are uniform throughout instead of varying in quality from end to end of the pot, as in the case of pots cast vertically in sand. A manufacturer of internal combustion engines using a cast iron liner only a few millimeters thick, who had a great many wasters when using sand castings for the liners, was able to avoid practically all wastage when using these centrifugal castings.

The casting machine is direct-driven from a variable speed electric motor through a flexible coupling and friction clutch. The floor space occupied is about 12 x 3 ft. and a weekly output of between 3000 and 4000 castings is obtained from six machines. No floor space is occupied by moulding boxes or sand-mixing appliances, and waste of material is largely eliminated owing to the absence of headers, risers, etc. The time taken to produce a 6-in. diameter drum, counting from the time of pouring into the receiver on the machine to time of taking out the completed casting, is something under a minute.

Stokes Castings have up to the present largely confined their research to the question of grey cast-iron, but interesting experiments have been made with some of the non-ferrous metals, and analysis showed the interesting effect of the centrifugal action in that the tin and lead of a

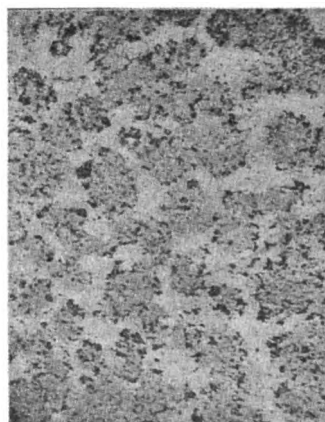


Fig. 1—Polished specimen of centrifugal casting. Unetched, magnified 50 diams, showing cellular distribution of graphite

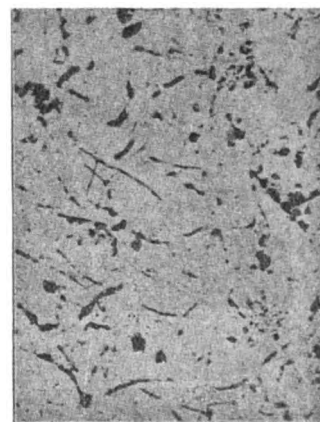


Fig. 2—Polished specimen high-grade sand casting. Unetched, magnified 50 diams, showing cellular distribution in the form of flakes

lead bronze had tended to fly to the outside of the casting, the Brinell hardness figures reflecting the displacement. For the analysis used it was estimated that an ordinary sand casting would give tensile figures of not much over 12 tons to the square inch, with an elongation of, say, 9 per cent. The centrifugal casting shows as high as 20 tons to the square inch a very marked improvement.

**T**HE Paris Academy of Science has been informed by M. Guillaume, Director of the International Bureau of Weights and Measures, that the Japanese Parliament has passed a law making the adoption of the metric system obligatory in Japan. The metric system has been optional in Japan since 1893, when the decimal system was adopted side by side with the Japanese weights and measures. In China, the decimal system was adopted in 1906, and the metric system, adopted in 1913, should become obligatory in 1923. In Siam, the metric system has been obligatory since 1912. Thus the metric system has been adopted throughout the Far East, and in France it is thought that the decision of Japan will have a certain influence in Anglo-Saxon countries, since the opponents of the metric system in the United States, Great Britain and the Colonies have partly based their objections to it on the need of conserving the English way of reckoning in the East.

# Combustion Phenomena Revealed by Indicator Cards

A discussion of experiments showing the effect of mixture proportions, ignition timing, cylinder temperature, and electrode temperature on the character of combustion. Heated spark plug is believed to be the final agent in causing knocking in most present day automobile engines.

By Victor R. Gage\*

**R**ECENTLY there have been many investigations made, and hypotheses advanced concerning the process, or processes, of combustion inside of a gasoline engine cylinder. The phenomena called detonation, pinking, or knocking, especially, have received much attention. The results herewith presented were obtained in an endeavor to produce detonation in an ordinary gasoline engine, and although detonation was seldom obtained, still much interesting information was secured concerning the general processes of combustion. This information may be useful in supplying a few of the

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many fragments of evidence which are necessary in order to complete the story of combustion.

Knocking and detonation, as well as other combustion phenomena, are inseparably connected with the quality of the mixture, the time of ignition, the density and temperature of the gases, and many other factors, such as turbulence, stratification and dilution.

The cards shown in Figs. 1 and 2 serve to show the effects of varying mixture only (Fig. 1) and of ignition timing only (Fig. 2). These two figures present both pressure-volume and pressure-time diagrams\*\* for usual operating conditions and are similar to those obtained in the regular course of instruction in the Sibley College, Mechanical Laboratory, Cornell University.

For the other diagrams, Figs. 3, 4 and 5, the factors which were intentionally varied were temperature (Fig. 3) and ignition conditions (Figs. 4 and 5).

All of the cards were taken from a single cylinder, 6.55 x 9-in. gasoline engine, with compression ratio of 4.1 to 1. The general shape of the combustion chamber and spark plug location is shown in the accompanying schematic drawing, Fig. 7. The approximate valve timing of the engine is: Intake opens 20 deg. late, closes 30 deg. late; exhaust opens 20 deg. early, closes 10 deg. late. The engine speed was maintained at 350 r.p.m. by a hit-or-miss governor, so that every working cycle is made with the same throttle conditions. The air supply to the carburetor was unheated, being taken direct from the room at about 75 or 80 deg. Fahr., the gasoline being at the same temperature. The mixture had only a few inches to travel from the carburetor venturi to the intake valve, and in this passage it was neither cooled nor heated, except for the cooling effect of the vaporization of the gasoline. Commercial gasoline, "Socony" brand, was employed as a fuel, being supplied through a needle valve controlled opening located at the

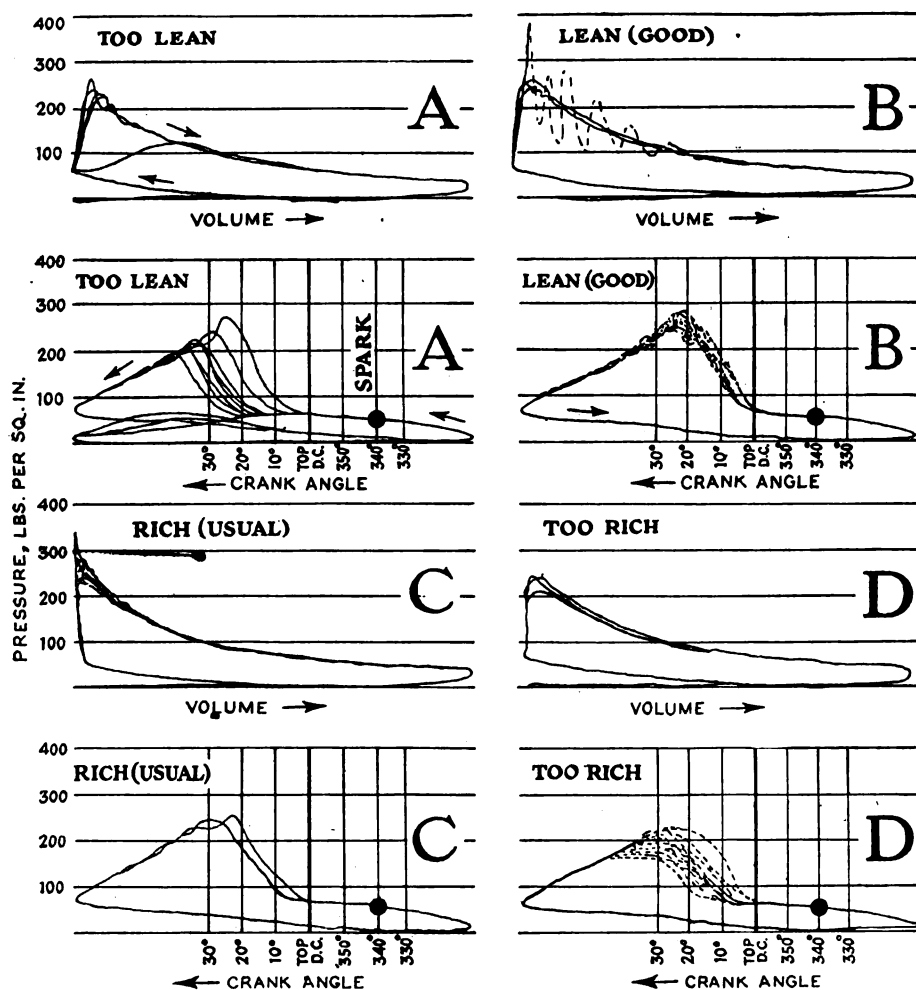


Fig. 1—Cards showing effect of varying mixture proportions

\*\*Similar cards were discussed by the author in "Effects of Varying Mixture and Ignition Timing" (Power, Nov. 23, 1915).

throat of an air venturi, just as in the usual straight tube carbureters.

The engine set-up is excellent for qualitative demonstration work, but it is not adapted to complete quantitative determinations. The load was applied by means of a band brake, and could be quickly changed to meet new conditions, such as a drop of power caused by lean mixture misfires. As the governor is a hit-or-miss type, the band brake is constantly regulated so as to seldom permit a "miss" stroke, but still allowing an occasional "miss" to make certain that the speed has not been reduced. The use of this combination, i.e., hit-or-miss governing and a quick acting brake secures: (1) constant speed, (2) constant throttle or manifold depression, and hence (3) a constant indicated load, as every power impulse is a full load explosion, and (4) the elimination of carbureter variables. In order to avoid any possibility of doubt, cards were not taken until two or three consecutive explosions followed a miss stroke, the only exception being in the case of an extremely lean mixture, when it is desired to obtain a card showing a backfire through the carbureter. As a matter of fact, one or two consecutive misses do not change engine conditions enough to make any perceptible change in the following explosion, except, perhaps, with an extremely lean mixture.

The indicator was suitable for a much higher speed than that employed on these tests, being a light weight inclosed spring Crosby Gas Engine Indicator, connected with the combustion chamber by a straight and large size opening. The corresponding pressure-time and pressure-volume cards were taken with the same engine conditions, but not at the same time. In taking cards the pencil was held on to the paper for many explosions, so as to secure a complete record of all fluctuations for a given set of operating conditions. In Figs. 1 and 2 it is seen that there is a complete cycle of fluctuation covering wide ranges of pressure with too lean or too rich mixtures, whereas all explosions are nearly alike when the mixture is correct. The ordinary pressure-volume indicator cards were taken in the usual manner, but special provisions were made to study the characteristics of the rise of pressure after ignition. In the latter case the eccentric which actuates the indicator is placed approximately 90 deg. out of phase with the crank, so that at the time of ignition when the engine piston is at the end of its stroke, the indicator card is in the middle of its movement. The engine flywheel was graduated in degrees, and a calibration or key card was made enabling the crank position to be superposed upon the misplaced diagrams. The result is that the central portion of these cards, where the combustion is located, is practically a pressure-time diagram, equal angles being nearly equally spaced, although at the ends of these diagrams this is not true. However, these cards will be spoken of as pressure-time diagrams. The time of ignition is shown by a dot on the compression line, located by means of the fly-wheel calibration and the key card.

The effect of change of mixture ratio with a fixed spark is shown on

Fig. 1, the usual pressure-volume cards (the upper card of each pair bearing the same letter) and the pressure-time cards (the lower card of each pair) are for the same conditions. The too lean mixture (cards A, Fig. 1) was the leanest at which the engine would run. It gives very erratic combustion. Sometimes the pressure does not rise at all, and it was at times necessary to choke the carbureter to prevent stalling. At other times, without having to strangle the carbureter, there would be a back-fire through the carbureter, which seemed to warm up the passages, so that the next time the spark passed a small pressure rise would occur, producing more heat and successively better pressure rises. The characteristic burning of this lean mixture seems to be that the spark properly ignites the charge, but that the heat generated by the burning charge is not sufficient. The lack of sufficient heat generation may result in a complete extinguishing of the combustion. It may result in a bare existence of the flame without any excess heat, so that the temperature of the mass does not rise, just as a piece of charcoal glows until the piece is entirely consumed. If this occurs it is quite probable that some portion of the charge is still burning when the intake valve opens, and so a back-fire will result. Or the charge may be ignited and burn in the regular manner, as shown by a few of the explosions which gave about 78 lb. indicated m.e.p.

For the next two cards (B and C, Fig. 1) the mixture was made slightly richer than the too lean condition, just enough richer to secure absolutely certain engine operation, with no back-fires or weak explosions, as was shown by the large number of pressure-time diagrams

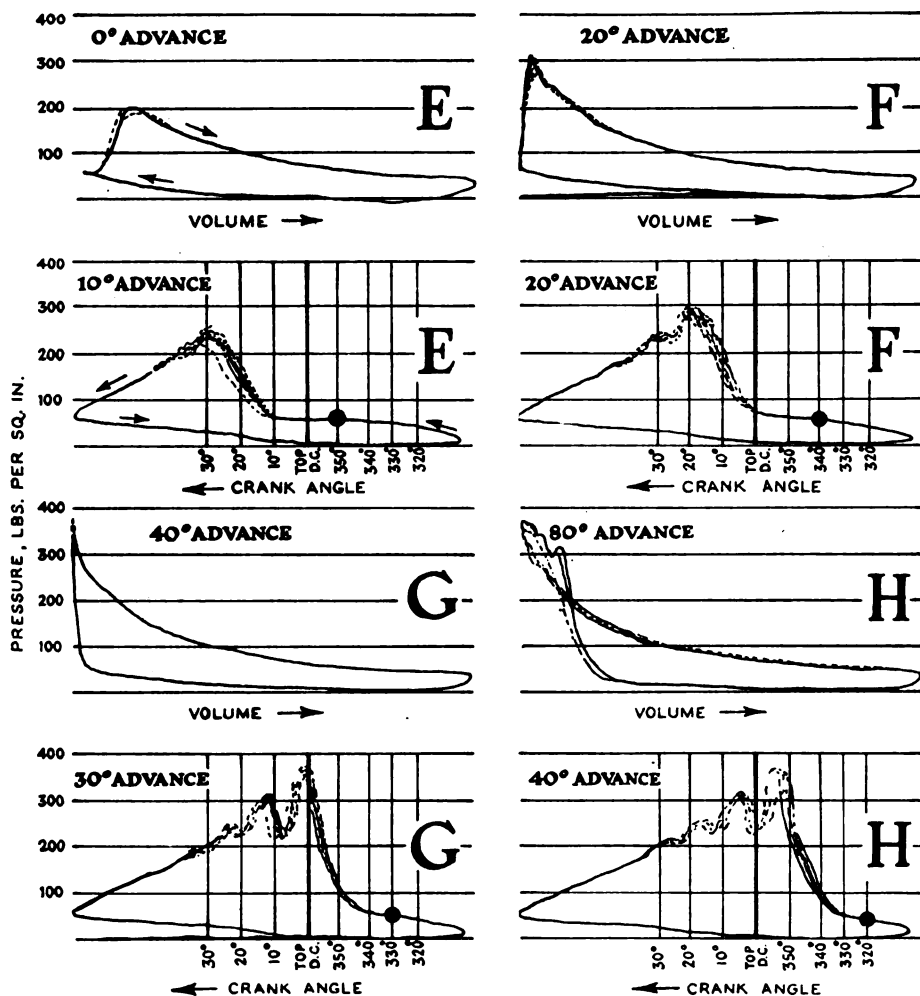


Fig. 2—Cards showing effect of ignition timing on combustion

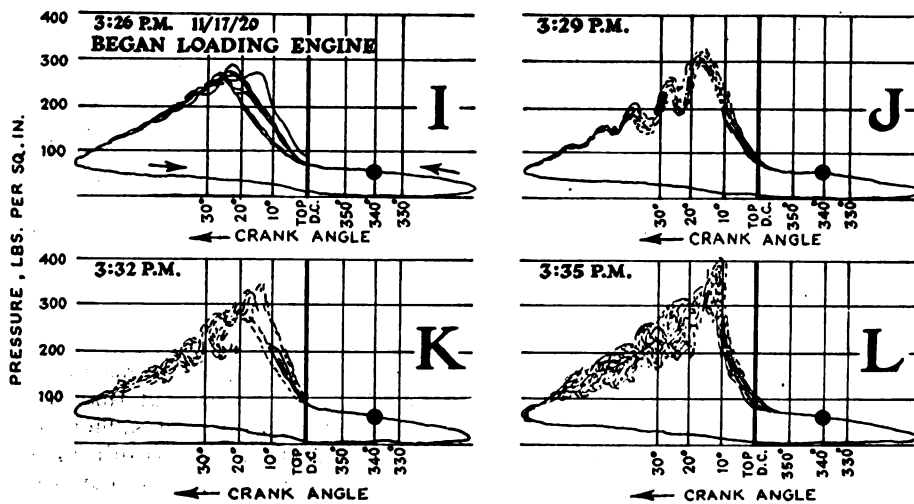


Fig. 3—Cards showing the effect of heating the engine. Time of Ignition not varied

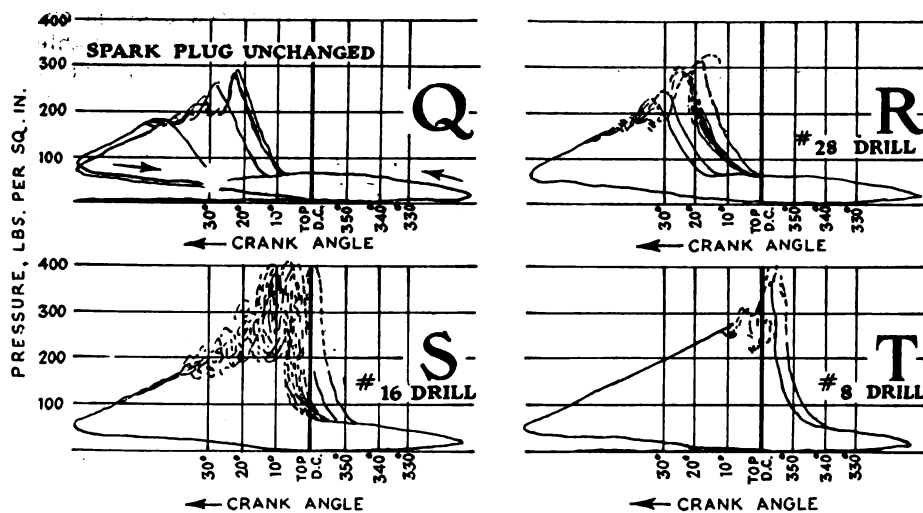


Fig. 5—Cards showing results of autog ignition brought about by plug shown in Fig. 6

which coincide. On the pressure-volume card one explosion (perhaps detonation) gave an exceedingly rapid rate of rise of pressure. This is shown by the excessive maximum pressure which was reached, and by the waves on the expansion line. A rapid rate of application of pressure upon the indicator piston acts just as a hammer blow, causing the parts to vibrate, whereas the usual (relatively) slow application of pressure acts simply as a gradual push upon the indicator piston. The action may be illustrated by the difference between pushing on a bar of iron, when no sound is produced, or tapping it with the same total pressure, but applying the pressure in a shorter time, when sound (vibration) is produced. In the optical type indicator, where the whole optical system is attached to the cylinder by an ell-shaped connection, the indicator waves may be produced by vibrations of the material of which the indicator is constructed, for example: in an inverted "L" one end of which is fastened rigidly to the engine cylinder, it is certain that engine vibration will cause the free end to move relatively to the fixed end. The richer mixtures never show appreciably indicator vibrations, because the rate of application of pressure is always relatively slow. Indicator vibrations increase with increase of the rate of application of pressure.

With the too rich mixtures the burning was always irregular, within limits, never refusing to burn and never burning very fast, as revealed by the several combustion lines of the last cards D of Fig. 1. The "rolling" of an automobile engine with a too rich mixture

is due to this characteristic as well as to manifold distribution.

The rate of rise of pressure is slowed up by richening the mixture. The slope of the combustion line on the pressure time cards indicates the rate of pressure rise; the steeper the line the faster the burning. The too lean mixture, cards A, Fig. 1, often gave as fast, if not a faster, rise of pressure than the good lean mixture (Cards B), and yet more spark advance is necessary with the too lean than with the good lean, because the too lean mixture hangs fire so long after the spark has passed and before the pressure rise begins, even though it burns, as fast or faster after it starts. The too rich mixture, cards D, also requires more spark advance than the good mixture, because it is slow burning throughout combustion period. Both too lean and too rich mixtures give less i.m.e.p. than a good mixture. With a too lean mixture, although the maximum pressure is sometimes greater than with a good mixture, the intermittent weak explosions will reduce the power output for a given time. With a too rich mixture the maximum pressure is always low and the after-burning does not cause the expansion line to fill out sufficiently to build up the m.e.p.

In connection with the relative meaning of too lean and good mixtures, cards A and B, it was noted that, with constant air and fuel temperatures, a mixture which was too lean at normal cylinder temperatures and spark advance was made to burn like

a good mixture with higher cylinder temperatures and with more spark advance. Most automobile engines have insufficient spark advance for a very lean mixture. The reason that a too lean mixture can be made normal by heating is perhaps explained by stating that the rate of combustion of a given mixture is controlled by its temperature and density at the time of ignition. If the temperature is increased, so is the rate of burning, because less heat is required to raise the mixture to its kindling temperature. If the density is greater (excluding liquid condition) the fuel and oxygen molecules are closer together and so unite more readily.

Density is proportional to the absolute pressure and inversely proportional to absolute temperature. Increasing the pressure at the time of ignition will increase the rate of combustion. This increase in pressure can be effected by an increase in temperature. But, in order to accomplish this the heating must be done after the intake valve is closed, when the cylinder is shut off from all outside passages, for under these conditions the volume will be constant and the pressure must rise with the temperature. If the temperature of the mixture is raised before the intake valve is closed the mixture will have a chance to expand back into the manifold or the air, and the volume occupied by a given weight will be increased, but no pressure change will occur. So it is possible to use a leaner mixture when the cylinder temperature and particularly the piston temperature is increased, or when a higher absolute pressure exists at the time of ignition, as with an increase of compres-

sion ratio. If a high compression engine is throttled this advantage is lost, because the absolute pressure at time of ignition is reduced. A change of spark timing either way from dead center causes ignition to occur at a lower pressure.

The foregoing statement that the rate and type of combustion is controlled by the temperature and density of the charge needs amplification. The total pressure was considered as a factor in the density. In strict truth, it is not the total pressure of the whole charge, but the partial pressure of the combustible elements which control the combustion. Knocking or detonation can be stopped by diluting the charge with inert gas, for example, by bleeding exhaust gas into the intake manifold. When this is done the total pressure at the end of compression is (hardly) changed, but, as the combustible elements are a smaller proportion of the contents of the cylinder, their partial pressures are much less than when the contents of the cylinder are not diluted with inert gases. Another factor affecting the pressure at the end of compression, but perhaps not a very big factor, is the heat taken up as latent heat when gasoline is vaporized during compression. The pressure at the end of compression will be higher with pure air than with a gasoline-air mixture and will be higher with a lean mixture than with a rich one, as more gasoline is vaporized when more is present, so both temperature and pressure at the end of compression are lower when richer mixtures are supplied. This explains at least in part the common practice of increasing the fuel supply when an automobile engine begins to knock.

The pressure rise shown on the indicator cards is closely connected with flame propagation, but the two are not identical. The pressure-time diagrams all indicate a time lag of about .007 to .01 sec. from the time of ignition until a perceptible indication of pressure rise due to combustion is recorded. Messrs. Woodbury, Lewis and Canfield\* have shown that this delay of pressure rise is an actual fact and of about the same order of magnitude shown on the cards here given. What the pressures are in the burnt gas, behind the flame front, is, of course, unknown, but it is believed that they are much greater than in the unburnt gas ahead of the flame front.

The diagrams of Fig. 2, cards E, F, G and H, illustrate the effects of altering the time of ignition. The maximum indicated m.e.p. is obtained from the engine if the pressure rise occurs when the piston has started on the expansion stroke, not when the piston is stationary at dead center. That such timing of pressure rise may give better thermodynamic efficiency is shown by W. S. Walker.\*\* The 80 deg. advance card (H) is similar to the card presented by S. W. Sparrow of the Bureau of Standards (S. A. E. Journal, October, 1920, page 397).

\*The Nature of Flame Movement in a Closed Cylinder, S. A. E. Journal, March, 1921, page 209.

\*\*Thermodynamic Cycles of Internal Combustion Engines, Engineering, London, Dec. 24, 1920, page 847.

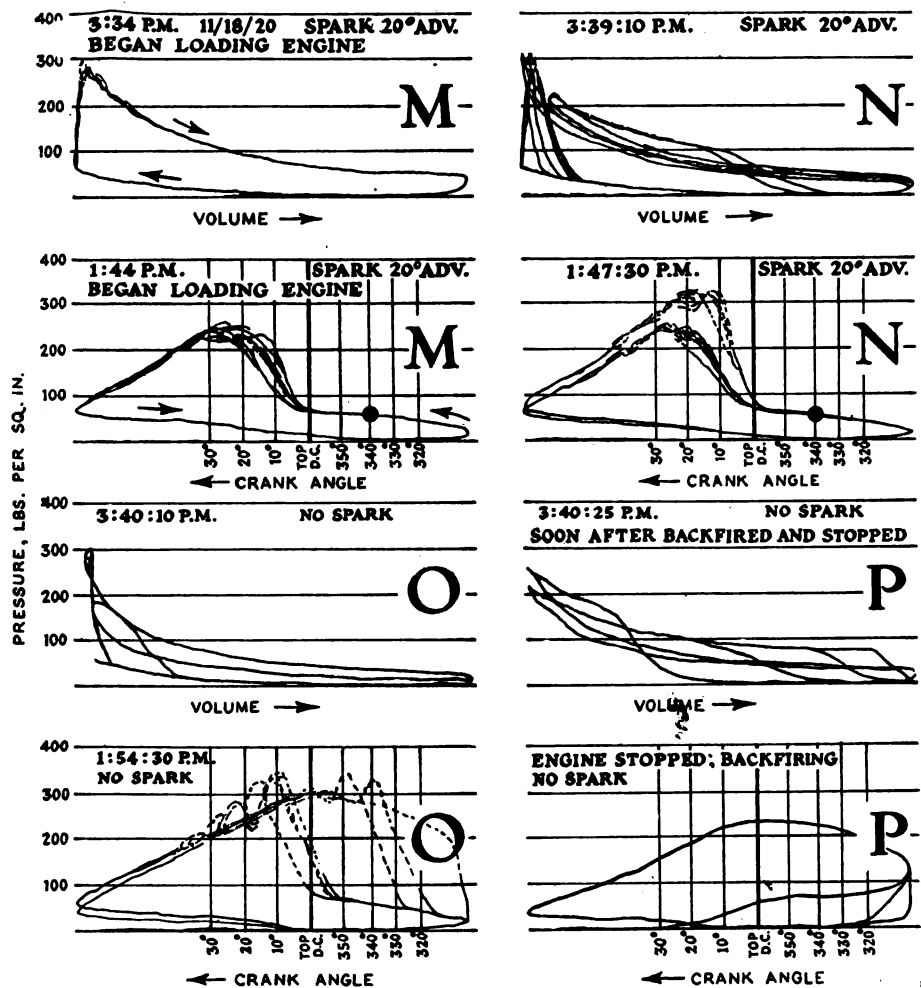


Fig. 4—Cards showing effect of heated spark plug electrode

The elapsed time between the starting of pressure rise and the maximum pressure is about .007 to .01 sec. Approximating the maximum distance which the flame has to travel from its source and approximating the time from the beginning to the end of pressure rise as shown on the pressure-time diagrams, where 10 deg. of crank travel are equal to nearly .005 sec., it is found that the rate of travel of the pressure wave is about 50 to 70 ft. per sec. If it be assumed that the time from the start to completion of pressure rise is a measure of the time of combustion, then the velocity of combustion will be approximately 50 to 70 ft. per sec. for conditions of normal burning. These values are comparable with the velocities of flame propagation given by Hohneman and McKenzie (S. A. E. Journal, November, 1919). When detonation takes place, the velocities indicated by the rapid pressure rise appear to produce practically spontaneous ignition throughout the mass, this occurring, however, after a short period of apparently normal combustion.

Fig. 3 presents a series of cards, I, J, K and L, taken to show the effects of heating the engine. Card L is the normal card obtained with best spark advance and with the mixture leaned as much as possible, but still obtaining regular firing. The cooling water was shut off immediately before this card was taken and the engine was run at practically full load, continuing for about nine minutes. Although the jacket was full of water at the start, much of it must have boiled away during the run, as the heat was sufficient to start cracking the paint on the engine cylinder. Cards were taken at three-minute intervals during the nine-minute period. These cards



show the changes in the process of combustion as the engine became hotter and hotter. The maximum pressure increased from normal of about 270 lb. per sq. in. to over 400 lb. per sq. in. The time of ignition was unchanged and the beginning of pressure rise (time lag from ignition) changes but little with engine temperature. But the location of maximum pressure shifts from 20 deg. after top center with cool engine to 10 deg. after center when very hot. Some of the highest pressures with the hot engine result from combustions which are nearly, if

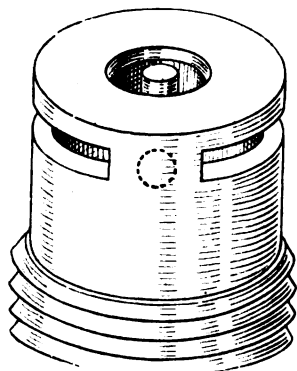


Fig. 6 — Plug used in securing autoignition

not actually, detonations. There is not a preignition shown on any of the cards of Fig. 3, although the engine knocked badly while the cards, J, K and L, were being taken. In fact, the engine knocked badly with either preignitions, or rapid combustions, or detonations.

In order to obtain preignition a piece of a broken spark plug porcelain was placed around the center electrode of a good plug, the engine was run under nearly full load, but with the usual rather cold jacket water. Typical cards for these conditions, M, N, O and P, are reproduced in Fig. 4. In this figure even the first card of the pressure-time series, taken immediately upon application of the load, indicates erratic combustion. Card N shows two distinct types of combustion, neither of which is detonation. For card O there was no electric ignition and the several diagrams show combustions ranging from normal to a preignition occurring during the compression stroke, but without any detonations. On card P the ignition was occurring earlier and earlier until it caused ignition of the incoming charge during the suction stroke, resulting in several back-fires through the carbureter, and finally stopping the engine.

Reviewing the cards of Fig. 4, it is interesting to note that the maximum pressure and the whole expansion line of the quicker combustions on pressure-time card N are above the slower ones. On the cards O and P the too early combustion is shown to be complete, and the subsequent expansion of the compressed burnt gases follows the normal expansion, except for leakage and cooling losses. This phenomenon is noted on the card shown by Sparrow in which after the pressure rise due to the early ignition is complete, the subsequent compression follows parallel to, and slightly above, the expansion.

The author has tentatively classified three types of combustion, each of which appears to be distinct. One of these types of combustion is the normal, relatively slow burning, shown as the lower set of combustion lines on pressure-time diagram N of Fig. 4. Another type is the faster burning shown by the upper, higher pressure combustion lines of the same diagram. Neither of these two types of combustion gave evidence of pinking, although the faster burning type did cause knocking. The third type of combustion has been classified as detonation, and is shown by a practically vertical pres-

sure line on the pressure-time diagrams. Cards S and T of Fig. 5 show such instantaneous pressure rise and pinking was suspected, although the knocking was so bad that it was almost impossible to be sure of an extra pink. The combustion lines on card L, Fig. 3, seem to start out with the second (rapid) type of combustion, which eventually changes over into the detonation type near the end of the process, when high pressures are existing. Cards G and H, Fig. 2, with too early ignition, also exhibit this tendency. The pressure-volume diagram B of Fig. 1 shows one freak combustion which may have been a detonation, but so far it has not been possible to again secure this freak combustion under the same conditions of operation.

For the purpose of studying the temperature required for ignition a special form of hot wire ignition in which the igniting wire should also be a resistance thermometer in order to measure the ignition temperatures, was to have been employed, but it was not possible to use this in tests here recorded. A qualitative study was possible, however, by using some less effective form of pre-igniter than the broken porcelain. A spark plug was found which offered possibilities of being converted from a spark plug into a sort of hot tube. This plug is shown in Fig. 6. There was no electricity used for ignition in any of the cards, Q, R, S and T, of Fig. 5, all of them resulting from autoignition. It was found that the plug in its original form would run the engine after the igniting current was shut off. Card Q is the result of such operation. The plug in its original form never caused any preignition with normal spark, but it would become hot enough to give irregular ignitions after the electric spark was cut off, such as would have been produced by a spark timing of from 10 deg. retard to 10 deg. advance. For obtaining the next card, R, the plug was changed by drilling a small hole in each of the two bridges which connect the end plate to the shell of the plug, as shown by the dotted circle in Fig. 6, so that there was not so much metal to conduct the heat away from the end plate. This gave a more regular autoignition, producing cards corresponding to those obtained with a spark advance of about from 5 to 20 deg. For card S the heat conducting capacity of the bridges was again reduced so that

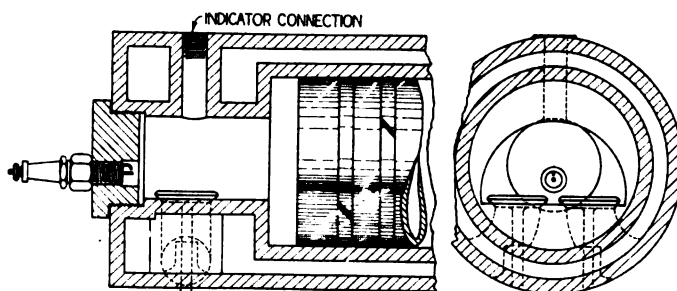


Fig. 7—Diagram of engine cylinder showing shape of combustion chamber and location of indicator

the plate would run hotter, and the timing of the auto-ignition was thus still further advanced. The character of the combustion was also changed to detonation, which in card T is so early as to be preignition as well as detonation. The engine knocked during the period when last two cards were taken.

The mere fact that a spark plug gives autoignition when the ignition is off does not necessarily mean that the charge is preigniting. The ordinary spark knock when climbing a hill or with a carbonized engine is probably due to the fact that the temperature of the gases inside the cylinder is relatively increased, a condition

which was simulated in obtaining the cards shown in Fig. 3; resulting in some portion of the spark plug becoming hotter and perhaps causing the auto-ignition to come earlier in the stroke, as in Fig. 5. It is seen that such knocking can be stopped or reduced by reducing cylinder temperatures or otherwise securing a cooler spark plug. For example, more gasoline cools the cylinder as it uses more heat for its evaporation, and a retarded spark will also reduce temperatures by reducing the pressure at time of ignition. It is interesting to note that point ignition with the broken porcelain (Fig. 4) produced only one "near detonation," while ignition from the larger hot surface, when hot enough (cards S and T of Fig. 5) produces consistently repeated detonation.

It is suggested that ordinary combustion may be roughly divided into three types: (1) normal, (2) rapid, (3) detonation, of which the last two will cause knocking. The first two types are well exemplified by pressure-time diagram M, Fig. 4. When the "normal" explosions occurred, as shown by the lower combustion and expansion lines of this card, the engine did not knock. But it did knock when the combustion caused the higher pressure lines. It is peculiar that the time lag from the jumping of igniting spark till the beginning of pressure rise

is practically the same for these two types of combustion.

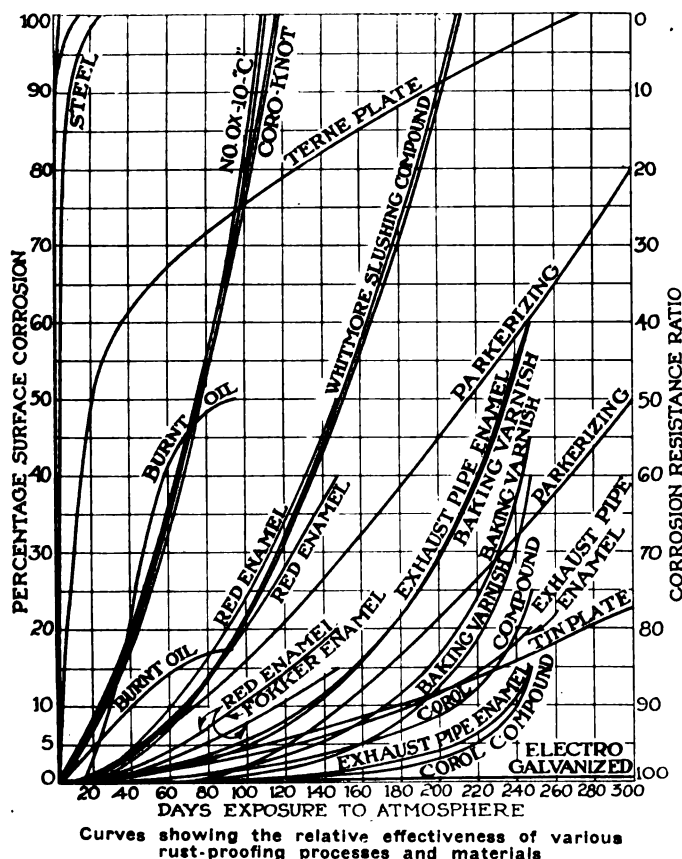
Knocking can also be caused by too early ignition, irrespective of the type of combustion which follows, and preignition is followed by any one of the three types of combustion, or by a combination of any of the types. The experience of the author with this and other gasoline engines leads him to suspect that the spark plug is almost always the final agent in causing knocking, although the misbehavior of the plug is generally induced by some cause independent of the plug. The spark plug does not get too hot until the piston and cylinder temperatures are increased by some condition such as carbon deposits. The knocking can be stopped by cooling the plug. This statement is made, in spite of the fact that it is known that different fuels have different knocking characteristics, because it is believed that none of the automobile engines now built have too high a compression for the present day fuels (most of them have too low a compression for good thermal efficiency) provided suitable plugs, plug location and plug cooling are provided. The only drawback to proper cooling of the spark plugs is that sometimes so much oil gets by the pistons that the plugs have to run hot or they will rapidly foul.

## Tests of Rust-Proofing Processes and Materials

THE Engineering Division of the Air Service at McCook Field has been conducting a series of tests on the effectiveness of various rust preventatives, especially with regard to their applicability to aircraft parts. Test specimens of sheet steel of uniform composition were cut to uniform size, 4 by 6 in., carefully cleaned to remove all rust, and thoroughly coated with the material to be tested. These were exposed out of doors for varying lengths of

time. Periodic examinations were made to ascertain the time of the initial appearance of rust and the rate of corrosion progression. These values, plotted against the time in the accompanying chart, show how long each coating will keep the piece of steel from rusting.

As a result of the tests the conclusion is reached that there is no known method by which complete protection is afforded. At best, all coatings are only inhibitive agents. An examination of the accompanying chart will show that these coatings have marked variations in protective properties. It will be noted that the two pieces of steel coated with Corol compound and the two coated with exhaust pipe enamel corroded the least. The Corol compound samples rusted 15 to 25 per cent during 247 days' exposure and the exhaust pipe enamel sample rusted 15 to 20 per cent during 247 days. Zink plating held up better than any other coating, corroding less than 1 per cent during 300 days.



## Aeronautical Safety Code

A CONFERENCE was held recently in Washington to consider the development of an Aeronautical Safety Code, for which the Bureau of Standards and the Society of Automotive Engineers have been designated as the joint sponsors by the American Engineering Standards Committee. This conference was attended by representatives of the War, Navy and Post Office departments, the National Advisory Committee for Aeronautics, the National Safety Council, Manufacturers' Aircraft Association and the Insurance Underwriters, as well as representatives of the two sponsors and the American Engineering Standards Committee.

It was the sense of this conference that a safety code ought to be developed without delay and that a committee should at once be formed which would include representatives of all organizations interested in this subject as well as those which were present at the conference. Invitations have, consequently, been extended to other interested organizations.

# Special Features in Cylinder Block Production

Cylinder block department producing 171 blocks per day contains special machinery from which exceptional production results are being obtained. A clamping device for holding blocks against locating face during profiling operation is one of the interesting features discussed.

By J. Edward Schipper

**F**ROM the standpoint of completeness of modern machine tool equipment, there are probably no plants in the country which surpass that of the new engine factory at the Olds Motor Works. This concern is manufacturing its own engine for its small, eight-cylinder car. The engine plant is entirely new and is equipped throughout with the latest developments in special machinery for this work. Some of the machines are establishing new records for continuity of performance, and one of the great features of the work is the accuracy of manufacture, in spite of the use of high-speed production methods.

The cylinder blocks for the eight-cylinder motor are arranged and so designed that there is no difference between the left and right block; that is, a block may be put on either the left or right side of the crankcase and consequently the number of differently made parts for the engine is cut in two, as compared with eight-cylinder motors in which the left and right blocks differ. This result has been accomplished by establishing exact symmetry of design between the front and rear end water connections and, of course, exact similarity between both ends of the blocks in all other respects.

The present production rate averages about 19 blocks per hour per machine. The shop is on a 9-hr. day, giving 171 cylinder blocks per day, or a capacity of 85 engines. The average amount of metal cut from each cylinder block is 16 lb., as the rough casting weighs about 73½ lb. and the finished casting 57 lb. This gives a total of over 2700 lb. of metal cut per day in the cylinder block department. At the present time, with the plant operation being kept down to a maximum economy, one operator can, in a number of instances, take care of two or three machines. The result is that these cylinder blocks are being turned out at a labor cost which is astoundingly low, in spite of the fact that the operators are making good money on the job.

## Roughing and Finishing Operation on One Machine

The first rough machining operation is handled on an Ingersoll rotary miller. The cylinder blocks are all inspected at the foundry and gaged in the usual manner to check up the amount of material at all machine surfaces. The Ingersoll rotary miller not only takes off the rough cut, but also takes the finish cut off in the same machine. The cut is taken from the top and bottom faces of the block, the rough cut taking off 3/32 of an inch and the finish cut 1/32 of an inch. The locating for this work is handled from a button located at the top of the water jacket and two locating pin bosses on the bottom flange. The clamp on the jig shown in

Fig. 1, which illustrates both cuts taken on this operation, forces the block against the locating pin, sideways, and the endwise location is from the outside of Nos. 1 and 4 cylinder walls. One of the features of this big milling machine, which is practically in continuous operation, is its great rigidity. The machine holds six blocks at a time and the operator is loading the blocks on the machine at the opposite side from that illustrated in Fig. 1. The machine readily takes care of the schedule production of 19 per hr., and provides an accuracy in the finish cut which permits of a dimensional range from 7.750 to 7.752 in. That is, a total variation of .002 in. on the finish cut between the top and bottom faces of the cylinder.

## Reaming and Drilling in Second Operation

The same operator who handles the first operation takes care of the second operation on these blocks. The second machine is a Foote-Burt drill with twelve spindles. This machine drills the bottom flange and two dowel holes, reaming the latter to locate the cylinder on the crankcase. The machine really performs two operations in doing this, as the reamers replace the drills for the two dowel holes, as shown in Fig. 2. The two drills which are replaced by reamers may be noted by the Magic quick-detachable chucks. The work is located by a V-block between the two center cylinder barrels and by two stops on the core side or inside of the cylinder block located at the end cylinders. This machine has the same capacity as the first milling operation; that is, 19 per hour, and, while it keeps the operator busy to run both these machines, he can readily do so by properly timing his movements.

The two dowel holes which align the cylinder with the crankcase, the drilling and reaming of which were described under the second operation, are utilized for locating practically all of the machine work which follows on the cylinder block. They are used for locating the third operation, which is done on a Foote-Burt machine, consisting of rough boring the four cylinders simultaneously. In this rough boring operation about 1/8 in. is taken off the cylinder bore, leaving about 1/32 in. on a side for finishing. This machine is capable of 19 per hour, to time it with the machines which precede it.

Another Ingersoll rotary miller mills both ends of the cylinder block at the rate of 20 per hour. This machine, like the machine described in the first operation, takes both a rough and finish cut off each end. The parts milled are the water opening pads on each end, the two ends being similar, as described, so that a block may be put on either the left or right side of the crankcase. The

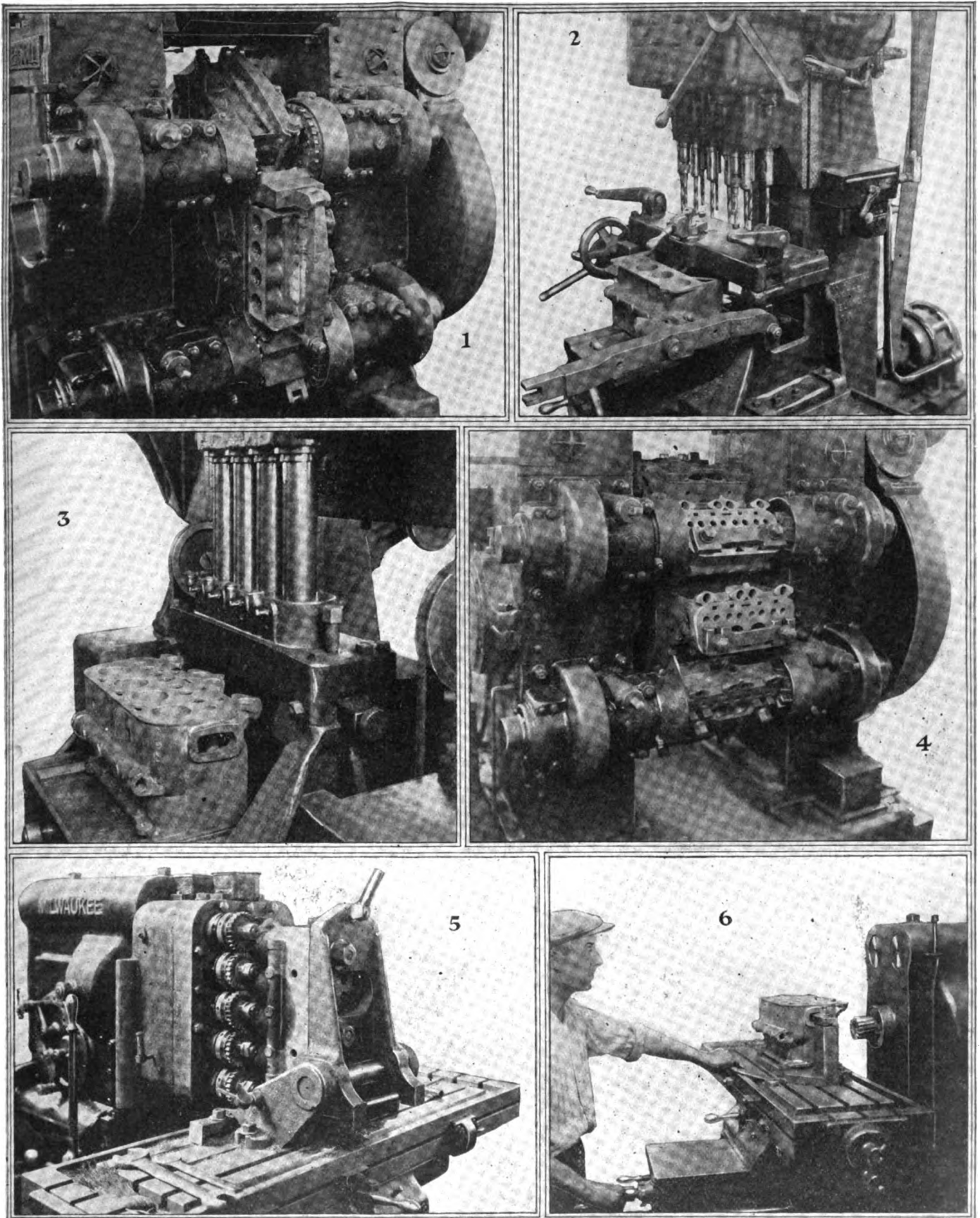


Fig. 1—Ingersoll continuous rotary miller which takes rough and finish cut from top and bottom face of block. Fig. 2—Foote-Burt multiple spindle drill with twelve spindles which mills bottom flange and drills and reams the two dowel holes for locating the crankcase on the cylinder block. These dowel holes are used for locating practically all of the machine work on the block. The dowel spindles may be noted by the Magic quick-detachable chuck used for changing over to the reamers for these holes. Fig. 3—Foote-Burt machine for rough boring cylinder block. This machine takes about  $\frac{1}{8}$  in. off the bore and operates at the rate of 20 blocks per hr. Fig. 4—Ingersoll rotary miller for milling both ends of the block. Miller has both rough and finish cutters. Fig. 5—Milwaukee 3B miller which mills the intake manifold flange on all cylinder blocks. Fig. 6—Milwaukee miller for milling eight bolt hole faces and spot facing two bolt hole faces on Olds blocks. Note location on these operations, which is from dowel holes in bottom of blocks, the work being secured by clamps in the water outlet hole



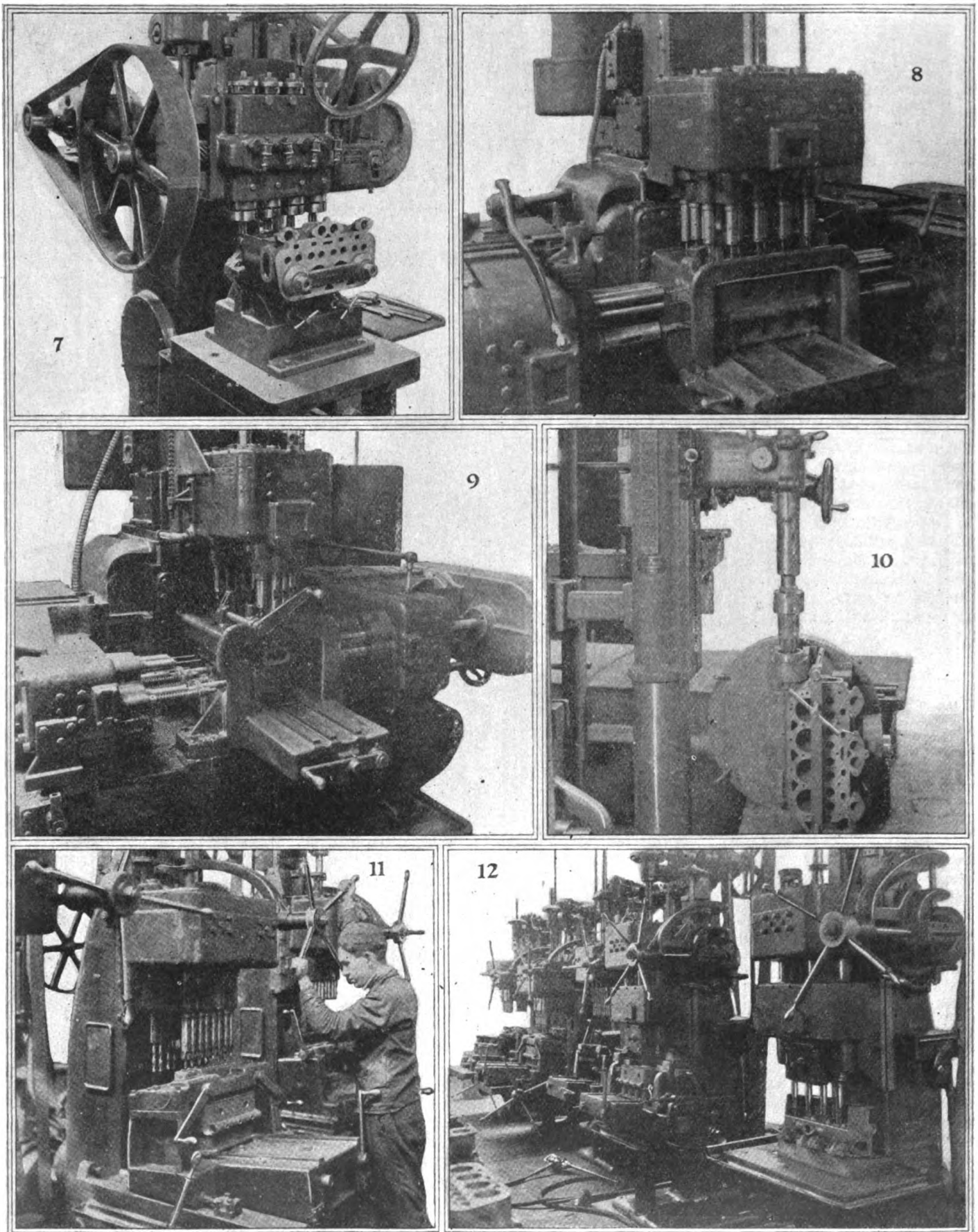


Fig. 7—Profiling machine made by Automatic Machinery Co. for profiling valve in section cover surface. Fig. 8—Three-way Foote-Burt drill, drilling 35 holes simultaneously, taking care of all the bolt holes on the top and both ends of the cylinder block. Fig. 9—Three-way Foote-Burt drill, drilling on front and rear sides of block and on top. Fig. 10—Cincinnati 24-in. radial which chamfers the gas intake manifold passage, counterbores and faces water circulation hole. Fig. 11—One of the Foote-Burt machines which works on the valve stem guide holes. There are a battery of these, one operator taking care of five machines, handling 75 blocks an hr. Fig. 12—View of the battery of Foote-Burt drills which is handled by one operator working on the valve stem guide holes and the valve opening chambers



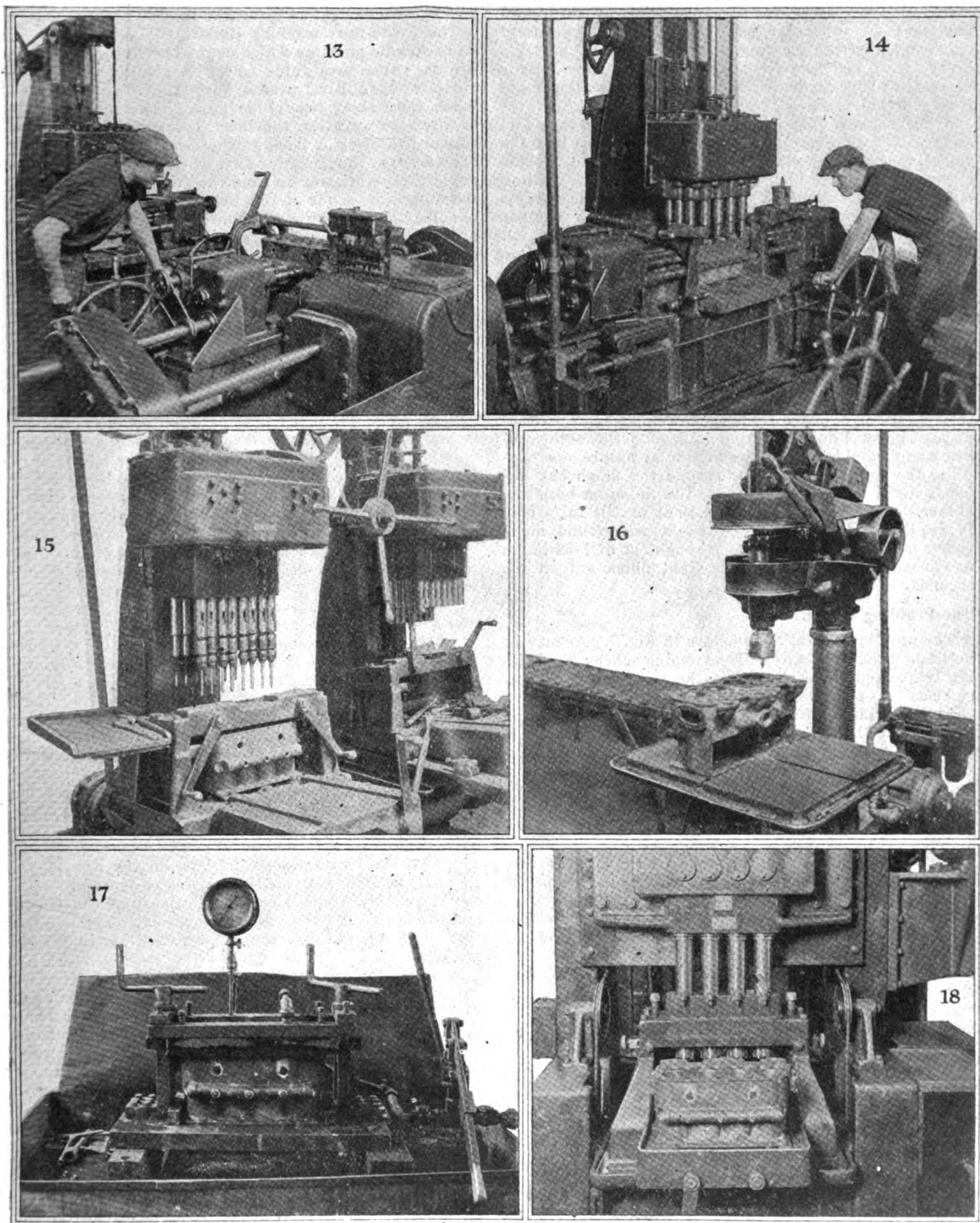


Fig. 13—Two-way Foote-Burt taper which taps three water circulating plug holes on the rear side of the block, the gas intake manifold flange cap screw hole and two valve inspection cover stud holes simultaneously. Fig. 14—Three-way Foote-Burt taper which taps 35 holes simultaneously in the Olds cylinder blocks. Fig. 15—Foote-Burt machine for semi-finish reaming the valve stem guide holes. Fig. 16—Garvin taper which finish taps all the bolt holes for the cylinder head and exhaust manifold studs. Fig. 17—Fixture used for water testing the cylinder blocks. The water test is given at 60 lb. hydraulic pressure. Fig. 18—Foote-Burt machine for giving the cylinder blocks a semi-finish ream. One man runs three of these machines, which reams four cylinders bores at a time and takes off .064 in. of metal, leaving .020 in. for finish

cylinders are located for this operation by the dowel holes on the crankcase flange, and the blocks are held rigidly against the locating plate by means of a clamp bracket fastened between the two end cylinders. This bracket, which is bolted into place, is clearly illustrated in Fig. 4, which shows this operation.

A Milwaukee 3-B miller mills the intake manifold flange. Location for this is by the dowel pins and the work is secured by clamps in the water outlets. This milling machine, which is provided with five milling cutters, is illustrated in Fig. 5. The machine is capable of handling from 20 to 25 blocks per hour. Another Milwaukee miller with a single cutter mills eight bolt hole faces and spot faces two bolt holes. This single cutter miller is shown in Fig. 6. The block is located in the same way from the dowels on the bottom flange and is held against the bottom dowel plate by means of clamps in the water opening end. The miller is stationary, the table moves carrying the work to the cutters.

The following operation is a very interesting profiling job handled by an Automatic Machinery Co. profiler. This tool profiles the valve inspection cover surface and the operation is located from the dowel holes in the usual way. The profiling operation is around three sides of a rectangle and two machines of similar nature, one handling the rough cut and the second the finish cut, are used. Originally, it was intended to finish on both machines, but in order to hold the limit to .001 in., which is required on the finish cutter, it was found much easier on the tools to take off a rough cut of 7/32 in. on one machine and then take a light finish cut on the second.

### The Profiling Operation

The profiling operation is shown in Fig. 7. As may be noticed on the illustration, the clamping scheme for holding the cylinder blocks against the locating face is the same as that employed on several other operations where the block is laid on its side for the work. This operation is extremely hard on any kind of a milling cutter, and this way of handling it is one of the most ingenious features in the entire shop. The Automatic machine which does this work is, of course, a special machine built for the operation, as are practically 100 per cent of the machines taking care of the manufacture of these cylinder blocks.

A three-way, 35-spindle Foote-Burt drill takes care of all the bolt holes on both ends of the blocks and the water circulation holes on the top of the cylinder. This machine also drills at the same time the bolt holes for the exhaust manifold on the top of the blocks and the cylinder head bolt holes. The block is located in an oven type of jig, this jig being so designed that the block is slid in on guides and then the dowel pins raised by manipulating the lever crank shown at the bottom left side of the jig. The operation is illustrated in Fig. 8, and is a particularly good example of three-way drilling on cylinder block work.

Another three-way Foote-Burt machine drills the Welch plug holes and counterbores them. These are on the rear side of the block. The same machine also drills three water circulation holes on the rear side and the water circulation holes in the head. It also takes care of the intake manifold bolt holes and the valve inspection cover plate bolt holes on the front side of the block. This gives a total of 19 holes drilled simultaneously.

The operation shown in Fig. 10 is on a Cincinnati 24-in. radial which chamfers the gas intake manifold passage and counterbores and faces the water circulation hole. This operation is handled in a tumbling jig and located from the dowel holes in the usual manner. The jig, of

course, is indexing, as shown in the illustration.

The Foote-Burt machine illustrated in Fig. 11 is an eight-spindle machine which counterbores the core holes for the valve stem guide holes. A similar type of machine, which is illustrated in Fig. 12, drills and counterbores the valve stem guide holes. This machine has two sets of spindles, the block being moved back and forward to bring it into position for each set. The jig, of course, is indexing for this work and operates upon guides. The location is from the dowel holes similar to the other operations of this nature. The same operator handles the drilling and counterboring on this and a previous machine, as well as the reaming operation on the guide holes and valve opening chambers. He also handles the machine shown in Fig. 12, which counterbores for the valve head, and the other Foote-Burt machine, which faces the valve spring seat. With this series of five Foote-Burt machines all handled by one operator, one man is capable of taking care of the operations described, or 75 blocks per hour.

### Few Hand Operations Required

Practically the only hand operation on the entire job is that of counterboring all of the cap screw studs and bolt holes in the block. This is done on an air drill. Following this there is a two-way Foote-Burt tapper, shown in Fig. 13, which taps three water circulation plug holes on the rear side of the cylinder block, the gas intake manifold flange cap screw holes and two valve inspection cover stud holes. The location of this work is from the dowel holes on the crankcase flange, as previously described.

For tapping the top and end holes there is a three-way Foote-Burt tapper with 35 spindles. This takes care of the holes on all except the bottom side of the cylinder, on which the dowel locating holes are again employed for positioning of the work. This operation is shown in Fig. 14.

Following the tapping of the holes on all three sides, as described, there is an assembly operation in which the valve guides and end cover plate are fitted, the water circulating holes are fitted with Welch plugs and pipe plugs are placed in the water circulation holes. The blocks are then given a semi-finish ream in the valve guide holes on a Foote-Burt machine and then the valve opening is finish reamed and the valve seat roughed out. The location for this work is done on the dowels, the jig being so arranged that the dowels are depressed while the block is put in position beneath the spindles. Quick-acting chucks allow for the replacement of spindles to take care of the different operations on this same machine.

In order to make certain that the bolt holes for the cylinder head are all exactly finished, these are given a finish tapping operation on a Garvin tapper. This operation is shown in Fig. 16. Following the tapping operation, the cylinder blocks are ready for the water test, this being handled on the fixture shown in Fig. 17. The water test is given under 60-lb. hydraulic pressure. This is sufficient to bring to light any defective blocks.

One man operates three Foote-Burt machines for semi-finish reaming the cylinder blocks. All four cylinder barrels are reamed simultaneously. On this reaming operation, which is shown in Fig. 18, .064 in. of metal is taken off. The location for the work is from the dowels on the bottom flange of the cylinder block. After this operation .020 in. of metal is left for finishing the cylinder bore. The cylinder bores are chamfered at the top and bottom on another Foote-Burt machine, as illustrated in Fig. 19. One man handles eight spindles similar to those shown in Fig. 20. This finish reaming operation

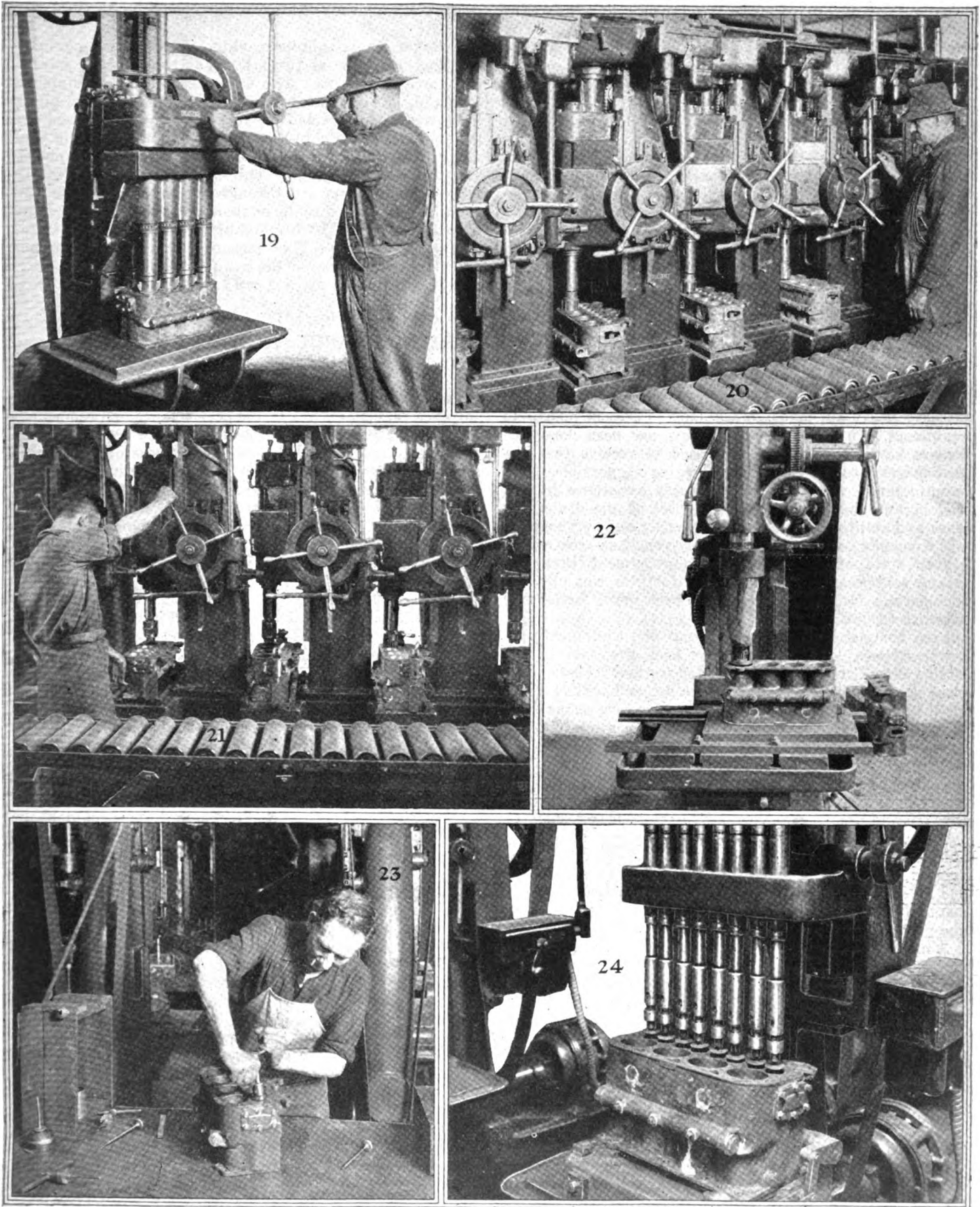


Fig. 19—Chamfering the top and bottom of cylinder barrel on a Foots-Burt machine. Fig. 20—Finish reaming the cylinder bores. One bore is reamed at a time on these machines, one operator taking care of eight spindles. Fig. 21—Rolling the cylinder bores to a finished surface. It requires 15 min. to a block to do this work. There is a taper of about 3 deg. on the rolls which is sufficient to run them through the blocks. This rolling operation puts a mirror finish on the cylinder block, slightly compressing the outer skin of the metal. Fig. 22—Baker single-spindle machine for chamfering the connecting rod clearance at the bottom of the cylinder barrel. Fig. 23—Finishing the valve seat by hand. Fig. 24—Grinding-in the valves on a special Foots-Burt valve grinding machine



takes out the .020 in. of metal left for finishing the cylinders and is held to a limit of plus or minus .001 in. The diameter allowed is 2.874 in. to 2.875 in.

The final finish on the cylinder bores is by rolling. This work is also done on single spindle machines, the rolling operation being done by a tool which resembles in some respects a roller bearing. The blocks are rolled to their finish surface, giving them an exceptionally smooth and mirror-like appearance. There is a slight taper of about 3 deg. on the rolls, which is sufficient to run them through the blocks and to give the desired feed. It takes about 15 min. to a block in handling this operation. Location is by the dowel holes in the usual way, with clamps on the top side of the blocks to hold it firmly against the bed plate on which the locating

dowels are placed. This rolling operation is shown in Fig. 21.

A Baker single-spindle machine chamfers the connecting rod clearance at the bottom of the cylinder barrel, as shown in Fig. 22. The valve seats are then finished by hand, as illustrated in Fig. 23, and the valve guide holes are finish reamed on an air drill. The valves are ground in on a Foote-Burt special valve grinding machine, which gives the peculiar compound motion necessary for valve grinding. This machine spins the valves backward and forward through the arc of a circle and then lifts them and replaces them on the seat in the same way as the hand valve grinding operation, which is familiar to everyone. This operation concludes the manufacturing operations on the cylinder block.

## Dealer Aids Make for Better Farm Power Merchandising

**A** FEW automobile manufacturers have sufficiently interested themselves in their dealers' merchandising methods to lay out model garage and salesroom plans and equipment. In the cases where this has been done, the dealers have usually been very glad to receive the suggestions and to act upon them insofar as possible. The manufacturer can be of very valuable assistance in this way because he places at the disposal of the dealer the work and abilities of trained engineering and service men.

Automobile merchandising, however, has reached a higher state of refinement and development than has tractor selling, and the tractor manufacturer who provides such service for his dealers has an even more fertile field in which to work.

Very complete plans for the layout and equipment of a power farmer dealer's store have been prepared by the Moline Plow Company and presented to their dealers. The plans are arranged to take care of a dealer handling a full Moline power line, and are designed to combine a maximum of efficiency and service potentialities with a minimum of expense.

A brief explanation accompanies the floor plan of the salesroom and service station. This description points out the reasons for the various features embodied in the layout. In addition to the floor plan, a complete list has been compiled of the machinery, tools and equipment which such a dealer should have. This equipment is listed and supplemented with charts and diagrams showing the advantages and necessities of the various units. A practical arrangement of the necessary machinery is shown by drawings and printed explanations.

A model tractor delivery truck has been designed for the power farming dealer, and drawings of this truck accompany the other material. In addition to the truck model, there is a specially designed service car which is also described by drawings.

Among other things that have been worked out by this manufacturer as an assistance to the dealer, is a stock record card and bin index especially designed for the power farming dealer; also a job card that is simple to fill out, but which constitutes an effective record.

A somewhat similar example of a farm power manufacturer recognizing the necessity for providing constructive aid to his dealers is an accounting system which has been worked out by the Avery Company for its dealers. This system is designed primarily to meet the needs of the dealer in tractors, threshers, farm implements, etc. The system is complete as regards records, but comparatively simple to operate and maintain. It will mean a distinct step in the direction of progress if this firm can "sell" the plan to a majority of its dealers.

It is not so much the details of these plans that are of interest, as the fact that tractor manufacturers are devoting such intensive effort to the development and refinement of the sales efforts of their dealers. Such dealer helps as this are bound to increase the effectiveness of the tractor and power farming salesmen and dealers and will go a long way toward bringing that industry, at least, out of the present general industrial slump. It is doubtful if many pages of "pep" talks could accomplish nearly as much as will this constructive effort.

## British Tire Innovations

**S**EVERAL important variations in the policy of the British Dunlop Tyre Company are announced, as follows:

A range of straight-sided tires will be made in sizes from 32 x 3½ in. upward, with a new pattern non-skid tread. These straight-sided tires will have a cord fabric and a rim with a quick-detachable flange. All inner tubes are to be molded to the exact shape of the tire and will be jointless, both circumferentially and diametrically. Schrader valves in two sizes will be standard, steel-studded tires are abolished and canvas-cased covers will eventually disappear. Facilities will be provided for converting beaded-edge tire rims (clincher pattern) to the straight-sided type. A new detachable wire wheel, held by four or more studs and nuts, will be manufactured.

Beaded-edge covers will continue to be made for replacement purposes, and this will probably be necessary for many years to come, in view of the fact that practically all cars, except those of American manufacture, now in use in Great Britain have beaded-edge tires.

Although it has been suggested in some quarters that the use of straight-sided tires will eliminate the detachable wheel, this is not the view of the Dunlop company, who consider that interchangeable and quick-detachable wheels are almost as necessary with straight-sided tires and quick-detachable flange wheels as with beaded-edge tires; at all events, it is considered that the vast majority or motorists object to changing covers and tubes by the roadside, no matter how easily they may be fitted, if only because of the need for a certain amount of skill and muscular effort and the use of a pump. Detachable rims are not favored as an alternative.

This move of the Dunlop company in introducing a range of straight-sided tires will doubtless be followed sooner or later by other British tire firms, and there is good reason for believing that most of the cars at the next Olympia Show will have this type of tire.

# The Trailer's Place in Transportation Merchandising

## Part I

The attitude of truck manufacturers toward the trailer has changed in recent years. The problem of marketing the trailer, however, is not yet solved. The trailer may aid truck sales as an auxiliary hauling unit. This article and another to follow discuss trailer merchandising.

By H. W. Perry\*

**W**HEN the motor truck members of the National Automobile Chamber of Commerce, at their annual meeting in June, adopted a recommendation that pintle hooks for drawing trailers be adopted as standard equipment for motor trucks, they took a step that was highly significant. It was evidence of an important change in the attitude of the truck manufacturers toward the trailer and indicative of their recognition that trailers are going to be used more and more with motor trucks.

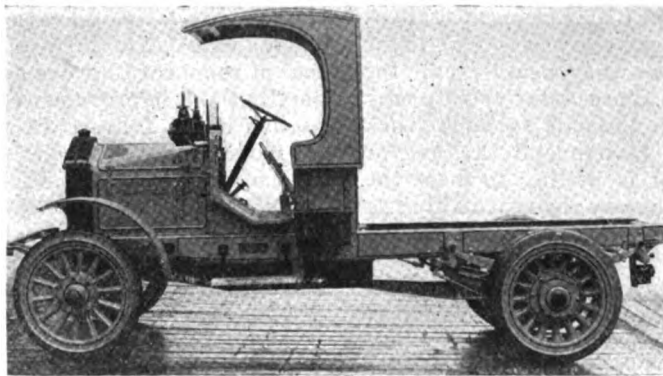
A few years ago the leading truck companies were opposed to the use of trailers with their standard trucks, and about seven years ago the truck committee of the chamber put itself on record in a resolution opposing the use of trailers with standard trucks except under the most favorable conditions. Engineer members of the committee maintained that the hauling of a trailer slowed down the speed of the truck, increased the consumption of fuel due to running in low and intermediate gear, and caused additional wear of mechanism and tires, so that any gain in increased load hauled was offset by greater operating expense and depreciation. Experience up to that time, perhaps, justified these conclusions. Trucks were less efficient and sturdy then than now, and trailers had not even approached their present stage of development; moreover, the experience of users was exceedingly limited and did not furnish a sufficient basis for a conclusive finding. This early opposition persisted, however, up to very recently. It is still felt by some truck makers and by the large majority of truck dealers. The dealers' lack of interest in or active disparagement of trailers arise from different causes, which will be dealt with later.

As recently as eighteen months ago one of the largest trailer companies wrote to the chief engineers of the most prominent truck companies asking for a frank statement of their attitude toward trailers, and in each case

received a reply that was more or less antagonistic toward trailer transportation. During the past year, however, the same company has had letters from practically all of the larger and many smaller truck companies requesting descriptive literature, operating cost data and leaflets for salesmen's handbooks. It has been evident for some time that a marked change in sentiment toward the trailer was developing, and the recent action of the N. A. C. C. confirms this publicly.

### Growing Co-operation

A number of truck companies already attach pintle hooks as standard equipment on their regular models, and about a score build short wheelbase trucks as tractors for drawing semi-trailers and pole, pipe or logging trailers. From time to time a truck company goes to a trailer manufacturer for advice regarding the production of such a tractor model. In fact, a highly desirable and commendable spirit of co-operation is developing between these two branches of the industry. This is as it should be, because the truck



Short wheelbase tractor for semi-trailers, with permanent cab and dual rear tires

and the trailer are both necessary units in economical highway transport and are interdependent; the trailer is useless without the truck and the motor truck is unsuited to certain kinds of work and is uneconomical under some hauling conditions without the trailer.

Formerly the truck interests were inclined to look upon the trailer as a competitor, believing that every sale of a trailer killed the sale of an additional truck, just as the railroads were of opinion that motor trucking cut into their traffic revenue. But as the railroads are beginning to see that motor trucks, by developing industry and commerce, are increasing the volume of the more profitable long-haul traffic, so the truck makers, by study of the situation, find that the trailer adapts the truck to new uses, makes it more profitable or economical for users and actually helps to create more sales.

The present depressed condition of general business is no doubt a powerful factor in drawing the favorable

\*Recently General Manager of the Trailer Manufacturers' Association.





Hauling uptake for 7500 ton ship with truck and four-wheel trailer in Philadelphia

attention of the motor truck sales managers and transportation engineers to the possibilities of trailers in their various types. The necessity of doing business on a narrower margin of profit than for many years past compels reduction of expenses in every direction, including the cost of haulage. If, by an installation of trucks or tractors and a fleet of trailers, a municipality, a lumber company, a haulage contractor or other business can do its hauling cheaper than with horses, a sale can be created for both types of vehicles where there would be no sale for trucks alone. It happens frequently that trailer salesmen develop prospects for an installation of trailers and are asked to recommend a make of truck or tractor for drawing them. In such cases they usually call for the co-operation of some truck representative. In any event, they naturally try to turn the sale to some truck company that is not afraid to recommend the use of trailers with its trucks and that is willing to meet the customer and trailer man half way by furnishing a suitable trailer coupling and the proper gear reduction for the work. As one trailer sales manager puts it: "The attachment of a pintle hook hitch as standard equipment on the rear of the truck indicates to the buyer that that particular make of truck has drawbar pull and that the makers are selling TRANSPORTATION as well as motor trucks. The successful motor truck manufacturer is going to be the one who can convince the purchaser that his truck will pull a load, in addition to carrying one." Says another trailer man: "I believe I am justified in saying that from now on the truck manufacturer cannot sell trucks as easily and with as little consideration of cost of operation as he has in the past. In consequence, the trailer will justly be considered a necessary adjunct to the truck in order to make truck operation economical."

#### Special Haulage Problems

Trailer manufacturers have given more thought and study to special haulage problems than the truck manufacturers and their sales organizations. The trailer is, indeed, a specialized product developed in its several forms to meet unusual conditions that were not fully or satisfactorily met by the truck alone. The trailer sales manager and trailer engineer, therefore, have a broad understanding of highway transportation problems. They cannot entertain any prejudice against the truck and are

always glad to co-operate with truck transportation engineers by supplying information and advice or suggestions. "Co-operation between the transportation engineers of the truck manufacturers and trailer manufacturers has been very good for the last two or three years and is constantly improving," says the general manager of a trailer company. "We have always felt that the truck engineers have co-operated with us, and we, of course, have with them. The ultimate gratifying results will no doubt be tangible very soon. And what I have said in regard to truck engineers and trailer engineers applies without modification to the relation of truck factory and trailer factory sales managers. There is a good deal of room for improvement along the lines of co-operation, but the improvement of the present time over what we had about four years ago is of great importance. I am looking into the very near future with a great deal of encouragement, visualizing a condition in which truck factory sales managers, district managers and even truck distributors will seek very close co-operation of our experts, and in a good many cases their advice, before they sell a complete truck installation. This view may be somewhat optimistic, but it is my conviction that, were it not for the fact that business is practically at a standstill in any line of endeavor, a great deal of this expected co-operation would right now be existing and working to the advantage of the ultimate buyer, who, after all, is the fellow that spends the money and must be served properly."

#### Sales Agencies a Problem

It is an open question to-day just how the trailer is going to dovetail into the truck business and by whom and how it is going to be marketed. Neither the truck makers nor the trailer makers have reached a satisfactory conclusion. The trailer industry is passing through much the same experience as the truck industry did in its earlier development, when it was found exceedingly difficult to effect sales through passenger car dealers and when exclusive truck agencies were unprofitable because of the limited truck market. In some respects the trailer business is analogous to the truck body business, but in the matter of selling it has to be conducted more nearly along the lines of the truck business, and is even more difficult.

The natural outlet for trailers should be through the

established truck dealers, who have all the facilities for conducting the business and have a good understanding of motor haulage, wide acquaintance with truck users, an intimate knowledge of the hauling requirements in their territory, and should be able to grasp readily the essentials of trailer transportation. Most of the trailer companies started their distribution on his assumption, and a large majority of trailer dealers to-day are established dealers in trucks. It has been found, however, that the truck dealer does not, as a rule, become an enthusiastic trailer man. In fact, he is less interested than the truck manufacturer. He finds that the problem of trailer transportation requires more study than truck transportation and that trailers are harder to sell because the trailer idea has to be sold to a prospect before the vehicle itself can be sold. The list price of trailers is much lower than on trucks, and, even with the same discount, the commission to dealers is comparatively small, so the dealer naturally prefers to make truck sales. Usually he has a considerable investment tied up in trucks and is anxious to turn his money over. The successful truck dealer and salesman are inclined to regard the trailer with some disdain and at best handle it only as an incidental side line. It has secondary place in their thoughts and, instead of taking a broad view of highway transportation and endeavoring to sell the equipment best suited to each particular job, they concentrate on the sale of trucks even in cases where the buyer would be benefited more by an installation of trailers.

The distributor under whom the dealer and salesman work contracts with the truck manufacturer for a stipulated number of trucks, usually for a period of one year. When times are good he cannot get enough machines to fill the demand and adjusts his sales and operating force to the volume of business to which the manufacturer limits him. On the other hand, when a reaction sets in and plenty of trucks are available but are harder to sell—a condition that has prevailed for the last twelve months—the distributor and the dealers make every effort toward moving the whole number of trucks for which they have contracted; consequently, the selling force has no time to give any attention to trailer sales. In such a situation they recommend trucks to purchasers who they know would be better served by trailers, but their problem is to move the trucks, and that is what they are doing. To make a success of trailer sales the dealer should put a salesman on the job exclusively. The passenger car dealers did not make a success of truck sales until they created a separate department for trucks and put truck salesmen on the job. And the truck salesmen had to be developed; it took a long time to convert a passenger car salesman into a good truck salesman, and it was often found easier and better to draw men from other lines of salesmanship instead.

### Trailer Selling Difficulties

The policy of marketing trailers through truck dealers meets another important difficulty. When the agency for a line of trailers is given to a truck dealer, the dealers in other makes of trucks in the same territory are very loath to send a customer for their trucks to a competing truck dealer to buy a trailer. Consequently, they

actively discourage the idea of using a trailer and to this extent become trailer "knockers." The psychology is perfectly obvious. On the other hand, where trailers are handled independently by an exclusive trailer representative there is no such objection.

Changed business conditions that have been brought about in the last twelve months may alter the attitude of the dealer, who now finds that the market for trucks has been oversold in many directions and that most owners of a number of trucks have from 25 to 50 per cent of their machines standing idle. There is little chance of selling these owners more equipment until the volume of their business increases to the point where all the trucks are used to capacity. When such revival has occurred, it is almost certain that the owners will consider much more carefully than heretofore the initial investment and subsequent operating expenses of new equipment and will be very attentive to arguments in favor of trailers. The dealer or the manufacturer who can show how an installation of trucks or tractors and trailers will cut down the hauling cost will be most likely to get the new business and in many cases will be able to supplant whole fleets of old and inefficient trucks.

It is admitted in the trade that many trucks sold to date were badly sold; that they are not giving the best and most economical service because they are not suited to the kind of work they are doing. These will be the first to be replaced, and tractors with semi-trailers or pole, pipe or logging trailers will be substituted because they can handle double or triple the tonnage in one load, can haul material or objects of unusual length or awkward size and weight, or can save idle time during loading and unloading operations.

In other cases smaller power units and medium-sized, four-wheel trailers will displace trucks of 5 to 7½ tons' capacity because of legal restrictions against excessive weight and because the trailer will take care of occasional overloads, while the smaller truck can handle the normal work more cheaply than the large truck operated with 50 per cent capacity loads.

### Studying Transportation

Just now the field of sales possibilities has to be raked with a fine-toothed comb to find worth-while prospects. Then some very convincing facts must be presented to lead up to a sale. The most likely field of endeavor is among lines of business in which horses are still used largely and for which the motor truck is not well suited. These trades need painstaking study and analysis, which the truck dealer who has not made a thorough study of highway transportation in all its phases, and particularly of trailers, is hardly competent to make. In such cases the dealer calls on the truck factory for assistance and the factory transportation engineer is sent to make an investigation and recommendations as to the proper equipment for the work. If analysis indicates a need for trailers, a trailer man may be called on for co-operation before the sale is consummated. Thus the factory is necessarily closely tied up with many retail sales, even though it has a complete system of distribution through branches, distributors and dealers.



Tank truck hauling four-wheel tank trailer, used for oil distribution. Trailer can be uncoupled and left at service station to be emptied while truck goes on to next delivery point

# Demonstration Shows Tractors More Economical

The average cost per acre of preparing soil for sowing was 57.20 cents by horse outfits as against 16.72 cents for kerosene tractors—the best six tractors averaged 12.8 cents. Other results obtained are not very complete, while the oil consumption figures present special difficulties.

By David Beecroft

**O**FFICIAL results of the three-day tractor demonstration held at Fargo, N. D., June 28, 29 and 30, have been issued by the committee of the National Implement and Vehicle Association having the work in charge. The issuance of the report was delayed because the horse outfits which were competing with the tractors had not completed their work until some days after the tractors had finished theirs. The demonstration consisted of each tractor plowing and cultivating a 10-acre tract of land in the black, level, gumbo areas adjacent to Fargo, N. D. The temperature was very high, the thermometer registering over 100 deg. Fahr. during the day, which made it particularly hard on the twelve horse outfits, seven of which withdrew. Of the thirty-seven tractors that competed, one was disqualified due to breaking a gear.

The results are not very complete and show only the numbers of gallons of gasoline or kerosene needed in plowing and cultivating per acre, and also the time required to do the work. The figures are not given for individual tractors, but only averages for all tractors. There were thirty-six tractors that completed the demonstration, and of these twenty-five burned kerosene and eleven burned gasoline.

## Fuel Consumption

The average fuel consumption for the twenty-five that burned kerosene in plowing 10 acres each amounted to 3.01 gal. per acre. Kerosene was worth 11.8 cents per gallon at Fargo, so that the kerosene cost per acre was 35.518 cents. To this should be added gasoline which was used by them in starting. Approximately .12 gal. per acre of gasoline was used, which, at a cost of 23.1 cents per gallon, gives a cost per acre of 2.772 cents for gasoline. Adding this to the kerosene cost gives an average of 38.29 cents per acre for fuel for the twenty-five kerosene-burning tractors.

The cost figures for the eleven tractors which burned gasoline showed that they used 2.77 gal. per acre in plowing, which, at 23.1 cents per gallon, gave a total cost of 63.987 cents per acre. It will be noted that the average amount of gasoline was less than kerosene, but the cost of gasoline being approximately double that of kerosene made the cost per acre approximately double.

It must be borne in mind that these figures represent average fuel consumption of the twenty-five kerosene-burning tractors in one case, and the eleven gasoline-burning tractors in another case. Two other sets of averages were given in the report, as follows:

A—The average of all of the tractors constituting the

better half of the group, those that would be above the average figures already quoted.

B—The average of the six tractors giving the lowest fuel performance.

The figures for the A group show considerable improvement over the average of all the tractors, in that the best half averaged 2.87 gal., compared with 3.01 for the first. This gives a fuel cost per acre of 36.24 cents, as compared with 38.29 cents per acre in the general average.

When the B group is considered—that is, the fuel economy per acre of the six best performing tractors—greatly improved results are shown, the average kerosene fuel consumption being 2.51 gal. per acre, instead of 3.01 gal. per acre for the entire group. The fuel cost per acre plowing by the six best performers was 30.56 cents per acre, with kerosene used as a fuel and gasoline used for starting purposes.

The three averages summarized as follows:

	Cost per acre
No. 1—General average (kerosene).....	38.29 cents
No. 1—General average (gasoline).....	63.98 "
No. 2—Best half average.....	36.24 "
No. 3—Best six average.....	30.56 "

## Oil Consumption

Figures on lubricating oil consumption were given, but AUTOMOTIVE INDUSTRIES greatly doubts the value of such figures, due to the difficulty of getting figures on engine oil consumption that admit of comparison with engines where different lubricating systems are used. There is also the difficulty of accurately measuring oil consumption over such a short period, while the problem of crankcase dilution is a factor that should be considered in connection with lubrication consumption report.

After each tractor had plowed its 10 acres it was required to cultivate and seed by means of disk harrows, spike-tooth harrows, seed drills and in some cases other farm equipment. This work was done immediately after the plowing was completed and a record was kept of the fuel used and the length of time required. For the four divisions given above the cost figures for fuel are:

	Cost per acre
No. 1—General average (kerosene).....	16.92 cents
No. 1—General average (gasoline).....	29.56 "
No. 2—Best half average.....	16.11 "
No. 3—Best six average.....	12.60 "

This summary shows that the best six had a fuel consumption at least 25 per cent better than the average of the twenty-five in No. 1 classification using kerosene.

The committee in charge endeavored to give some report on the time required in doing the work, and the

figures were given out in the form of man-hours per acre, that being an effort to arrive at the man-cost plowing per acre as compared with plowing per acre by horses. In the four classifications the number of man-hours per acre are given in the following tabulation, and the man-cost per acre reckoned on a wage of 40 cents per hour is also given:

	Man-hours per acre, plowing	Man cost per acre, plowing, cents
No. 1—General average (kerosene) .....	.94	37.60
No. 1—General average (gasoline) .....	.95	38.00
No. 2—Best half average.....	.95	38.00
No. 3—Best six average.....	.84	33.60

On a basis of a 10-hour day this puts the workman's wages at \$4 per diem.

Owing to the information not being given out as to the number of plows drawn by the six best tractors in the No. 3 group, it is not possible to arrive at conclusions as to whether the six best were machines pulling three, four, six or eight plows. The only figures are averages.

The report gives some figures on the five horse outfits, each of which plowed and cultivated 10 acres. Unfortunately, the figures are not given separately for plowing and cultivating, so that no comparisons can be drawn with the tractor classifications. They show the amount of hay and oats needed by each horse outfit and the number of man-hours for plowing and for seeding.

The horse outfits required 2.64 man-hours per acre, which, at 40 cents per hour, gives \$1.056 man-cost per acre, as compared with 33.6 cents by the best six tractors.

The cost of preparing the soil for sowing the seed and seeding, as based on a man-hour record, and labor at 40 cents per hour, shows that the cost per man-hour for the six best tractors is 12.80 cents, as compared with 57.20 cents by horse. Each horse outfit consisted of six horses. The tabulation for the different classifications is:

	Man hours per acre	Cost per acre
No. 1—General average (kerosene) .....	.418	16.72 cents
No. 1—General average (gasoline) .....	.43	17.20 "
No. 2—Best half average.....	.42	16.80 "
No. 3—Best six average.....	.32	12.80 "
Horse Outfit average .....	1.43	57.20 "

## Removal of Glue Stains

ACCORDING to the Forest Products Laboratory, casein and vegetable glues containing caustic soda produce stains on certain kinds of wood, notably the oaks, maple, cherry, elm, ash, birch and beech. Some glues stain the wood more than others, and those that contain the most alkali are likely to be most injurious. The staining is due to the action of the alkali in the glue on the tannins and other constituents of the wood, whereby a substance related to ink is formed. No means have yet been found of preventing this chemical action. Precautions can be taken which will keep the discoloration from the finished surfaces.

The most trouble with glue stain in woodworking is caused by the penetration of the glue solution through thin face veneers. This seepage is very likely to occur if the veneer is less than 1/20 in. thick and somewhat porous. The consistency of a glue in part determines whether it will be squeezed through the wood or not. It is quite obvious that under similar conditions a thin glue will penetrate farther than a thick glue. For this reason the quantity of water that is added to a glue might be diminished and "fillers" added when staining is feared. The amount of pressure exerted by the panels in the press is also a factor, but it would not be advisable to reduce the pressure in order to check the flow of the glue.

If a panel is dried promptly, the caustic-soda solution will have difficulty in coming to the surface. Rapid drying can be brought about by removing the panels from the press as soon as it is safe to do so, and placing them on stickers. The amount of staining can also be decreased somewhat by placing a caul or some other flat object between adjacent panels in the press.

Casein and vegetable glue stains can be almost entirely removed by sponging the stained surface with an oxalic acid solution, prepared by dissolving one ounce of oxalic acid crystals in about twelve ounces of water. Still better results can sometimes be obtained by moistening the wood first with a sodium-sulphite solution made up in the same concentration as the oxalic acid. In this way very stubborn stains can be almost obliterated.

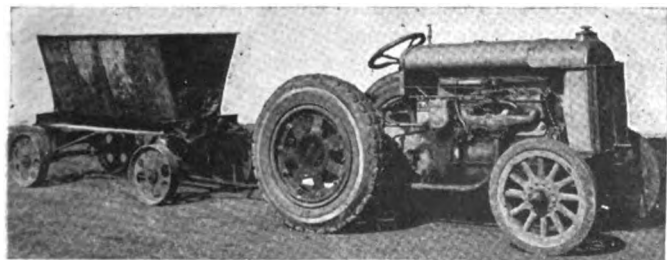
## Small Motorcycle Performance

THE Tourist Trophy races constitute the major motorcycle event of the year in Great Britain. The features necessary in a machine to win one of these races include acceleration, ease of control, efficient braking, reliability and, last of all, speed. There are two classes, Junior and Senior, and the races are run over a typical road course. The Junior machines are limited to 350 c.c. and the Seniors to 500 c.c.

This year the Senior race was won by a Junior 350 c.c. machine running in the Senior class. Commenting upon the significance of this result, the *Motorcycle* says editorially:

"Many consider that the 500 c.c. machine is at a disadvantage on such a tortuous course, and that the race is not won on sheer speed on the level, but upon corner work. Be that as it may, the winner was in no sense a reckless rider, and, possessed of a mount which held the road magnificently, he was able to prove what we suggested after last year's Senior race, viz., that the present limit of 500 c.c. might reasonably be cut down to 350 c.c., Junior machines to 250 c.c., and genuine lightweights to 200 c.c. without loss of speed.

"After all, as we have long argued, if we gain anything by the T. T. it is in efficiency from a given capacity, and instead of piling on weight to cope with the increased speed attainable, and producing heavy solo machines (some scaled over 300 lb.), the natural course seems to be gradually to continue the restriction of engine "c.c.," and so gain the advantage of greater engine efficiency by reducing weight. Many question whether the ideal solo mount is a machine of 80-m.p.h. caliber scaling 300 lb.; yet that was a fairly common specification of Senior machines. Speed is only of real value when opportunities for its employment are available."



Fordson tractor equipped with pneumatic tires used for hauling various equipment at one of the plants of the U. S. Rubber Co.

# The Value of Foreign Trade as Hoover Sees It

In times when production capacity is greater than domestic needs, export sales should be measured by the buying power so given to those persons employed to produce these goods. Some workers are probably saved from poverty. Automotive export notes.

**S**OME highly interesting remarks on the general subject of export trade are found in an address by Herbert Hoover, Secretary of Commerce, at the National Shoe and Leather Exposition and Style Show at Boston. A few paragraphs from this address are quoted here:

There is a feeling of some uneasiness and even of pessimism regarding the future of our foreign trade in which I do not participate.

Our exports and imports during the last few months have dropped nearly 50 per cent in value from the high-water mark of a year ago. Some of this decrease is due to the fall in prices relatively more than volume; some of it to the temporary world depression, and some of it lies deeper.

In these times of troubled minds we find much conflict of opinion as to the situation and its remedies. Some extreme groups insist that inasmuch as our exports comprise but 10 per cent of our total production, therefore our foreign trade bears only this ratio to our economic life, and that consequently our true course is to forget it and to devote ourselves to healing our internal economic wounds. Other extreme groups consider that for our internal situation the only remedy is restoration of our export trade and they would undertake desperate measures to accomplish it. In either case we must not allow the present extreme industrial depression to obscure our view. We have passed through several depressions since the Civil War, and we have already turned the corner of this one.

The importance of our foreign trade requires but little defense. I may say, in passing, that our whole standard of living greatly depends upon our imports, and that our exports are the great balance wheel for our production. Exports are vital to the stabilization of our industries, of price levels, of wages and of employment. While our exports do cover but a small per cent of our total production, on the other hand they do comprise a large percentage of the production of certain industries. For instance, we generally export 20 per cent of our wheat, 60 per cent of our cotton, 75 per cent of our copper, not to mention others. **Unless we find a market for the surplus production of our great industries, we shall continue to keep some twenty-five millions of our people in reduced buying power.** We might even drive them into poverty—during the many years that would be required to shift the whole basis of our internal production. Nor does a nation become rich by its exports alone—but by its trade.

While many of the causes of the present depression lie within our own borders, yet there may be no recovery from these hard times for many years to come if we neglect our economic relations abroad. Even if we lower our vision of civilization in this crisis solely to our own

selfish economic interest, we are yet mightily concerned in the recuperation of the entire world. **The hard times that knock at every cottage door to-day came from Europe. No tariffs, no embargoes, no navies, no armies can ever defend us from these invasions.**

**Our sole defense is the prosperity of our neighbors and our own commercial skill. The recovery of our foreign trade can march only in company with the welfare and prosperity of our customers.**

As to our manufactures containing a large element of labor cost, in which we do not enjoy special advantages, we must look out and take measures of our own. We can no doubt devise tariff measures that will protect our domestic market. But if we are to hold to our foreign markets in this vast group of our manufactures, and thus to keep our people employed, we have several things to attend to.

**Fundamentally, we must get our production costs down. That lies only along the road of increased efficiency in our whole industrial machine. It means a willingness of our working people to put forth every effort that is in them consistent with health, proper family life and good citizenship. The surest road to a continued high wage, and the surest safeguard against unemployment is to remove every restriction on effort. This must extend from our mines to the railways, to the factories, to the wharf and to the ship. It means smaller margins of profit.**

It means that ultimately we must have much lower transportation rates. It means we must have better organized marketing machinery abroad under Americans themselves. It means the establishment of adequate short-time credit machinery and much more care in foreign credit risks than our merchants have shown in the last twelve months. It means elimination of the great wastes in industry. For instance, in the Atlantic seaboard area alone, by the development of these great water powers and through economies by electrification generally, we could profitably save 30,000,000 tons of coal per annum if we had the courage to go at it. It means the Government must remove as quickly as possible those unnecessary domestic burdens upon commerce to which the Government is a party by the reorganization of our tax system, the settlement of the tariff question, the reduction in Government expenditure through the reorganization of the Federal Government, through reduction of armament and through reduction of Shipping Board losses and by the settlement by the Government of the outstanding claims of our railways.

It means we must cease trying to drive American ship owners off the sea with tax-paid shipping losses. We must carefully determine what particular trade routes



we will maintain in development of our commerce over a period of years, and let our merchants know them. It means the Government must provide such information to commerce and industry, from both at home and abroad, as will enlarge its judgment. It means we must extend scientific research into the problems of waste, the perfection of processes, the simplification of methods that are beyond the ability of one manufacturer acting alone, and we must co-operate with industry to perfect these things. I am confident we can hold our markets, our higher standards of living and of wage if we will all put our backs into it.

In summary, on the production and marketing side of our commerce, we can say that our food exports should remain on a greatly enlarged scale; that the demand for our raw materials should slowly increase toward pre-war amounts; that in respect to our manufactures we should be able to hold special fields of repetitive production and ingenuity; that we will need to make a fight to hold the markets for manufactured goods where we come more directly into competition with the European manufacturer, but that we can do it if we will work and apply our brains to it. On the financial side of our situation, I do not believe our world credit situation is at all so insurmountable or that it requires extraordinary solutions.

#### As to Paraguay

Steady growth in the use of automobiles in Paraguay, one of those interior countries of Latin America which so often is seldom considered by export managers as offering an outlet for sales, is shown in a report to the Bureau of Foreign and Domestic Commerce by Vice-Consul George E. Seltzer at Asuncion. The mayors of the five most important cities in Paraguay have given the number of cars in their localities as of Jan. 31, 1921. The reports are Asuncion, 384; Villarica, 12; Concepcion, 40; Pilar, 4, and Encarnacion, none. It was estimated that at least 95 per cent of these are of American make.

#### If You Sell in Britain

A man who has long been interested in the merchandising of cars in Great Britain recently wrote to AUTOMOTIVE INDUSTRIES:

If it was my duty to instruct the American exporter of cars for the British and Colonial markets I would draw up a specification of requirements on these lines—bearing in mind that a compromise would be necessary to combine the requirements for two markets—domestic and foreign—which must of necessity be dissimilar and varying.

Gross weight with two- or four-seater body not to exceed 1500 lb.

Starter optional, but provided for.

Magneto ignition optional, but available also as dual with standard accumulator and coil set; variable timing.

European type of carbureter. Auto-vac or gravity feed optional.

Engine a "four" or "six," preferably the latter, en-bloc cylinders—not exceeding 2¾ in. x 5 in., with loose head, overhead valves with all inclosed valve-gear, light pistons, gravity cooling with provision for a circulator or impeller (not a centrifugal pump) for Colonial use, simple pump-assisted lubrication with more efficient details, and able to displace a large volume of oil, if required, for hot colonies; also a three-bearing crankshaft.

Three-point suspension and one-piece construction of engine, clutch and gear box, with ready access to the clutch for independent removal—this would entail a

longer and half-open clutch pan and housing than with present unit construction.

A four-speed and reverse gear and 4½-to-1 axle gear (spiral-bevel) ratio, axle gear removable from the back of the casing. Axle gear ratio of present American popular cars is a trifle too long.

Pressed metal axle casing and torque tube, no reliance on springs for drive thrust or torque.

No internal or sub-frame to chassis frame.

Double rear hub, side-by-side interchangeable brakes. Better steering than is usual with cheaper American cars.

Better grade body work as regards doors' fit and the depth of squabbing and seating, and details at large, including lamps. These and other details should be copied from a standard British light car, but with more leg room than average of British and French light cars.

Alternative model with two-, three-seater body—very popular among doctors and travelers, but must be roomy and well ventilated without being draughty. Latter remark applies also to open touring body.

Better grade radiators of cellular or film type than is sent here on cheaper cars.

Suspension quarter-elliptical throughout.

Gross or retail price in Britain not to exceed £250, or \$1250, at normal rate of exchange.

Commencing April 9, the Polish Government permitted the importation of passenger cars, upon which the customs duty is 13,500 Polish marks per 100 kilos (220 lb.) of weight. This report was made to the Bureau of Foreign and Domestic Commerce by Trade Commissioner Van Norman at Warsaw. Motor trucks, which have not been excluded, now take a customs duty of 300 Polish marks per 100 kilos.

#### Market in Algeria

A correspondent of the London Times Trade Supplement has drawn attention to the good prospects for motor vehicles in Algeria. He gives the following figures in support of his statement:

Number of vehicles recorded as actually in use at the end of March last 10,553, of which 8764 were cars, 1317 trucks, 310 omnibuses and 162 motorcycles. At the end of 1919 the total was only 8000.

In normal times Tunis and Morocco constitute good markets for motor vehicles, though they do not reach the importance of the Algerian market. About 2000 motor vehicles are at present in operation in Tunis, of which 1760 are cars and 165 lorries. Generally speaking, strong and simple machines are preferred of 8 to 15 hp. with four to five seats. Prices should be moderate.

It has to be pointed out that whilst French cars enter Tunis free of duty, foreign makes are heavily taxed. Consequently most of the cars in use are French. Next come American, Italian and British.

French Morocco is a market for 6000-7000 lb. trucks, which, however, must have large fuel tanks, and be sent out well supplied with spare parts; their mechanism must be simple and easily accessible, as, in most cases owners must carry out their own repairs, and the radiator should have a large cooling surface on account of the heat in the summer time. Particular attention should be paid to strengthening all parts likely to be affected by indifferent road surface.

One hundred fifty-four thousand seven hundred automobiles enter and leave New York every day.

Four hundred twenty thousand passengers arrive in New York by automobile daily.

# Remarkable Hangar Built for the Navy's Two Dirigibles

This building, with doors 170 by 264 ft. has some amazing features and is expected to serve as a model for docks for this sort of aerial conveyance. The measurements are: Length, 803 ft.; width, 264 ft.; height, 190 ft.

**T**HE U. S. Navy Airship Hangar at Lakehurst, N. J.—America's first great terminal for the giant airships which may be a common sight in this country within the next few years—is practically completed. It is the largest structure of its kind on earth, being 803 ft. long, 264 ft. wide and 190 ft. high. Set down in a city it would occupy three blocks. The doors at each end are more than 170 ft. high and are 264 ft. wide. A sixteen-story skyscraper could be pushed into the shed through the space disclosed by the doors when they are opened.

Rising from the Jersey flats, it presents an amazing spectacle to one on the ground. Observation platforms on the roof command a view of the Atlantic, 7 miles distant. In another direction, equally as far away, the fashionable summer resort of Lakewood can be seen clearly; while in the near vicinity the last of the 1400 acre reservation is being cleared to provide workshops, shelter and transport facilities for the 800 enlisted men and 500 civilian employees who will be required to man the hangar and care for the two great airships which it will shelter.

The airships are the Z.R.-1 and Z.R.-2, the former being built at League Island Navy Yard, Philadelphia, and the Z.R.-2, now undergoing trials in England. The hangar will be completed before the scheduled trans-Atlantic flight of the Z.R.-2 in August. The airships are each 700 ft. long and 85 ft. in diameter. They are as large as the great ocean liners. Capt. W. A. Moffett, Chief of Naval Aviation, an ardent believer in the future of aerial transport, is of the opinion that commercial aviation will receive considerable impetus from the operation of the Navy dirigibles and their terminal. Accordingly, all preparations at the Lakehurst hangar are with a view toward establishing facilities and conducting experiments which will aid commercial transport, and at the same time keep the public informed concerning the progress in the development of lighter-than-air craft.

In addition to the great hangar, the Navy plans to erect a mooring mast to which the big airships may be tied outside of other shelter. The mast will be so constructed that the giant ships will be moored bow on to the mast, and will swing in the direction of the wind, thus avoiding the dangerous forces exerted by high winds. The Navy contemplates also the erection of other mooring masts throughout the country, such as St. Louis, Kansas City, Chicago, Denver, San Francisco, Seattle, New Orleans, Atlanta, Columbus, Ohio, and San Diego, Cal. These will be based on results of experiments with the Lakehurst mast.

To-day the hangar is so nearly completed that Captain Moffett has assigned Comm. R. D. Weyerbacher, of the Bureau of Construction and Repair, and lighter-than-air expert for the Navy, to supervise preparations for receiving the Z.R.-2.

The doors of the hangar constitute the chief engineering

problem. Each leaf is made up of 800 tons of steel and corrugated asbestos. There are two leaves on each end, opened by sliding parallel with the front of the shed. Only they do not slide. Instead, they are supported on concrete trucks, which in turn rest on wheels the size of those on a freight car. Similar trucks set out from the doors and parallel to them support huge steel girders braced against the top steel framework on the doors, and acting as braces against heavy winds which sweep through the great shed with the ferocity of a gale. High winds would blow the doors apart if they were not properly braced, engineers assert.

Like the doors, the entire siding of the shed is corrugated asbestos, arranged in strips alternating between gray and two shades of brown, so camouflaging the shed as to break up its outlines and making it impossible for a hostile observer to identify it from the air.

Besides the railroad running lengthwise through the hangar, there are three trolley slots which are known as docking rails. The dirigible about to enter the hangar will be fastened by cable to these rails, which extend on a 1500-ft. runway at either end. Anchored to the rails, it will be a simple matter to guide the leviathans of the air into their berths.

Under the roof, among the network of steel rafters, five monorail cranes support movable platforms which enable the workmen to repair the airship after it is docked. The rafters are so far from the floor that a human voice cannot be heard. Workmen become mere specks as they move along the "cat-walks" which criss-cross the arches at dizzy heights. More than 16,000,000 lb. of steel have been used in the framework.

Supporting this are series of nine trusses forming arches. They are the largest of their kind, and are arranged in pairs. These iron girders are 172 ft. long.

The entire hangar is as fireproof as possible. The concrete floor is covered with asphalt to prevent falling tools striking sparks and exploding the gas, and, incidentally, to maintain warmth. The heating is entirely beneath the floor, distributed through three tunnels beneath the floor level. Wiring, wherever possible, is on the outside of the shed. The powerplant is located some distance away, as is the gas plant, which will have a daily capacity for manufacturing 75,000 cu. ft. of hydrogen gas, later to be increased to 100,000 cu. ft. capacity.

Searchlights on two diagonal corners of the hangar will guide the dirigibles at night. On the other two corners are flood lights which will illuminate the field to the extent of 20 acres. Sunken lights arranged like crosses have been installed at the end of each runway, also to facilitate landings at night.

A 25-hp. electric motor is used to open each leaf of the doors. It performs the work of some 1500 men who would otherwise be employed at great loss of time in dragging the doors away from the entrance.



## Power Required for Car Operation

*Editor, AUTOMOTIVE INDUSTRIES:*

This talk on operation on closed or nearly closed throttle is very much misrepresented. Based on operating a car in the city of New York there is some basis of truth, but for average conditions the idea that a car is operated on nearly closed throttle a majority of the time is truly rot. Under ordinary conditions the average car will do at a maximum about 45 miles per hour. This, under good conditions of level road and in the average shape that the usual owner keeps his car.

Now on usual road work I find in long distance running the average is around 25 to 30 m.p.h. or about two-thirds of the maximum.

In shorter runs quick acceleration and hill work take momentarily full throttle which brings up the average of power required.

While it is not my contention that a motor is run anything like constantly on a wide open throttle, the assumption that it is being run on the average from 75 to 90 per cent on nearly closed throttle is a pure fake.

I am not guessing at the above but base what I have said on my own actions combined with what I have noted on the road for many years.

GEO. M. BROWN.

The terms part throttle and part load are sometimes used interchangeably, but are by no means the same. When, for example, we speak of one-quarter throttle, we sometimes mean that the throttle valve has turned through one-quarter of its maximum angular motion, sometimes that the throttle lever on the steering wheel has moved one-quarter of its maximum motion on the quadrant, sometimes that the area by the butterfly valve is one-quarter of the area when the valve is wide open, or sometimes that the power developed is one-quarter of the maximum developed at the same speed when the throttle is wide open. As a matter of fact the power depends, other things being equal, upon the area by the throttle valve and the speed of the engine. For example, when the throttle is one-quarter open the engine may, at low speed develop 90 per cent or more of the power it is capable of developing at that speed, whereas at high engine speed and the same opening it may develop 25 per cent, more or less, of the power it is capable of developing at that higher speed. For these reasons it is necessary to be quite specific when we discuss part throttle operation.

If, however, our correspondent means that cars are not operated at least 75 per cent of the time at less than one-quarter load we are much inclined to disagree, for there is ample experimental evidence to the contrary. For example, a certain American car weighing about 4800 lb. and equipped with an engine of 295 cu. in. displacement, geared 4.5 to 1, requires\* the following b.h.p. to propel it on the level: 2 b.h.p. at 10 m.p.h., 5 at 20 m.p.h., 8 at 30 and 15 at 40. At the equivalent engine speeds the engine develops at wide open throttle the fol-

lowing b.h.p. 15, 32, 48, and 62 respectively. Consequently the per cent of full load at which the engine runs is as follows: 13 per cent at 10 m.p.h., 16 at 20, 17 at 30, and 24 at 40. It will thus be seen that at speeds under 40 m.p.h. the power required to propel this car at constant speed on a level road is always less than one-quarter of that the engine is capable of developing at the corresponding speed. Similar conditions will be found to apply in case of other cars.—EDITOR.

## Radial Air-Cooled vs. Other Types of Aircraft Engines

*Editor, AUTOMOTIVE INDUSTRIES:*

I note that Mr. Heron takes exception to my statement that "air-cooled engines were made in the radial form for cooling reasons rather than aircraft requirements." I do not believe his objection is really justifiable in the light of practical experience to date. In his letter, Mr. Heron refers to the British RAF-4A air-cooled Vee-engine as an example of what can be done in constructing air-cooled engines in other than the radial or rotary form. According to the best information in my possession the engine weighed 4.17 lb. per b.h.p. hour, had a fuel consumption of 0.68 lb. per b.h.p. hour, and an oil consumption of 0.067 lb. per b.h.p. hour. While these figures can undoubtedly be and probably have been improved on in other engines of this type, yet, the horsepower, weight, ratio and economy figures given, as compared with water-cooled engines, leave a great deal to be desired.

I wish to go on record as being a firm believer in the future of the air-cooled aircraft engine for certain purposes, and it is my conviction that the radial type offers the best field for development. I see nothing in the Vee type of air-cooled engine to commend itself except a reduction of resistance which in itself is open to question. The air-cooled radial engine has advantages in ease of cooling, ease of mounting, accessibility, compactness and possibilities in weight reduction, which to my mind would more than offset any slight increase in resistance as compared with the Vee-type of air-cooled engine.

Summing up, I think now, as always, that air-cooled aircraft engines will be used extensively in the future, and that of the three types, radial, rotary and Vee, so far constructed, the former has overwhelming advantages and deserves the greatest encouragement in development.

J. G. VINCENT,  
Vice-President of Engineering,  
Packard Motor Car Co.

**T**WO members of the Weights and Measures Division of the Bureau of Standards have recently visited several important gear manufacturers to obtain first-hand information as to the manufacturers' requirements in testing and measuring gears, gear cutters and hobs. Sufficient information was obtained to start the design of a machine for measuring the important elements of gears and gear-cutting tools.

\*See paper by A. L. Nelson printed on p. 162 of AUTOMOTIVE INDUSTRIES issue of Jan. 27, 1921.

# The Significance of the British Coal Strike Settlement

The provisions of the British coal strike settlement show practically nothing that could not have been agreed upon before the strike. Demand for larger voice in management likely to follow. No one is satisfied; a temporary compromise is apparently all that has been achieved.

By Harry Tipper

**T**HE final ending of the coal strike in Great Britain and the terms which have been agreed upon make it valuable to examine the character of this strike and the advantage secured by the workers, if any, to offset the amount of money lost and the net future revenue foregone in order to jockey for political advantage. Before the strike had been called, the government agreed to carry its subsidy for a sufficient length of time to enable the industry to swing over without undue hardship to the workers. The owners agreed to the profit-sharing principle, although the details were not worked out. The miners have secured in the adjustment of the strike practically nothing more than this allowance, except that the methods of profit-sharing have been worked out more completely in detail and provision is made for the supervision of the accounting in such a way that the workers' interest will be conserved.

The great principle of a national pool about which the miners made so definite statements is not included in the terms of settlement, the settlement being left to the various districts in accordance with their local conditions of settlement. This means that the local inequalities in wage will continue, and the local inequalities in profit on the profit-sharing basis will probably accentuate the individual character of the mining problem.

When due consideration is given to the desire on both sides to use the present situation for the pressure of advantage, the futility of uniform national machinery for the settlement of individual questions is very clearly shown.

The strike lasted about three months. How much it has cost Great Britain cannot be computed, because it will be many years before the total cost can be estimated. In the actual stoppage of industry the cost will run into the hundreds of millions of pounds.

The final settlement has secured no advantage for either side not suggested in the preliminary conferences before the strike actually occurred.

The only feature in the settlement worth considering at all is the extensive character of the profit-sharing agreement, affecting as it does all the workers in one of the basic industries. No experiment in profit-sharing of this magnitude has been attempted and there are no indications of its success in changing the situation.

Separate establishments do not make the same amount of money as profit, and this profit-sharing system adopted at the conclusion of the coal strike in Great Britain will lead to inequalities in the final rewards of the workers, due to the usual inequalities in the profits secured.

The miners have been very insistent upon a national wage and a uniformity of that wage. The present settlement does not lead in the direction of that uniformity, so that it does not lead in the direction in which this union organization has been moving for some time.

The miners have not shown disposition to accept any reductions in wages nor any reductions in their rewards, irrespective of the economic position of the industry and the effect of their demands upon the profits. There is nothing in the past history of the actions of the miners' unions that would indicate their willingness to base their reward upon the economic position or the profits to be secured in the industry. The present settlement indicates that a portion of their reward is to come from their share in profits. Whether they will expect to govern the prices in order that profits may be shown or whether they will accept the ordinary losses that occur from time to time in such a business is a matter for the future. Profit-sharing schemes have failed before now because the workers have not been willing to accept their share of the losses, and the disposition of the coal miners in their union action has not indicated any willingness on their part to accept such a situation.

A further question is likely to arise in connection with this powerful union and that is the question of their voice in the management of the mine properties. In some of their earlier demands they included the demand for a voice in the management, and this demand has not been less insistent than the other demands they have made. The present settlement does not carry any statements as to the management except those relating to the joint inspection of books, etc.

It would not be surprising if the present settlement led to a further demand for a larger voice in the management of the affairs of the mine properties, particularly as the profits will depend considerably upon the increased efficiency of mine operation.

Meantime there has been an increase in the standard wage and government provision for relief during the period of change. This last amounts to a government subsidy for the mine workers for a limited period.

The national pool and the national wage were political objects of the labor leader necessary to the continued growth of labor union power among its own members. Without nationalization of industry, labor unionism carried to the extent to which it has been in Great Britain has no object and cannot continue its development. It is based upon a program of uniformity, standardization and, therefore, of national agreement, and, finally, of nationalization.

Profit-sharing as secured in this settlement will not further the object of the labor union leader in this field unless such profit-sharing leads to a larger control of the management of the properties themselves. It emphasizes the difference where the object of the leaders has been to develop a common uniformity.

The uniform wage is a necessary part of the program for the continued development of labor union power and the control of production must be included in the objects, if the workers' organizations in Great Britain are to continue their growth along present lines.

These articles have pointed out many times the political aspect of the labor union movement in Great Britain, and the impossibility of securing any permanent settlement of industrial questions by means of these union developments.

It is significant that some of the leaders of the miners have stated that this is the last chance of peace in the coal trade under private ownership. This very statement would indicate that it is not a permanent settlement in the minds of the union leaders. They have accepted it under the conditions and with a faint hope that it may work out.

There is no evidence that the leaders are in full accord with the settlement or that they have abandoned their ideas on nationalization of mines and the development of a national wage system.

No part of their political program has been dropped in providing this settlement, although a good deal of it has been deferred until this particular compromise is given an opportunity to work out.

The very fact that the strike was allowed to go for three months and then settled on the basis previously suggested indicates that the settlement was made not because the objects of the strike were attained, but because the leaders felt that it was necessary to abandon the strike and to compromise upon any reasonable basis for the time being. The present settlement, therefore, does not satisfy the political desires of the labor party, nor the union objects of the miners. Its hope of success, rather, lies in its provision of opportunity for the individual worker to secure a reward based upon the value of the business and the individual advantage arising from the inequalities still existing in the settlement. This settlement, in fact, is a test of the strength of union organization among coal miners in many ways. If the union program is supported by a majority of the mine workers, this settlement would represent nothing more than a temporary compromise, accepted because it was necessary, but without agreement.

If the miner's interest in his own welfare and the maintenance of his local operations becomes of more visible importance to him under this settlement than the objects of the union, the power of the union to continue

its further program will be lessened to that degree and the present settlement may become the basis of a future agreement.

None of the other important parties to the settlement are entirely in accord with its terms. The liberal middle-class opinion, as represented by the Manchester "Guardian," is distinctly doubtful of the outcome, and the owners have made the settlement without the feeling that the plan itself is one with which they can fully agree.

The main points in the agreement are given so that the terms of the settlement may be understood, and are as follows:

National and District Wages Boards to be established, with equal representation of both sides and independent chairmen.

District wages to be in the form of a percentage upon the district basis rates, periodically adjusted, and determined by the proceeds of the industry in each district, ascertained after joint audit.

Wages above the standard to amount to a sum equal to 83 per cent of the proceeds, after allowance for standard wages, for other costs of production and for 17 per cent of the aggregate standard wages to be devoted to standard profits.

A subsistence wage for low-paid day workers to be decided by the District Wages Board or, failing agreement, by the independent chairman.

Standard wage to be the basis rates existing in each district on March 31 last, plus district percentages payable in July, 1914, or equivalents necessitated by subsequent adjustments.

The minimum rate will be the standard wage plus 20 per cent.

Items of costs are to be decided by the National Board or, failing agreement by July 31, by the independent chairman.

Wages up to August 31 to be based on the results of July, and for September to be based on the results of July.

During the temporary period of three months the costs of production will be based on the average of the first quarter of the year. The reductions during this period are not to exceed 2s. per shift in July, 2s. 6d. in August, and 3s. in September, providing that the balance of the government grant is sufficient.

The agreement is to last until September, 1922, and afterwards only to be terminated by three months' notice on either side.

There is to be no victimization, and men engaged temporarily during the stoppage are to give way to men working in their places before the stoppage.

The coal fields are to be divided into thirteen districts for the purposes of the agreement.

## Fuel Alcohol from Rice Straw

IN a paper recently read before the Indian and Colonial Sections of the Royal Society of Arts, Sir Charles H. Bedford referred to the production of industrial alcohol from rice straw. The suggestion to use rice straw came from Arthur Rogers, C.B.C., shortly after the termination of the war. Sir Charles decided on Burmah as a suitable sphere for operations and was able to secure the support of the Burmah Oil Company for carrying out experiments on a manufacturing scale. A distillery and laboratory have been erected at the company's refineries at Rangoon

and experimental work has been carried on there, as well as in England. The work is still in progress, but Sir Charles thinks it will shortly have been carried far enough for demonstration purposes, and he, and other technical and commercial experts, are satisfied with the results obtained. Other materials than rice straw will also be used to keep the plant in operation at all seasons of the year and this feature, combined with the utilization of certain by-products, is expected to materially reduce the cost of production.





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## More About Commercial Bribery

RECENTLY we called attention in these pages to House Bill No. 5632, pending in Congress, which provides a strict penalty for the bribing of employees to induce them to recommend certain kinds of material as the proper purchase. It is the habit of manufacturers to-day to assert that this practice has been stamped out. Despite this belief on the part of many employers, the practice persists. The paint, varnish and glue industries have been seeking to rid themselves of this practice recently. The following paragraph is taken from a complaint filed with the Federal Trade Commission against a glue manufacturer:

That respondent in the course of its business, gives and has given to superintendents and other employees of proprietors of cabinet manufacturing establishments, and other establishments, without the knowledge and consent of the employers of such superintendents and other employees, cash commissions or gratuities, usually amounting to five cents per pound for all glue sold to said establishment by respondent, to induce such superintendents and employees to favor and recommend, and influence their employers to purchase, the products of

respondent, and to refrain from purchasing the products of its competitors, and without other consideration therefor; that the total sales of glue made by respondent exceeds \$500,000 annually; that such cash commissions and gratuities so given by respondent to the superintendent of the cabinet factory and to other employees of one of its customers, to-wit: the Talking Machine Company, during the two year period ending Jan. 1, 1921, aggregated approximately \$34,000, which resulted from the payment of a cash commission of five cents per pound on all glue sold by respondent, to such customer, for which glue respondent received thirty-five cents per pound; that respondent adds to its annual cost of doing business a sum equal to that paid out for cash commissions and gratuities as aforesaid, and is compelled to, and does add to the selling price of commodities sold by it, an amount sufficient to cover the amount so paid out for cash commissions and gratuities, which is in addition to the fair market value of such commodities.

This complaint goes on to state, in legal wording, that under such conditions it is quite impossible to have free and fair trade conditions. The company to whose employees this bribe money was paid is often referred to as one of the best-organized manufacturing companies in the country. Now that this bribery is discovered, the employer is helpless and cannot punish either the giver or taker of the bribe beyond his ability to discontinue his purchases from one and the discharge of the other.

Apparently there is a place for a law that would punish persons who betray their positions of commercial trust.

## What's the Difference?

SOME storage batteries supplied regularly with certain cars have a useful life of three or more years. Others supplied in similar cars of about the same grade have a life of one year or less. What's the difference between the two in first cost to the manufacturer, in replacement cost to the user, in construction, in bulk, in weight? These are pertinent questions in which a great many people are interested.

The number of factors which govern the life of a storage battery is admittedly great. Some of these are beyond the control of the battery manufacturer and the car builder, hence alibis are not difficult to find, and "passing the buck" becomes a favorite pastime when an effort is made to place the responsibility for the failure of a battery which must be replaced before it has served as long a life as can reasonably be expected. Almost invariably the car owner is the goat, for it is he who pays for the new battery, frequently after a period of difficulty in starting or ignition trouble, which sometimes occurs when a replacement battery is difficult to obtain.

Since, in nearly all American cars, the ignition, starting and lighting systems are largely or wholly dependent upon the battery, it seems evident that the car manufacturer should make certain that the battery equipment is at least on a par with the rest of the car in quality, instead of the weakest link, as it now appears to be in many cases. It is often said that some battery manufacturers sell to car makers batteries which not only are far too light and small for the service they will be called upon to perform, but sell these batteries at, or substantially at, cost,

figuring to make their profit in retail replacement sales at prices three or four times as great as the price to the car manufacturer. This would not be quite so bad if the expense ended with the first replacement, but the second battery is usually as inadequate as the first, since the user is not in a position to judge as to the basic reason for the failure, and, even if informed concerning the true facts, is unable to correct the fault for lack of space for a larger and more durable battery.

Whether this is a true picture of the average or quite general case, we do not know. We do know that a large percentage of batteries fitted are of inadequate size, and that they are a source of serious annoyance and expense which might be mitigated if the car manufacturer would spend a few extra dollars in providing a properly proportioned battery at the start. In so doing we believe he would serve his own best interests by avoiding service troubles. It is well to remember that a few extra dollars spent by the manufacturer will often save the user many times that amount. Ten dollars more spent in the original battery equipment may, for example, provide a battery that will last three years, whereas with the cheaper equipment two replacement batteries, perhaps costing the user \$40 each, in addition to the original, may otherwise be required to cover the same period of operation.

The day has passed when it is considered good business to build cheaply without regard to serviceability. The reputation which comes from failure of the finished product to perform with satisfaction over a reasonable period of time is not an enviable one.

We feel that there is need for more education, or at least more general appreciation of the facts, in regard to battery equipment and shall, as in all subjects of similar import, be glad to carry in our Forum columns an expression of the views of those interested in this important subject.

## Fuel Prices and Fuel Development

ONE of the hopeful signs as regards the immediate future of the automotive industry is the decrease in the price of fuel. Where a year ago as much as 34 cents per gallon was charged for gasoline at retail, it can now be bought for 26 cents, a decrease of 23.5 per cent. This tends to equalize matters in those branches of the industry where there is competition with other means of transport and traction, though, of course, the decline has been not at all commensurate with the drop in the cost of horse feed.

The cost of production of motor fuel depends largely on the cost of labor, and with the present situation in the labor market a gradual reduction in fuel prices is naturally to be expected. Another factor of importance undoubtedly is the general economic situation. Although the number of automobiles, trucks and tractors in service is probably greater than ever before, it is quite likely that the passenger cars, which, after all, consume the bulk of the motor fuel, are in many cases not being used as intensively as formerly and that, as a result, stocks of gasoline are accumulating.

A decrease in fuel prices will, of course, encourage increased use of cars.

The present decline in the price of gasoline will, no doubt, tend to check the development of substitute fuels. This development in this country has been entirely of a sporadic character. Interest in it declined some eight years ago, when the introduction of the cracking process resulted in a material decline in fuel prices and rose again when war activities led to an unprecedented demand for petroleum fuel, followed by a rapid rise in prices. In spite of the cost estimates sometimes furnished by optimistic inventors, it is fairly obvious that no fuel made from vegetable material specially grown for the purpose, or from mineral materials by involved processes, can compete with petroleum distillates so long as petroleum can be pumped from the ground in sufficient quantities. Therefore, while reports of the invention of new motor fuels occur in the newspapers at short intervals, they create hardly a ripple of public interest.

It is to be hoped that the decrease in fuel prices will not be the signal for cessation of effort to improve the economy of automotive engines, for the need for such improvement is just as real as ever. Prices of other commodities are also falling. The decrease in the price of gasoline may indicate only a temporary adjustment in keeping with the times, rather than a permanent reflection of supply and demand factors. Efforts to decrease waste are always commendable, and there is no lack of evidence that the car of to-day is wasteful of fuel. The world-wide effort to gain control of petroleum reserves is in itself a sufficient indication of the importance attached to providing a supply of this fuel for the future. Let no one be deluded into thinking that it is less necessary than formerly to conserve our domestic supply.

## License by Weight

AN interesting experiment in the licensing of automotive vehicles is under way in Kansas, where the fee is based on weight of the motor car or on the useful load to be carried by the truck. Previously the license fee has been based upon the horsepower of the car and any one of several rather unsatisfactory bases for trucks.

When the Kansas license officials undertook to carry out the law, they found some unexpected (to them) obstacles. First was an inability to obtain a list of weights of the various cars. The Secretary of State wrote to the factories for the shipping weight, as he interpreted the law to mean the gross weight of the motor car as it stood in the salesroom. The weight adopted does not include gasoline, oil or water. In instances where the manufacturer did not supply a statement of the weight, the licensing officials caused an applicant for a license for a particular car to take the car to a scale.

There has always been objections to the license fee based on the horsepower of the motor car, the objectors asserting that this was in the nature of a luxury tax. A comparison of the fees involved in the two methods would shed some light on the subject of fairness of the two methods.

# July Business Surpasses Early June

## Barometer of Trade Rises Along Coast

**California Shows Steady Gain  
with Every Prospect for  
Improvement**

SAN FRANCISCO, CAL., July 20.—The barometer of trade in all branches of the automotive industry is rising steadily in California. The southern part of the State is busier in these lines than the north, but the north shows steady gain, with every prospect of improvement. It is still a buyers' market, and the buyers are more critical than ever, but more people are buying cars than have been buying them for the past eighteen months. In other words, the market for the right car, at the right price, never was better in the territory for which San Francisco is the center of distribution for automotive vehicles and equipment.

This is a brief summary of conditions as voiced to the correspondent of AUTOMOTIVE INDUSTRIES by a large number of dealers in San Francisco and in Oakland and Berkeley, on the eastern shore of San Francisco Bay. General reductions in the prices of virtually all cars is held to be responsible for the improved trading, but greater freedom of money and better prospects also are indicated by the increased demand for used cars, on which prices are virtually the same as they have been for the past six or eight months.

In no other industry on the Pacific Coast is this tendency to get back to a wholesome pre-war basis in the matter of movement of goods, merchandising prices and desire to buy, more marked than in the automotive industry. The demand is for the best possible car at the right price, and the reduction in prices by the factories, without reduction in quality of car delivered, has been a factor in bringing about the improved condition.

The passing of the so-called "price flurry" seems to have stabilized the business of buying, selling and distributing automobiles to greater degree than any one factor since the dealers came to realize that the time of hustle-for-orders, rather than sit-down-and-wait-for-buyers, had arrived.

### Denver

DENVER, July 20—Automobile sales seem to average slightly better than for the first half of June with less restlessness.

(Continued on page 146)

## JULY SALES BRISK IN ALL DISTRICTS

NEW YORK, July 20—Dispatches to AUTOMOTIVE INDUSTRIES from its correspondents in the principal distribution centers show that the volume of automobile sales at retail for the first half of July has been extraordinarily good as compared with the same period in June. While it is probable there will be the perennial mid-summer decline in the sales curve, it has been deferred later than usual in many cities. July business thus far has been better than either dealers or manufacturers dared hope it would be. Up to this time there has been practically no curtailment of factory operations and in some instances schedules have been increased.

Sales for the first half of July were better than the first fortnight of June in these cities: Detroit, Des Moines, Denver, Salt Lake City, Dallas, Cleveland, Columbus and Indianapolis.

July sales have held their own with June in Chicago, Milwaukee and Philadelphia.

July has shown a falling off as compared with June in New York, Minneapolis, New Orleans and Atlanta.

The Metropolitan slump is due to the universal exodus to summer resorts by persons able to buy cars. In the Northwest interest is centered on the harvest. In the South the continued low price of cotton has exercised a depressing influence.

San Francisco reports increasing business while Toledo and Louisville are holding their own.

## Chicago Keeping Pace with Business of June

CHICAGO, July 20—Business for the month in Chicago is keeping up the pace established in June, and June business, under the influence of reduced prices, was far in excess of recent averages. Buick, Studebaker and Dodge are leading the medium priced car field, but practically all dealers declare sales conditions satisfactory.

Country sales are still slow, but showing improvement. There are an increased number of inquiries along the Row, a fact which convinces dealers that there will be a continued steady demand, with a likelihood of a spurt in the agricultural districts following harvesting.

## Salt Lake Territory Shows Improvement

**Retail Business Holds Up Well  
During First Two Weeks of  
July**

SALT LAKE CITY, July 20—Retail automobile business in the larger cities and towns in the Intermountain territory has shown a steady improvement during the first half of July. Salt Lake, Ogden and Provo, Utah, and Boise, Idaho, dealers, are showing a better working spirit than is manifested by the less highly organized dealers in the smaller towns and communities. Wholesale business is at a standstill and dealers are largely dependent on their retail efforts to equalize their sales.

The retail business is holding up well under the general business slump largely because sales managers and salesmen are overlooking no opportunities. Salt Lake distributors particularly are diligent in pursuing prospects. Tourist trade during the last six weeks has aided the industry materially and the repair business is by this reason considerably better than during the spring.

Price reductions coming on the 1st of July have also helped to stimulate sales. Tires, accessories and batteries are registering a lively trade.

P. F. Drury, assistant general manager of the National Automobile Dealers Association, is visiting in Salt Lake. At an address before the Intermountain Automotive Trades Association he stressed co-operative methods and association work. From here he will go to Boise, then to Portland, Tacoma, Seattle, and he will be in Spokane the 27th, 28th and 29th of this month to attend the annual meeting of the Washington Automobile Chamber of Commerce.

### Philadelphia

PHILADELPHIA, July 20—Retail automobile sales for July thus far compare very favorably with June sales. Prospects are for considerably improved trade. Sales of new cars are 45 per cent of the entire June sales. This is considered owing largely to reduction of prices which is now considered over.

Another good sign is the falling off in sales of used cars which were good earlier in the season but now are quite flat. In new cars high priced automobiles are beginning to sell as well if not better than the less expensive types.

Truck sales continue dull. The trucking business is not heavy.

# Sales Increase Holds Up in Nation

## Notable Sales Made in New York District

### July Not Subnormal in Metropolitan Buying—Vacations Cause Usual Slowup

NEW YORK, July 20—Passenger car sales which ran high throughout June in the metropolitan territory have dropped considerably during July up to date and the majority of dealers expect the falling off for the month to be more or less comparative with that which prevailed in normal years before the war.

Oldsmobile, Scripps-Booth and one or two other cars which had price reductions late in June after the novelty of most of the competing reductions had worn off sold better during the first two weeks in July than in previous months. However, the normal run of cars including the strongest sellers have showed considerable dropping off in day by day sales.

The indications are that the July sales record will be considerably below June, but nothing subnormal as July goes in New York City, with a great many people in the automobile owning class out of town on vacations.

Some notable sales records were made during June. Dodge sold at retail within the limits of New York City more than 400 passenger cars and 100 trucks. It is said that this has not been equalled except in cases where distributors included sales in outlying territories in their New York reports.

Nothing has developed to indicate that there will be any severe curtailment of buying during July and August. Dealers generally expect business to be slow but in this respect they will just be going back to normal conditions prevailing before the rush for cars two years ago.

## Indianapolis

INDIANAPOLIS, July 20—It is expected that retail sales for the first half of July will beat sales for the same period of June by from 10 to 20 per cent. Dealers say that sales are good for the time being but they are pessimistic concerning future business. Those dealers handling cars on which reductions were made last month or during the last six weeks are reporting an exceptional business which will show a dollars and cents increase in spite of reductions. Dealers in the higher priced cars say business is showing better so far this month than it has during the year and these dealers are rather confident concerning business

during the remainder of the year. It is probable that Studebaker and Haynes cars are leading the field in their class, while the dealers in Dodge, Ford and Chevrolet all report increased sales during the month. One reason for the increased sales made, dealers say, is the fact that money is loosening up a little, though credits are yet very much restricted. Business in used cars also is showing a decided increase and dealers say that if the industrial situation continues to improve it is probable that further increases in used car sales will be recorded.

## Milwaukee

MILWAUKEE, July 20—The June record of retail sales for Milwaukee and vicinity will be maintained for the first half of July. Representative dealers see no indication of material slowing tendency but do not expect inflation during the remainder of the summer. The public apparently is not satisfied that prices have reached bottom. Rumors of impending supplementary reductions in Ford prices early in August have a disturbing influence on account of the expectancy that other cars must follow.

Expressions by eight big dealers give a general average of equality between sales for the first half of June and July. Distributors report wholesale business smaller, which is customary following the passing of midyear with country districts busy with crops.

## Detroit

DETROIT, July 20—Steadily increasing averages mark daily sales of Detroit dealers in standard automobiles. Volume for the first 14 days of July indicates an average increase for the month over June of 28 per cent. Largest percentage of increases were reported by Dodge, Overland, Buick, Oldsmobile, Studebaker and Hupp dealers though practically every one reports better business than in June.

Careful investigation of conditions by officials of the Detroit Automobile Dealers Association shows distributors and dealers optimistic and confident that the increased demand is not a flash in the pan but normal spring business delayed by unsettled price conditions and bad weather during April and May.

Price cuts naturally proved a stimulant to buying and nothing is in sight now to indicate a slump in demand, according to Guy O. Simons, president of the dealers association.

## 20 Per Cent Increase in Des Moines Field

### July Sales Will Beat Those of June—See All-Summer Business

DES MOINES, July 20—Interviews with 10 leading Des Moines dealers show that stimulation of business has held up well during the first half of the month, in fact, improvement of approximately 20 per cent over June is noted by all dealers. This refers only to retail city sales as country business with the exception of Dodge, Overland and Ford is practically at a standstill. Final figures for June showed 10 per cent improvement over May.

Eight of 10 dealers interviewed forecast continuance of present business until late September or early October. The other two expect a let down by late August. Truck sales are at a minimum.

Second hand car business is brisk at readjustment prices. Money is somewhat easier in the city and collections are fair but there are no signs of improvement in credit conditions in the country. July sales in the city are practically on a par with July, 1920. The major part of the improvement over conditions of spring and early summer is attributed to the stimulation of price cuts.

## Minneapolis

MINNEAPOLIS, July 20—Business in automobiles has shown a slump in July as compared with June in the Northwest territory. Just now the farmer mind is centered on his harvest and a new spurt cannot be expected until this harvest is in. Crop conditions are generally favorable notwithstanding the long period of hot weather. With a good harvest better conditions are expected.

The Fourth seems usually to be a cut-off line in the motor business and at that time the public loses interest in new cars, all having bought that have considered the matter seriously. A firm which did three times its business of June last year notices the slump strongly.

A large distributing firm with a crop service of its own, which reports a big drop in sales as compared with June last, believes crop news from the sun-burnt districts is mostly local and the crop as a whole promises well, if not a bumper, as expected. In North Dakota three-fourths of the State shows an exceptionally good outlook, in fact, better than last year.

## Leaf Spring Forms Group in M. A. M. A.

Second to Organize Into Separate  
Body—Score of Others to  
Follow

NEW YORK, July 18—The Leaf Spring Institute has dissolved as a separate organization and will continue its work as the leaf spring group of the Motor and Accessory Manufacturers Association. It is the second to be organized of some 28 groups of manufacturers with more or less like interests which will be formed within the M. A. M. A. H. R. McMahon, president of the Standard Steel Spring Co., has been elected chairman of the group, Mason Rumney of the Detroit Steel Products Co. vice-chairman, and E. R. Busby of the William & Harvey Rowland, Inc., secretary and treasurer.

Plans for the organization of the entire membership of the M. A. M. A. into groups will be carried out at once. The two groups already formed will be followed by groups in the following lines:

Asbestos products, axles, bearings, bumpers, carburetors, chains, clutches, engines, fans, forgings, foundries, gears, lamps, piston rings, radiators, shock absorbers, spark plugs, springs, startings-lightings-ignitions, steel producers, steel products, tires and tubes, tops, transmissions, warning signals, wheels, wind shields.

Among the subjects now before the association for standardization consideration and which will be referred to the respective groups following the division of the membership, are:

Design, purchasing specifications, construction, materials, cost systems, specifications, weights, dimensions, sales contract forms, packing, shipping, invoicing forms, guarantees, advertising, service methods. Upon a group taking favorable action on any subject of standardization, which will be by two-thirds of its members approving, the plan shall become effective by approval of the board of directors of the association.

A significant feature of the group plan is an arrangement whereby the chairmen of all groups constitute an advisory committee to the executive committee of the board of directors and an advisory board to General Manager M. L. Heminway. The president, first vice-president, secretary and general manager and general counsel of the association are ex-officio members of all groups.

### BATTERY COMPANIES MERGE

MARSHFIELD, WIS., July 18—The Stewart-Galvin Battery Co. and the Stewart Storage Battery Co. have been consolidated in a new corporation to be incorporated in Wisconsin, which has decided to locate its permanent works and headquarters in Marshfield, Wis. For the present the company will occupy the building of the Marshfield-Franklin Co. and employ 50 to 75 operatives.

## WANT NEW YORK SHOW AT GRAND CENTRAL

NEW YORK, July 20—The 1922 New York automobile show will be held, in all probability, in the Grand Central Palace instead of in Madison Square Garden as originally proposed. Negotiations to this end have been practically completed although a few details remain to be cleared up. This arrangement, which will be eminently satisfactory to every one concerned, is made possible by the fact that plans for converting the Palace into an office building have been delayed. The Garden still is available in case of emergency but its use would involve very heavy expense because of alterations which would be necessary in the building. The rental charged for the Palace will be much higher than in the past but the N. A. C. C. has decided that nothing must be permitted to interfere with the success of the show next year.

## \$6,000,000 in Contracts Let for Roads on Coast

SAN FRANCISCO, July 20—Contracts for construction of highways, let by the State of California between Jan. 1 and July 1, this year, number 35, with total value of \$6,000,000. The work is distributed all over the State, and bids on other sections are now being asked, with prospects that a total of half as much more will be let within the next ninety days. The State-wide extent of these road construction contracts may be gathered from the fact that the work is in the following counties:

Fresno, Tehama, Shasta, Santa Barbara, Kern, Humboldt, Butte, San Luis Obispo, Mendocino, Placer, Nevada, Sacramento, Amador, Solano, San Mateo, Tulare, Los Angeles, San Diego, Mono, Mariposa and Glenn.

The United States Bureau of Public Roads has signed up with the California State Highway Commission for the expenditure of the remaining money in the allotment of \$2,896,071.77 given to California under the 1921 allotment of Federal road moneys. The money will be spent on 24 highway projects in this State. This agreement puts all the money available for California under the 1921 allowance actually to work, under way, or agreed upon. The moneys available for the 1922 allotment will have been agreed upon or put to work before June 30, 1922.

### PATRIOT REORGANIZES

LINCOLN, NEB., July 18—The Patriot Motor Co., manufacturer of Patriot trucks, which has been operating under a receivership since last November, has been reorganized and will continue in the truck field. The assets recently were acquired by a new company.

## Coast Trade Is Good, Says Goodyear Man

Los Angeles Factories Increased  
Production 47 Per Cent  
Since March

AKRON, July 20—Business conditions are improving rapidly on the Pacific Coast with every indication of a quick return to normal, according to A. F. Osterloh, former sales manager of the Goodyear Co. of Akron and now vice-president and general manager of the Goodyear Co. in Los Angeles. Osterloh and other California Goodyear officials arrived in Akron to-day for a conference with President E. G. Wilmer, relative to production on the coast.

The Los Angeles Goodyear factories have increased production 47 per cent since March, now being on a basis of 3500 casings and 3700 tubes daily, according to Osterloh. This is the largest production in the history of the Western company which started production in June, 1920. With the demand for tires steadily increasing, further production increases are contemplated both in Akron and at the Pacific Coast factories. The Akron factories report this week's dealers' business was the heaviest in the company's entire history. Stocks are low and indications point to a tire shortage if the present rate of buying continues, unless manufacturers greatly increase production. It is stated by experts that there is now less than a 30-day supply of tires on hand in the United States. Experienced tire builders considered desirable for re-employment in the Akron factories are scarce. The Akron tire factories are endeavoring to build up their forces by putting on married men and home owners, and are trying to prevent an influx of transient floaters to Akron.

### Here for Conference

In the California party now in Akron are Osterloh, C. C. Slusser, factory manager at Los Angeles; Sales Manager J. R. Reilly, and Treasurer W. A. M. Vaughn. C. H. Carlisle, treasurer and general manager of the Goodyear Canadian factories, also is here to confer with Wilmer as to plans for increased production. Other Canadian officials here with Carlisle are R. P. D. Graham, vice-president of the Canadian Goodyear Co.; H. C. Lower, sales manager; H. G. Layne, assistant treasurer, and E. H. Koken, general superintendent.

### RECEIVERSHIP IS DENIED

KANSAS CITY, MO., July 20—Application for a receiver for the Beggs Motor Co. of Kansas City, manufacturing the Beggs car, was denied in Independence, Mo. The court, upon hearing, decided that on the showing made the company was not insolvent. Stockholders having a small amount of shares brought the suit.



## Packard Dealer Gets Durant Car On Coast

### Earle C. Anthony Will Handle New Make at Four Important Pacific Points

SAN FRANCISCO, July 20—First announcement regarding the marketing of the new Durant car in California is released by R. C. Durant of the Durant Motor Co., with the news that Earle C. Anthony, Inc., for 16 years Packard distributors in this State, will handle the Durant at the four most important distributing points in California—San Francisco, Oakland, Sacramento and Los Angeles. In all of these places the Anthony organization has branches.

At the same time, Mr. Anthony announced that George R. Bury, who, until July 1, 1921, had been general sales manager of the Packard Motor Car Co., had been appointed vice-president and assistant general manager of Earle C. Anthony, Inc., and will devote all his efforts to northern California territory. Bury had been more than fourteen years with the Packard company. The arrangement between the Durant company and the Anthony firm marks an alliance between America's newest car and one of California's oldest and strongest automobile concerns. The founder and president of the distributing company is Earle C. Anthony, a pioneer in the motor car business in this State, having entered the business in Los Angeles in 1904. In 1905 he became Packard distributor for Southern California, acquiring the whole state for that line four years ago. More than eight years ago he entered the state distributing field, at that time with Chalmers, but this was replaced in 1915 by the Reo, which Anthony relinquished July 1 in order to devote the entire energies of his company to the Packard line and to preparations for the marketing of the new Durant upon its arrival. The Anthony organization conducts its own stores in San Francisco, Oakland, Sacramento, Fresno, San Jose, Bakersfield, Los Angeles and San Diego.

R. C. Durant heads the Durant Motor Co. of California, a subsidiary of the Eastern parent concern, and a \$3,000,000 factory in Oakland will be producing Durant cars by December of this year. Associated with R. C. Durant are C. M. Steves, A. L. Warmington, George R. Scott, H. T. McKnight and Charles H. Durham.

### RECEIVERS ARE OPTIMISTIC

COLUMBUS, July 20—Receivers W. C. Willard and George A. Archer of the Allen Motor Co. of Columbus announces that orders are coming in much better and that during July it is planned to turn out 200 cars, all on orders. The outlook for the future is now much brighter, according to the receivers. A total of 200 workmen are now employed at the Columbus and Bucyrus plants.

## TRAFFIC SO GREAT WILL WIDEN ROADS

HARRISBURG, PA., July 18—Preliminary studies of projects for increasing the width of main State highways entering the larger cities of Pennsylvania so that they may be ultimately extended to 100 or 120 feet, are under way by State Highway Department engineers. The rapid increase in motor traffic has made it imperative to create future building lines. Studies nearest Philadelphia have been in Delaware, Buck and Montgomery counties and in the Main Line district.

## Warehousemen Urging Service Parts Stations

LAKE OF BAYS, ONT., July 18—The National Furniture Warehousemen's Association, comprising more than 500 household goods and furniture storage-men, the majority of whom operate motor trucks, adopted a resolution today, at its convention here, addressed to the unit parts manufacturers of the country requesting them to establish service parts stations where distributors and agents could furnish not alone present supplies but parts long considered obsolete.

The resolution set forth that if such stations could be established where both old and current models of parts could be obtained, this would tend to stabilize prices, would prevent price advances, would assure immediate deliveries for customers and would give the maximum efficiency to which those patrons were entitled.

The Pacific Coast Furniture Warehousemen's Association and the California State Draymen's Association have adopted a similar resolution it was disclosed.

### REMY ELECTRIC TO REOPEN

ANDERSON, July 20—Remy Electric Co. plants which closed down July 8 will reopen next Monday, according to announcement. New business added to incomplete orders in sufficient quantity for operation on the same scale as has existed for several months is understood to have been added. Higher efficiency of labor is said to be one factor in the reduced force that has been operating the plant.

### RECEIVER FOR TIRE COMPANY

INDIANAPOLIS, IND., July 20—The petition for the appointment of a receiver for the Federal Rebuilt Tire Co. of this city was filed by H. R. Morgan & Co. recently, alleging that the company is in danger of insolvency. Jacob Morgan, a local attorney, was appointed receiver for the company by Judge Solon J. Carter and has started to work out the company's affairs.

## Million in Revenue for Standard Parts

### Receiver Reports Rush of Business—Profits Large in Last Two Months

CLEVELAND, July 20—The Standard Parts Co., a \$20,000,000 corporation making automobile parts and accessories, which has been in the hands of a receiver since last September, has been making money in the last two months.

John Younger, who is in charge of operations for Receiver Frank A. Scott, says that the company's showing is proof that the automobile industry is healthy and business is good. The Standard Parts in recent months has obtained considerable new business and has taken on some big contracts from concerns that are operating at capacity and are rushed with orders. The gross revenues have been running approximately \$1,000,000 a month lately.

Action taken by this corporation on July 1, in consideration of the recent reductions in prices of steel announced by the United States Steel Corporation and the Bethlehem Steel Corporation, is regarded significantly by the trade here.

Since July 1 the Standard Parts has been quoting low prices on springs, tubings, rims, and other products manufactured by the corporation.

For some time the corporation has been operating all of its plants, as follows: The Bock Bearing, Perfection Springs, Standard Welding, Eaton Axle, Canton Drop Forge, and Pontiac Spring Co. No statement was made at the local headquarters offices with respect to the size of the staffs working, but it was learned that it is near normal. In addition to the above plants, the corporation is operating spring service stations in New York, Boston and Cleveland.

The receivership has helped officers of the company greatly by giving the corporation stability in these times. It has the power of the United States court back of it and with this backing all orders are being promptly fulfilled.

A short time ago the common stockholders asked the court to continue the receivership for the time being.

The creditors of the company are to meet here August 10 to discuss what shall be done with respect to the receivership. They had advanced a plan for the formation of a new company to take over the assets from them and reports will be made on the progress of this at the meeting. Stockholders have not regarded this proposal with favor.

### H. C. S. TO MAKE CLOSED BODIES

INDIANAPOLIS, IND., July 20—The H. C. S. is planning to get into the manufacture of closed bodies some time in August. At the present time the company has completed its first limousine. The job has wire wheels and the body is of aluminum construction.

## Committees Study Contract Changes

### N. A. C. C. and Dealers Consider Amendments Covering Cancellations, Etc.

NEW YORK, July 18—The committees representing the National Automobile Chamber of Commerce and the National Automobile Dealers' Association in the promotion of closer relations between the manufacturers of motor cars and their distributors are giving close consideration to proposed amendments to the present form of contract. Three important changes have been proposed by the dealers. They cover cancellations of contracts, allotments of motor vehicles and depreciation in the value of motor vehicles and parts. These are the major points covered.

Directors of the N. A. C. C. were to have considered the subject at their meeting in Buffalo last week, but the draft of the proposed changes was not received from Harry Harper of Philadelphia, former president of the N. A. D. A., until just before the meeting opened, and it was decided to defer any discussion until there had been opportunity to study the subject. In the meantime they will be taken up by the committees in preparation for a joint meeting, which will be held in the near future at a date not yet determined.

The committees representing the two organizations are carrying on their discussions in the most friendly spirit and marked progress has been made in the deliberations. There is evident a strong spirit of mutual helpfulness with the realization that what helps the dealer helps the manufacturer and vice versa.

In addition to contractual relations, the dealers are expected to urge that changes in models and prices be announced in future at the time of the big shows instead of spreading them over the entire year.

The N. A. C. C. directors at their Buffalo meeting decided to take a monthly census of production and sales in the industry to be reported to Secretary of Commerce Hoover, as he has requested. Only the totals will be given and there will be no details concerning individual companies.

In connection with the \$5,000 which will be offered in prizes to the school children of the country for the best essays on accident prevention on the highways, it was decided to offer special prizes to the teachers who supply the best lessons on "safety first." The prizes will include cash and trips to Washington.

### REFUSES REFUND ON TAXES

RALEIGH, N. C., July 20—State Treasurer B. R. Lacy has formally declined to make any refund of automobile license taxes paid to the State by automobile manufacturers or their representatives in the State. J. S. Griffin, a Raleigh attorney, representing the Olds

Motor Works, the Kissel Motor Car Co., the Cole Motor Car Co. and the Marmon Motor Car Co., had made formal demand on the treasurer for a total refund of \$6,000, representing sums paid in by his clients in compliance with the State law. Invalidity of the revenue act, so declared by the United States Supreme Court, because of discrimination in favor of North Carolina corporations is the reason assigned for the demand. Treasurer Lacy, replying to the formal demand, says: "In reply will say that after consultation with the attorney general I am advised by him not to refund any of these license taxes."

## Airplane Inquiry Will Disclose Engine Ideas

WASHINGTON, July 20—Information of great value in designing airplane engines in the United States is promised by the Bureau of Standards in forthcoming final reports to be made in connection with a thorough investigation that has been completed as to the performance of two well-known makes of German airplanes. The investigation was made through co-operation between the Bureau and the Air Service at McCook field.

The two engines which have been investigated are known as the B. M. W., 185 hp., and the Maybach, 300 hp. Both machines are of the 6-cylinder type which has long been a favorite in Germany.

It may be of interest to note, the Bureau reports, that the performance of the B. M. W. engine at high altitude was excellent, its low fuel consumption being the outstanding feature of merit. The chief point of interest in connection with the Maybach was the design of the carburetor, which, however, cannot be considered as entirely satisfactory as, although it gave excellent economy of fuel, the efficiency of the engine at part load was rather poor.

### COURT HALTS USE OF NAME

NEWARK, N. J., July 20—Samuel Ehrlich of the Hudson Tire Co., Inc., of this city has just obtained an injunction in the United States District Court, Southern District of New York, against the Hudson Tire & Rubber Corporation, W. M. Doucette, H. B. Seymour and Ulrich Wiesendanger, restraining the corporation and its officers from using the name "Hudson" in connection with their business.

Ehrlich claimed that the defendants were fraudulently making use of the name "Hudson" in connection with their business, well knowing that Ehrlich had been doing business as Hudson Tire Co., Inc., in Jersey City and Newark for several years.

Ehrlich has been selling Hudson tires in Newark, all of the New England States and practically throughout the United States, and is now arranging to establish agencies for the sale of his tires in every State and section of the United States.

## Palmer Charged with Undue Favoritism

### Bosch Magneto Sale to Supposed Friend "Fixed," Complaint Says—Makes Denial

NEW YORK, July 18—Charges first made last year that A. Mitchell Palmer had shown undue favoritism to Martin E. Kern of Allentown, Pa., in the sale of the assets of the Bosch Magneto Co. which were sold by Palmer as Alien Property Custodian in 1918 for \$4,150,000 have at last been made openly. The company then was reorganized under American control as the American Bosch Magneto Corp. The allegations have been denied by Palmer as "part of a drive by Germans to influence Congressional action so that they may regain their properties sold when this country was at war with Germany."

It is asserted that Kern was "a close friend and business associate" of Palmer, that Kern valued the property at \$8,000,000 three weeks after he bought it, and that the auction of the assets was "fixed" so there would be no competitive bidding. It also is charged that:

The Bosch company's controlling interest in the Boonton Rubber Manufacturing Co., of which the Bosch company held more than one-half the stock, was held for \$1,000 to Kern.

The 130 patents held by the Bosch company were sold to Kern for \$1. The Reading Standard Co., manufacturers of motorcycles, of which the Bosch company held more than one-half the stock, was sold for \$1.

The St. Louis Car Co., in which the Bosch company invested \$100,000, was sold for \$1.

The good-will of the company and its various valuable trademarks were turned over to the purchaser gratis.

Palmer did not advertise the sale widely, and held it "in the woods" on the outskirts of Chicopee, Mass.

Palmer characterizes all the allegations as "nonsense." The whole question was threshed out before the Senate Judiciary Committee two years ago, he asserts, when his name was presented for confirmation as attorney general and the committee decided unanimously that the charges against him were unfounded.

### SOUTH CAROLINA USES LESS GAS

COLUMBIA, S. C., July 20—South Carolina used less gasoline and kerosene for the first six months of 1921 than for the first six months of 1920, according to figures compiled by H. W. McCreight, chief clerk of the Department of Agriculture. From January through June this year 28,161,768 gallons of gasoline and kerosene were shipped into South Carolina, as compared with 31,787,608 in the same period of 1920. These figures are available from the tax imposed on the two products and do not absolutely mean that more gasoline and kerosene were used in the first period than in the second. The figures for gasoline alone are: For the first half of 1920: 21,291,739; for the first half of 1921: 18,907,178.

## U. S. Considers Ford Offer for Big Plant

### Muscle Shoals Nitrate Property May Be Taken on 100 Year Lease

DETROIT, July 18.—Announcement made in AUTOMOTIVE INDUSTRIES three weeks ago that Henry Ford had inspected the huge Government nitrate plant at Muscle Shoals with a view to making an offer for it has taken concrete form and Congress now is considering an offer from him to lease the property for 100 years. He has submitted the following proposals through the Secretary of War and the Secretary of Commerce:

First—He will take a 100 years' lease upon the Wilson Dam and No. 3 Dam and electric installation when completed. This work is estimated to cost \$28,000,000. After a short preliminary period, Mr. Ford proposes to pay interest at the rate of 6 per cent on the sum of \$28,000,000 and to amortize not only this sum but of the entire cost of both dams over a period of 100 years.

Second—To purchase all nitrate plant and equipment, lands, steam plant, etc., for \$5,000,000.

Third—To convert and operate the large nitrate plant (No. 2) for the production of fertilizer compounds and as a stand-by for Government explosives in case of war, and to keep it up to date in both lines.

Fourth—To limit the profits of the fertilizer plant to 8 per cent; an independent board embodying representatives of the American Farm Bureau and the National Grange and the Farmers' Union to certify to this maximum.

The completion of these works makes the Tennessee navigable to Chattanooga and there are undertakings by Mr. Ford for maintaining the locks, etc. The power development will ultimately greatly exceed the requirements of the fertilizer plant, and Mr. Ford proposes to use it in his own business. In order to meet the annual payments proposed, a very large use of power must be made outside the fertilizer works.

### U. S. Ready to Lease

Secretary Weeks has several times expressed his willingness to recommend to Congress that appropriations necessary to complete the work at Muscle Shoals be made, provided some substantial business concern would agree to take over the project on such terms as would benefit the nation and the Government.

Ford has made no statement regarding the use he proposes to make of the surplus power, but it is understood he intends to operate on the banks of the river a southern unit of his automobile factory from which he will be able to serve a huge territory at lower costs. There also are reports that he intends to specialize in tractor development in the South. It also would be possible for him to sell power for manufacturing plants over a large area.

## CAR BUYERS EMPLOY MONEY-SAVING PLAN

NEW YORK, July 18—Passenger car dealers have had experience lately with a new variety of automobile shopper. This person, who does not own a car and so would have none to trade, goes around to a second hand dealer and gets a loan of a used car and a statement of the price for which he can buy it. He then takes the used car and goes shopping around to new car salesrooms, doing his best to trade it in for a new car at an allowance which will give him a considerable margin over the used car price fixed by the used car dealer.

This custom, which has become quite prevalent and which is depriving dealers of the few remaining prospects who made "clean" purchases, has had quite a demoralizing effect on retail sales conditions as a number of dealers have gone into the business of overbidding each other on an allowance for the used car.

## See Attempt to Put Over Burke Bill on Hoosiers

INDIANAPOLIS, July 20—Rumors that the State administration would attempt to duplicate in Indiana the Burke bill passed in Ohio this year, are being investigated by the Indiana Automotive Trade Association. It is said that the bill will be drawn for the State highway commission at the instance of Governor McCray and that it will be introduced in the "next legislature" with administration backing and steering it. This is taken to mean that Governor McCray will call a special session of the legislature this fall, for the "next legislature" would not convene until 1923, and preparation of a bill at this time would be premature unless there is some early prospect of a legislative assembly.

In conference with Tom Snyder, secretary of the Commercial Haulers Association, L. M. Shaw, general manager of the Indiana Automobile Trade Association, this week began formation of defensive plans to combat the effort of the administration, which is taken to mean that the administration does not intend to build up the State highways for modern traffic but hopes to meet the situation by eliminating the heavy duty equipment. Secretaries Shaw and Snyder propose to have a conference of all motor vehicle interests of the State with the State Highway Commission.

### ABANDON AVIATION MEET

DETROIT, July 19—The Detroit Aviation Society has decided to abandon the Pulitzer trophy and other events which were to have been held Sept. 8, 9 and 10 because it has been impossible to get assurances of entries by the army and navy.

## Garage Equipment Needed in Belgium

### U. S. Consul Reports Lack of Free Air Devices and Other Accessories

WASHINGTON, July 20—Manufacturers of automobile accessories will be interested in a report just received by the Bureau of Foreign and Domestic Commerce from James P. Moffitt, American Consul in Charge, Antwerp, Belgium, regarding the market for automobile air compression and garage equipment in that place. The report states that there are about 2500 automobiles, 500 trucks and 800 motorcycles in Antwerp. Of the 80 public garages, large and small, there are only about 30 important ones. The number of cars housed in a garage varies from five to 20, though the average number is more likely to be from 10 to 20. Garages in Antwerp, it is stated, do not equal American garages in size or efficiency.

Generally speaking, the equipment is not designed to save labor, but requires the least outlay and is confined to the absolute necessities. Garage equipment, as is used in America, it is pointed out, is not used in Antwerp, first, because it is not known, and, secondly, due to the small number of cars, garage owners go rather slowly in making investments. Labor always has been cheap, and time is not essential. However, due to the present high cost of labor, compared with prewar prices, it seems the opportune moment to introduce American garage equipment.

Only a few garages are equipped with mechanical air compressors, and there are no service stations which offer free air facilities from curb hose lines to the passing motorist. Two garages have systems from Luchard, Paris, whereby compressed air is stored in tanks and the tank is carried from one car to another to inflate tires. Smaller tanks are filled to be carried along with the car. Even this system is very expensive.

### CLOSE IMPORTANT CONTRACT

NASHVILLE, TENN., July 18—The signing of the final draft of the important contract between the Southland Motor and Body Corporation and the Nashville Industrial Corporation brings into existence the largest operation of this kind in the South. Reconstruction work on the big building leased by the company is under way and the company expects to make initial deliveries on orders the next sixty days. Representatives have been established in most of the southern cities to handle the direct sales to automobile agencies and garages. At the beginning the new plant will manufacture commercial bodies for Fords on contracts with large users such as mail order houses. The product will be known under the trade name of Old Hickory. About 150 people will be employed at the start.

## Col. Clifton Honored on 16th Anniversary

**Directors of N. A. C. C. Give  
President Painting in Recognition  
of Long Service**

BUFFALO, July 18.—In recognition of his sixteen years' service as a leader in the automotive industry, the directors of the National Automobile Chamber of Commerce to-day presented Col. Charles Clifton, president of the Pierce-Arrow Motor Car Co., with a handsome painting to be added to his private art collection. The picture was "Le Palais Rouge," a scene in Venice painted by Henri Le Sidanier.

The presentation was made at the Country Club in behalf of the directors and through them of the entire industry, by Alvan Macauley, president of the Packard Motor Car Co. The gift was deemed especially fitting at this time because Colonel Clifton was elected president of the N. A. C. C. for the eleventh successive term at the annual meeting in New York last month. The directors were in Buffalo for the monthly meeting, which has been held here once a year since Colonel Clifton became president.

In making the presentation, Macauley said that people usually wait until a man dies before they laud his efforts, but that in the case of Colonel Clifton his services to the industry had been so great and had extended over such a long period that it was considered a privilege to give him the painting as a token of appreciation for his valiant services.

Colonel Clifton had been a leader of the industry for sixteen years, Macauley said, and it was due largely to his able guidance that the industry had grown so rapidly from infancy to the leadership of all finished products. He described Colonel Clifton as "the father of co-operative competition."

## \$1,500,000 Tire Plant to Be Erected in Tampa

TAMPA, FLA., July 20—A tire and tube manufacturing plant, valued at \$1,500,000, will be built in Tampa in the near future by the Peninsula Tire and Rubber Co. The company has already been organized and the site for the factory, situated on the Atlantic Coast Line and Seaboard Railways just outside the eastern boundary of the city in a section known as Gary, has been purchased. A building two stories high, approximately 100 by 300 feet in dimensions, and having a floor space of 60,000 sq. ft., will be erected.

The construction will begin within 90 days and operation of the plant will start in about six months. One hundred tires and tubes a day will be manufacturing capacity of the plant in the beginning.

H. A. Van Auken has been named general manager of the new manufacturing concern. He was at one time sales manager for the Northland Rubber

Co. of Buffalo, N. Y., which was later absorbed by the Kelly-Springfield interests. He was also sales manager for the Mutual Tire and Tube Co., a co-operative distributing agency.

At the present time tires and tubes being sold by the Peninsula Tire and Rubber Co. are being manufactured under contract with the Doff Rubber Co. of Atlanta. The present contract will be continued until the new plant is completed.

## Capitalists To Back Making of Doble Car

SAN FRANCISCO, July 20—Backed by a number of capitalists of this city, and with Abner Doble, designer of the car, as a member of the corporation, an organization has been formed here to start construction of the Doble steamer, as soon as a factory site can be obtained. One of the first models, one that has run 57,000 miles with no sign of trouble to date, is on exhibition here. The directors of the new corporation are said to be prominent financially, and it is understood that no stock is for sale, and none will be offered, all having been taken by the men who have formed the organization. No names, other than that of Doble, have been made public as members of the corporation, but the announcement is generally regarded as reliable. Production of 500 cars a year is contemplated.

The Doble-Detroit Motors, Inc., was formed in 1916, but the War Industries Board ruled against it, and it dropped from active production after booking \$27,000,000 worth of business.

## Coast Firm Gets Large Tire and Tube Order

OAKLAND, CAL., July 20—The Coast Tire and Rubber Co. of this city announces the receipt of an order from a firm of distributors in Tokio, Japan, for \$53,000 worth of tires and tubes, including both fabric and cord tires in a variety of sizes. This is one of the largest orders ever placed by a Japanese house with an American tire manufactory.

This brings the total amount of tire and tube orders in the hands of this company up to an even million dollars, and additional machinery has been ordered for the local plant. Cities of Portland, Seattle and Spokane have ordered tires from this factory for their municipally-owned automotive vehicles.

## MAKING SPECIAL CAR IN SOUTH

SAN ANTONIO, TEXAS, July 20—The Robertson Co. has started the manufacture of an automobile especially adapted to Mexico. Texas and the Southwest. Specific claims are made for gasoline and lubricating oil economy and the design has been especially worked out for pulling on mountains, sand, rock and mud roads. It is understood that the factory is financed by Mexico and Texas capitalists.

## N.A.C.C. Seeks End of Insurance Evil

**Detroit Conference Will Hear Protests—Threaten Mutual Organizations for Nation**

NEW YORK, July 20—Vigorous protests against evils which have grown up in automobile insurance will be made by the insurance committee of the National Automobile Chamber of Commerce, headed by William E. Metzger, to the Automobile Underwriters Association at Detroit to-day. The underwriters will be told flatly that unless they take adequate steps to remedy these evils mutual companies will be formed in all parts of the country to take over the automobile business. Companies of this nature are already operated by the Automobile Club of America and by the Chicago Motor Car Co.

The N. A. C. C. committee has attempted for some time to co-operate with the underwriters, but has found that the co-operation on the part of insurance companies has consisted in counting up their losses for the previous year and doubling the rates. It is contended that the companies do not take the moral hazard into account in writing insurance and will give a notorious crook the same rate that is granted to a reputable business man.

Another evil of which complaint is made is over-valuation. Cars are now insured for such amounts that it is almost an incentive to destroy them.

Serious objections also will be raised to the demand of the Underwriters Laboratories at Chicago, which are maintained by the insurance company, that all materials which go into a manufacture of motor cars must be approved by the laboratories under penalty of being subjected to a higher rate.

## OSHKOSH TRACTOR TO MOVE

STEVENS POINT, WIS., July 18—The Farmers Tractor Corp., originally established at Oshkosh, Wis., has completed the transfer of its business and offices to Stevens Point, Wis., where temporary works have been opened pending the construction of a machine and assembling shop during the fall and winter months. A. J. Patch is vice-president and chief engineer. The company announces the appointment of Page, Beck & White, Inc., mechanical, automotive and industrial engineers, to act for it in a consulting capacity in matters pertaining to manufacturing plant, building and construction.

## COLEMAN TRACTOR IN COURT

KANSAS CITY, MO., July 20—Bankruptcy proceedings have been brought against the Coleman Tractor Co. by the following creditors, with amounts owing them: B-R Electric Co., \$30.59; Butler Mfg. Co., \$517.95; Bonniwell-Calvin Iron Co., \$1,688.88.

## 3622 Machines Sent Back from Overseas

Heavy Traffic for Fiscal Year—  
Exports Off Over \$33,000,000  
from 1920

WASHINGTON, July 21—Preliminary figures compiled by the Bureau of Foreign and Domestic Commerce for the fiscal year show that 3,622 American made motor vehicles with a value of \$5,789,163 were returned to this country without payment of duty. The number for June alone was 518 with a value of \$911,785. The records do not show what proportion of the reimportations were the result of cancellation of orders.

Imports of foreign made vehicles for June were 34 with a declared value of \$63,029 and the total for the year was 1,051 vehicles valued at \$1,264,108.

June exports of passenger cars were 1,964 machines valued at \$2,057,490. The total for the year was 84,430 with a value of \$103,786,970, a decline of \$21,598,055 in value from the previous fiscal year. Exports in June, 1920, were valued at \$14,486,362.

Truck exports for June numbered 418 machines valued at \$531,234, making a total for the year of 17,598 vehicles valued at \$29,511,955, a decline of \$12,065,729 from 1920. Truck shipments in June, 1920, numbered 2,697 valued at \$4,216,502.

Exports of automobile parts, not including engines and tires, for June, 1921, were valued at \$2,211,528. This was almost double the May, 1921, exports which were valued at \$1,171,071, with a total for the fiscal year of \$67,409,570, an increase of \$1,116,818 over 1920. Exports for June, 1920, however, were valued at \$7,429,188.

Total exports of automotive engines decreased in value \$10,784,195 to a total of \$23,526,568 for the year. There was a decrease for the year of \$5,747,689 in the value of tractor engine shipments.

### NEWS BULLETINS

DETROIT, July 21—To finance the production necessary to meet current orders, the Lincoln Motor Co. has arranged to issue bonds to the amount of \$2,500,000. Half of this issue already has been purchased by the directors of the company. This arrangement makes \$1,250,000 available immediately and leaves the other half of the bond issue in reserve for an emergency. The issue is secured by first mortgage on the fixed assets of the company. The same group of men is continuing its indorsement of all bank notes. Production is running at the rate of 300 cars a month and orders are highly satisfactory. More than two thousand Lincoln cars have been placed in the hands of owners in the past eight months. The inventory is being balanced and reduced and more than \$1,000,000

has been paid on trade acceptances since the beginning of the year.

TOLEDO, July 21—John N. Willys, who arrived here yesterday for a conference of the Willys-Overland factory, announced that the company would make "a very substantial payment" on its bank indebtedness on August 1. The company now has \$10,000,000 in cash, he said, and its bank obligations total only \$20,000,000. Willys said there would be no further reductions in price of Willys-Overland cars.

NEW YORK, July 21—The Netherlands Aircraft Mfg. Co., of Amsterdam, Holland, controlled by Anthony G. H. Fokker announces that it soon will begin the manufacture of Fokker 'planes of all types in this country.

NEW YORK, July 21—The Federal Reserve Bank of New York has reduced its rediscount rates from six per cent to five and one-half per cent on all classes of eligible paper. The reduction is the third this year from the peak rate of seven per cent. The five and a half per cent rate also has been established by the reserve banks of Boston, Philadelphia and San Francisco.

## Delay Refinancing of the Willys Companies

NEW YORK, July 18—Refinancing of the Willys-Overland Co. and the Willys Corp. has been delayed by the reluctance of the preferred stockholders to give their assent to the issuance of mortgage bonds. One of the provisions in all the Willys preferred stock is that the consent of 75 per cent of the holders must be obtained before any securities can be issued. The bankers committees will issue a report this week telling of the progress which has been made, but it will make no reference to the tentative plan agreed upon. Notwithstanding the delay, it is certain that the financial affairs of the companies eventually will be worked out in a satisfactory manner.

The Willys-Overland Co. is making a highly satisfactory sales showing and the same is true of the Electric Auto-Lite Co. The New Process Gear Corp. also is receiving substantial orders. It is understood that when the reorganization and refinancing are worked out, the big Elizabeth plant, now a part of the Willys Corp., in which the "Chrysler Six" will be built, will be a separate unit, although there will be no change in its control.

## Report Says Ford Will Cut Cars in England

LONDON, July 8 (By Mail)—The outstanding automobile event of this week is the further reduction of Ford prices and the report current in inner trade circles that a further drop is impending. The present price of the Ford touring model is \$1,100 (at pre-war rate and the price reported as likely to follow would reduce it by a further \$100 to \$200.

## Reorganization Plan for Mercer Motors

Purchasers Found For Bonds If  
Creditors Take Notes for  
80% of Claims

NEW YORK, July 21—After months of laborious effort, the committees representing bank and merchandise creditors have evolved a satisfactory plan for the reorganization of the Mercer Motors Co. This plan has been accepted by the representatives of both classes of creditors.

As a preliminary it calls for an agreement with the officers and directors of Hare's Motors, the selling organization, for the cancellation of all contracts and options. The committees have expressed formally their appreciation of the helpful attitude of Hare's Motors and it is recognized that general conditions rather than lack of ability on the part of the executives were responsible for the difficulties of Mercer.

Purchasers have been found for \$500,000 of first mortgage bonds, which will provide working capital, contingent upon the issuance of \$2,000,000 in sinking fund collateral notes bearing 7 per cent interest, which both bank and merchandise creditors would be expected to accept for 80 per cent of their claims. If the creditors agree to this proposal they will be paid 20 per cent of their claims on Aug. 1 or as soon thereafter as possible and an additional 5 per cent before Dec. 31. The notes would be secured by the assets of the Simplex Automobile Co., Inc., and 50 per cent of the net earnings of the Mercer company would be paid over to a trustee for the benefit of creditors.

The purchasers of the bonds would insist upon the resignation of all the present officers and directors and the right to elect a new board as well as a release from the contract with Hare's Motors.

It is proposed to redesign the Mercer car and get it on a commercial production basis of 30 cars a month this year and to double that output in 1922.

A letter will be sent this week to bank and merchandise creditors of the Locomobile Co. asking them for an extension of time, probably for six months, in the hope that by the end of that period some plan can be evolved for the reorganization of that company. If an extension is granted it is believed this can be done.

## Goodyear Has Best Week in History of Company

AKRON, OHIO, July 18—Goodyear Tire & Rubber Co. dealer sales for the week ending July 16 were the largest in the history of the company, officials report, with sales to dealers of more than 72,000 complete tire units. Tire stocks are low, according to expert analysts, and present indications point to a shortage of tires if the present rate of buying keeps up, unless all manufacturers at once increase production.



# No Entangling Alliance for Durant

## Mergers Not Planned Stockholders Told

### Statement Says Company Does Not Intend to Monopolize Industry

NEW, YORK, July 20—Most of the innumerable rumors about the ultimate plans of W. C. Durant are set at rest by the definite statement of policy contained in a statement which will be mailed this week to stockholders of Durant Motors, Inc., outlining the progress made thus far in developing the enterprise. In this connection the statement says:

"Durant Motors, Inc., was not organized for the purpose of monopolizing the motor car industry or effecting a combination, merger or consolidation of existing companies in either motor car or accessory lines, and, regardless of rumors to the contrary, will consider no combination, mergers or entangling alliances with any firm or corporation identified with the production of automobiles at this or any future time.

"Durant Motors, Inc., was organized to build a line of popular priced motor cars designed by Mr. Durant, the business owned by Mr. Durant and his close associates, with no partner other than the investing public."

This disposes of the popular belief that Durant is building up his new enterprise with a view to selling out to the General Motors Corp. when it is built up to the right proportions. It also settles the report that he has acquired a very substantial interest in the Studebaker Corp. in the expectation of merging that company with his.

It can be stated, however, that the proceeds of sales of Durant stock are working and earning dividends. In fact, it is understood that the investments made have been so profitable that it would be possible at this time to pay a dividend on all Durant Motors stock which has been sold.

In addition to these statements in regard to policy, the letter to the stockholders says:

#### The Durant Statement

"Since its organization in January, 1921, three companies have been incorporated and are being independently financed to assemble the Durant line of popular priced cars. These are:

"Durant Motor Co. of New York.

"Durant Motor Co. of Michigan.

"Durant Motor Co. of California.

"Each of these companies, with respect to policy, product, operating and sales, will be controlled by Durant Motors, Inc. The parent company will be responsible

for and assume all engineering expenses in addition to providing proper and dependable sources of material supply. For this service and the use of patents, inventions, name, etc., Durant Motors, Inc., is to receive a major participation in the profits.

#### Will Produce in August

"Durant Motor Co. of New York, capitalized at \$3,000,000, will assemble the Durant car at Long Island City for distribution in the Atlantic Coast territory and export markets. The plant has a capacity of 25,000 cars a year and will be in production next month. F. W. Hohensee, president and general manager of the company, was formerly in charge of the operation of the entire group of Chevrolet factories.

"Durant Motor Co. of Michigan, capitalized at \$5,000,000, with headquarters at Lansing, Mich., is building in that city a modern plant with a capacity of 40,000 cars a year. The building contract specifies completion by November 1 next. E. Verlinden, who has been responsible for the development of the splendid business of the Olds Motor Works, is president and general manager of the Michigan company, which will assemble and distribute the Durant car in the territory between the Adirondacks and Rocky Mountains.

"Durant Motor Co. of California, capitalized at \$3,000,000, has secured an excellent location at Oakland, Cal., and plans are now being drawn for a modern plant having a capacity of 20,000 cars a year. Construction work will go forward on a schedule to permit automobile production in March, 1922. R. Clifford Durant, who until recently was at the head of the Chevrolet Motor Co. of California, is president and general manager of this company, which will assemble the new Durant car for distribution in the Pacific Coast territory.

#### Get Another Plant

"In addition to the above:

"Durant Motors, Inc., will on August 1, 1921, come into possession of the splendid plant in Muncie, Ind., now being operated by the Sheridan Motor Car Co. Division of General Motors Corp. A new company to be known as Durant Motor Co. of Indiana, capitalized at \$3,000,000, will be organized for the purpose of manufacturing at Muncie an exclusive six-cylinder car to sell at a popular price. D. A. Burke, formerly manager of the Chicago branch of the Buick Motor Co., will, as president and general manager, direct the affairs of the new operating company."

When Durant comes into possession of the Sheridan plant the name of the car will be changed to the "Durant Six."

## Deny Sale of U. S. Cars at Cut-Rate Prices

### Official Report Says Ex-Service Men Are Not Getting Machines Cheaply

WASHINGTON, July 20 — Official denial was made to-day to reports that the War Department had changed its policy of selling surplus motor vehicles by offering for sale, in blocks of ten, Ford runabouts and touring cars at nominal figures. The statement that trucks and touring cars are being sold to men in the service and ex-service men at cut rate price and that trucks are being leased for one hundred dollars per year, were branded as erroneous. The official statement reads:

"The only motor vehicles available for sale at this time are unserviceable ones. Under acts of Congress all serviceable automobiles not required for the use of the army are transferred to other Government departments to meet their requirements. The unserviceable cars—those not desirable by any other department—are offered to the public at public auction. Less than 10,000 unserviceable motor vehicles had been sold to July 9, 1921. More than 42,000 serviceable cars had been transferred to other Government departments up to that date.

"The records show that to July 3, 30,303 automobiles had been transferred to the Public Roads Bureau, Department of Agriculture, the Post Office Department had requisitioned 8286, the Public Health Service 1565, the Engineer Corps River and Harbor Works 305, and the Navy and Marine Corps 1273.

"A total of 51,444 motor vehicles had been disposed of to July 9, to which 41,955 had been transferred to other Federal bureaus."

#### TIRE PRODUCTION 70,000

AKRON, July 19—Tire production in this city now exceeds 70,000 which approximates 60 per cent of capacity for all factories. Goodyear is making 24,000 a day. Firestone 21,000, Goodrich 15,000, Miller 4,500 and the smaller companies a total of about 7,000.

#### DETROIT EMPLOYS 4,333 MORE

DETROIT, July 18—Reports from the 79 members of the Detroit Employers Association for the week ended July 12 showed 113,181 men on the payrolls, an increase of 4,333 over the previous week. There were 14,782 workers on part time, however, as compared with 9,251 the week before. Ford Motor Co. is running at full speed and contemplates a July production of 109,000.

# Export Trade Shows Improvement

## Business Increases in Foreign Fields

### Export Lists Show General Improvement in June—Automotive Trade Leads

NEW YORK, July 19—Business conditions in many of the foreign countries making up the export lists of the American automotive companies showed general improvement during the month of June, according to the monthly cables received by the Bureau of Foreign and Domestic Commerce from its trade commissioners and commercial attaches in the larger capitals of the world. This was especially true in Australia, China, France, Great Britain, Germany and South Africa.

#### Demands in Spain

Of special interest to the automotive trade is the dispatch from Commercial Attache Cunningham at Madrid that the demand in Spain is reviving and sales increasing of American automobiles, accessories and equipment, despite the fact that the Spanish markets are generally overstocked. Likewise of concern is the statement, dated July 5, from Singapore that German motor trucks are selling steadily in the Dutch East Indies. Aside from this indication of activity, Trade Commissioner Fowler declares that business is very dull and that there is little demand for imported commodities.

Little change in regard to other countries is reported. The process of deflation is continuing, but slight improvement is recorded by the trade observers.

The financial situation in Australia is reported as having shown some improvement, despite the decline in exchange and stocks of import merchandise have been reduced somewhat, resulting in inquiries being renewed in some lines. Commissioner Farin believes that wholesalers may begin buying again after the stock taking and closing of the fiscal year on June 30.

#### Chinese Outlook Better

The Chinese trade outlook is stated to be better than at any time during the last year. With less speculation in silver, the financial situation is improving and June settlements on the Shanghai stock exchange were the most encouraging since the armistice. Activity in highway and road construction is reported in North China.

Unrest and strikes have increased in Japan and money has become tighter, although bank loans have increased. No transactions of any importance are reported from the Straits Settlements and business remains at a standstill.

Trade Commissioner Butler, however, describes increased activity from Paris, where many new loans are being authorized for purposes of reconstruction and improvements. The labor situation is said to be growing more satisfactory. French war stocks have been liquidated to the value of 6,000,000,000 francs, leaving about 750,000,000 yet to be cared for. It is estimated that 18 months will be required for the complete liquidation of all French and American army supplies.

The financial and industrial situation in Germany has improved and checking and savings accounts in the banks are increasing. Unemployment is decreasing and great betterment was shown in June in the boot and shoe, clothing, cotton spinning and woolen goods lines.

The crisis of the readjustment will not be reached in Italy before August or September, it is stated, and unemployment is decreasing, although there seems to be less tendency toward unrest and industrial strikes. The depression in trade and finance in Scandinavia shows no signs of improvement, although deflation is occurring and speculation is decreasing.

#### Optimistic Feeling

Contrasted with this, however, is a general feeling of optimism in England. This is due to the reduction of the bank rate and the settlement of the coal strike. Prices of cotton, silk, hides, foodstuffs and flour showed some tendency to strengthen during the latter part of June but the prices of wool, flax, jute, sugar, coffee, wheat, oil, rubber, copper, tin and iron weakened. Settlement of the engineering trade wage dispute relieved a grave industrial situation. All of which brings forth the comment that the British industrial situation presents a bright aspect.

Argentina was reported in about the same condition as in June. There has been a notable improvement in the labor situation.

## British Automobile Makers Will Convene

LONDON, July 1 (By Mail)—A conference of British automobile makers and British automobile dealers throughout the world is fixed for the latter part of the month. The conference should do something to explain to British automobile makers why they have lost so much ground overseas. Other nations have the labor evil factor to contend with, and beyond all there is the fact that American labor is paid at a higher rate, apart from the workers' earning and being able to earn more than the British worker, yet produces and sells so much cheaper and having 83 per cent of the world's trade. This is one of the problems the conference needs to solve.

## Ford Sales Multiply in Peruvian Cities

### A. C. Shumway Opens Branches in 11 Cities—See Good Chance for Higher Priced Cars

LIMA, PERU, June 30 (Special Correspondence)—Two features in the automotive market of Peru have become prominent in the last year, although in a certain manner they are contradictory to each other. The first development in Peru is the extensive plan formed for the marketing of Ford automobiles, trucks and tractors.

The Ford representative in this country, A. C. Shumway & Co., with head offices here and from which it also handles the business in Callao, has opened branches and sub-agencies in eleven other cities and towns. The branches are at Pisco, Ica, Chincha, Trujillo, Chiclayo and Huancayo and the sub-agencies at Canete, Huacho, Supe, Piura and Pacasmayo. These localities range in population from 4000 to 22,000. Many of them are seaports, but each is the center of a rich agricultural or mining territory which heretofore has not been properly represented by automobile dealers and service stations. The Shumway branches will handle only Ford products and do Ford service work.

#### Right in Market

Automotive manufacturers and sellers of automotive products should watch these places and get in touch with dealers in the same cities. These places are now markets for Ford parts, tires and accessories. Soon, that is within a year or a year and a half, these localities will be markets for higher priced cars than the Ford.

The second development is the arrival of European cars. There are now to be seen in Lima the Fiat, Renault, Daimler, Benz, Opel, Wolsley, Mercedes and Minerva.

#### Trucks and Tractors

The Fiat and Renault agents have trucks and tractors as well as automobiles. The Daimler has a truck but no tractor. The Daimler, to which reference is made, is an English product. Curiously enough, there is a truck by the same name manufactured in Germany and several of them are in use in Lima. In addition to the German Daimler there is a Bussig, a French DeDion Bouton and a Draga, a Scotch truck. The Fiat, Renault and Daimler are the only companies seriously represented. The other makes are for the most part direct importations by consumers.

## Dallas Shows Gain Over June Business

### 10 to 15 Per Cent Increase in First Ten Days, Dealers Declare

DALLAS, July 20—Canvass of 15 retail automobile concerns in Dallas revealed that sales during the first 10 days of this month showed an increase of from 10 to 15 per cent over sales for the same period in June. Dealers declare this is due to the fact that the marketing of grain crops is pouring some \$30,000,000 into the pockets of the grain growers and as this money finds its way into other channels, financial stringency is loosened up and cars are bought.

The same retail houses declare prospects now are better than they have been in many months and say they expect to do a banner business during July and August. Another cause of increased sales is said to be the season for touring. Reduced prices were a decided factor in increased buying.

In addition to retailers reporting increased sales for the first 10 days of July, the used-car dealers declare they have never had better business. Retailers claim they are having more inquiries for cars right now than they had for a year and that generally these inquiries lead to sales.

Accessory and tire men also reported improved business during the early part of July. It is learned from wholesalers here that the automobile business over the territory generally is improving and that sales have increased during July.

### Denver

(Continued from page 136)

ness about further price drops, though some dealers report slower business. One dealer has sold six cars in July against 18 for the first half of June, but he had a rush then because the June 1 price drop attracted waiting buyers. He is now short on certain models demanded and also says July always was a slow month.

Another dealer reports 12 cars sold in July at retail against only three in June for the same period. This dealer believes that price restlessness largely has been overcome and another distributor expects his July total to exceed June sales of 44 at retail and wholesale.

Exact registration comparison is impossible because no July licenses are yet entered on the State records but leading dealers lean toward a slight gain.

### Atlanta

ATLANTA, July 20—Automobile business as a whole is less so far in July

than in June for the same period. Companies reducing prices July 1 are experiencing a good increase, but there has been a considerable falling off in sales of those cars reduced June 1. Ford sales are reported exceptionally brisk. Recent reduction in discount rates of the Federal Reserve Bank of Atlanta does not appear to be having any effect on sales. Continued low price of cotton is seriously affecting all lines of business and sales of automobiles to farmers as a result are far below normal.

It is too early in July to give an accurate comparison with June business, but as a whole dealers say business has been experiencing an upward trend in the past two or three months. This is exclusive of the stimulation caused when price reductions were announced.

### Louisville

LOUISVILLE, KY., July 20—As the season progresses, automobile sales are increasing rather than falling off, according to opinions of leading automobile dealers here.

Outstanding facts seem to be as follows:

The number of new purchasers of new cars is steadily increasing. That is, the number of persons buying cars who have never owned cars, and have not in consequence any "trade-ins," is increasing. This is particularly encouraging to the dealers, since the main end of the business must always be the sale of new cars. Price reductions, which have been on practically every make of automobile sold in Louisville, have established the market and created a new demand for automobiles.

On high priced cars, business, while apparently slow, is shown to be normal for this season of the year by a comparison with the last five years. The reason this class of cars moves slower now than during the spring and fall seasons is that purchasers of high-priced cars are away from the city during practically all of the summer.

### New Orleans

NEW ORLEANS, July 20—Four out of five largest local dealers say the first part of July sales are under for the same period in June when business was stimulated by price reductions. The Dodge distributor sold 95 cars in June and is doing about 60 per cent of this business in July. United Motor Car Co., Peerless distributor, reports very light July business.

Capital City, Studebaker dealers, report sales about one car per day, slightly under the June rate. Bernstein Glenny Co., Buick distributor, reports total sales for spot and future delivery and used cars in excess of June. Cadillac reports about 50 per cent of June business.

## Production Figures Sought by Nation

### Director of Census Calls Conference of Representatives of Automotive Industry

WASHINGTON, July 18—Director of the Census Stewart will hold a series of conferences with representatives of the automotive industry and other large trade and craft organizations to discuss the manner and methods for collecting and publishing production statistics for 1921. The meetings will be under the auspices of the National Association of Manufacturers, although non-member organizations will participate, because it is purely a Government conference.

Secretary Hoover has given directions to the Director of the Census to collect current commodity statistics under the provisions of Section 8 of the act of Congress of Feb. 14, 1903, which authorizes the secretary to make such special investigations and reports "which he, himself, may deem necessary and urgent." The primary design of this conference, the association has announced, is to determine the character and form of the schedules to be used in the collection of the census of 1921, which work begins Jan. 1, 1922, and to relate such work to the collection of such current commodity statistics as are desired by the Secretary of Commerce and which may be useful to the industries of the country.

The conference will be of the same general character as that assembled by the National Association of Manufacturers at the invitation of the Director of Census in 1919 and which proved of such value as to call for commendation of the director in the annual report for the year 1920.

President Edgerton will promptly issue a call for the conference which, it is stated, may result in the working out of a method of direct co-operation between trade and craft organizations with the Bureau of the Census, whereby they may collect for and on behalf of the census and themselves the figures relating to their industry.

### Toledo

TOLEDO, July 20—Automotive dealers here believe that the buyers' strike, as far as it effects automobiles and accessories, has been broken.

The retail sales here show that to be the fact. Every dealer made a record during the month of June, and sales are continuing well this month.

The lowering of prices has demonstrated that people have had the money to buy but were waiting. Toledo dealers have been amazed with the amount of cash business they got these days. In the last six months or more nearly 80 per cent of the automobiles sold here have been on payment plans.

## Chevrolet Prices Cut Second Time

### Reductions on All Models, Effective July 15 Announced in Detroit

DETROIT, July 20—Another reduction in prices on all models in both its lines has been made by the Chevrolet Motor Co., effective July 15. In the "FB" line the touring car and roadster have been cut from \$1,185 to \$975 and the coupé and sedan from \$1,885 to \$1,575. On the "490" models, the touring car has been reduced from \$645 to \$625; the roadster from \$635 to \$625; the sedan from \$1,195 to \$975 and the coupé from \$1,155 to \$975. The prices are f.o.b. factory. This is the second of the General Motors Corp. subsidiaries to make a second price reduction since the readjustment began. The Oakland led the way.

### KISSEL MAKES SECOND CUT

HARTFORD, WIS., July 20—A second reduction in prices is announced by the Kissel Motor Car Co. The standard touring car is reduced from \$2,775 to \$2,475, a total cut of \$1,000 since the price readjustment began. The following reductions are made on the "de luxe" models: Speedster and touring car, from \$3,475 to \$2,975; coupé and sedan from \$4,275 to \$3,775. This makes a total reduction of \$800 on all the "de luxe" models.

### FORD CUTS FREIGHT RATES

COLUMBUS, July 18—The Detroit, Toledo & Ironton Railroad, owned by Henry Ford, has filed with the Public Utilities Commission new freight rate schedules making a general reduction in freight rates on the road 20 per cent, to become effective August 2, if the commission approves.

Before Mr. Ford's road can apply reduced freight rate to interstate traffic it will have to file them 30 days in advance with the Interstate Commerce Commission, which may suspend their effectiveness pending investigation if it sees fit. In view of what Chairman Clark has recently said about a general reduction, railroad men think the commission will not approve one at this time.

### WANT LOWER RUBBER RATE

NEW YORK, July 18—A hearing will be given by the Consolidated Classification Committee, which represents all railroads throughout the country, on the request of the traffic committee of the Rubber Association of America for a reduction in all territories of the carload rating on crude rubber. The committee wants the rating taken from the fourth class and to the fifth.

### BUYERS GET NEW ROADSTER

DETROIT, July 18—The Wills Sainte Claire roadsters are now in production

and the cars of this model are already getting into the hands of purchasers. The roadster body is mounted on the standard chassis with a wheelbase of 121 in. The roadster seats two in the front seat and two more in a rumble seat.

The standard colors provided are Lady Mary maroon, Newport blue and Liberty green. The radiator, hub caps and side or courtesy light are nickel plated on the roadster. Like the touring car, the roadster is equipped with disk wheels painted to correspond with the body. The price of the roadster is \$3,275 f.o.b. Marysville. This is \$75 more than the touring car. Coupé and sedan bodies for the Wills Sainte Claire line are now under construction and will shortly be on the market.

### Lansing Plant of Reo Reopens on Schedule

DETROIT, July 18—The Reo Motor Car Co. of Lansing, which closed July 2 for two weeks, reopened to-day on schedule and is operating in all departments. R. C. Rueschaw, sales manager, said that the simultaneous vacation plan which was tried out this year for the first time apparently has been highly successful and unless unexpected opposition develops it probably will be adopted permanently. The trial of the plan by Reo has been watched with interest by several Detroit companies and in view of its success its adoption is likely to become widespread. The opportunity given for plant repair and for a general clean-up of all the production departments is said to have many advantages. Reo has resumed on a full time schedule.

### SUE VERLINDEN IN NEW YORK

NEW YORK, July 18—The General Motors Corp., which recently brought suit in Michigan to recover from Edward Verlinden approximately \$500,000, which he is alleged to have obtained wrongfully by cashing a check made out in his favor while at the head of the Olds Motor Works, has brought a virtually identical action in the Supreme Court of this State on the theory that he has large property holdings in New York. Verlinden's friends deny, however, that he owns property here.

### TRAILER FIRM WILL GO ON

EDGERTON, WIS., July 18—The Highway Trailer Co., Edgerton, Wis., intends to begin work within a few days on the reconstruction of its main shop building, which was almost totally destroyed by fire on the night of July 4, causing a loss estimated at \$260,000, with insurance of about \$90,000. Work has been delayed somewhat in order to enable officials of the company to determine the responsibility, if possible. At the request of the concern, the State fire marshal's office is making an investigation of cause. The building was 190 x 875 ft. in size, part two stories, of solid brick, with mill roof trusses and concrete floors.

## METAL MARKETS

IN judging whether continuing reports of price cutting in the steel market are based on facts and whether the recently downward revised schedules of the chief interest and the leading "Independents" will once more deteriorate into a nominal list observed solely as a means of cutting under, the automotive purchasing agent must exercise extreme caution. As on previous occasions, a large number of steel producers look once more to the automotive industries to set the wheels of representative demand in motion. As far as can be positively ascertained, there has been no price cutting on fresh inquiries. When the Bethlehem and United States Steel corporations promulgated their new schedules some business was in process of negotiation at lower levels than those which these interests announced, and it is these figures which came to light recently and were forthwith interpreted as fresh evidence of a repetition of the previous situation in which "official" prices were gradually undermined by the intensive contest for what little business the market offered. Then, again, there are still innumerable resale transactions in which prices considerably lower than for "production" steel prevail. A Chicago automotive instrument maker offered a few days ago from his surplus free cutting cold-drawn steel at \$2.50 cwt. base and hot-rolled strip steel at \$2.25 cwt. base, as compared with \$2.80 and \$2.50 asked by producers. The price named by this reseller for cold-rolled strip steel, however, was \$4.25 cwt. base, which is also the producers' price. There has been a good deal of talk about certain sheet mills cutting \$5 per ton under the "official" price. This appears to be the result of confusion, certain mills having based prices for certain gauges of sheets on the plate schedule. Buyers are testing the market in every conceivable manner. A bid of \$30 for a 500-ton order of sheet bars is a case in point. As stated before, further downward revision of steel prices waits upon two factors, lower freight rates and further downward adjustment of wages. Progress is being made in the latter direction, but as for the former there is still no indication when relief may be expected. There is, therefore, little likelihood of a further cut in "official" prices in the immediate future. Market news is scarce in the dog-days, and it is only natural that there will be frequently recourse to speculation as to when the next change in prices will come. Meanwhile, however, there is a slow but nevertheless perceptible improvement in activities, especially of the smaller mills.

**Pig Iron.**—Automotive foundries are taking on larger tonnages, especially so because prices are thought to have reached levels at which all risk is eliminated.

**Steel.**—So far the principal activity in the market for cold-drawn steel bars consists of releases from passenger car builders, with fresh business confined to small tonnages for filling in purposes. The leading builder of low-priced passenger cars is reported to have placed additional orders. Cleveland reports have it that an order for 10,000,000 bolts is about to be placed by a Detroit automotive interest. Most of the sheet business coming out is for less than carload tonnages.

**Aluminum.**—The Aluminum Co. of America has reduced its base prices, making 98 to 99 per cent virgin ingots 24½ cents, No. 12 alloy 23.80 and sheets 39.10. As a result of this reduction the entire outside market is unsettled and lower.

**Copper.**—The market is flat and domestic demand conspicuous by its absence.

**Tin.**—At present prices tin is considered cheap, and some consumers are buying moderately because they consider values advantageous.

## FINANCIAL NOTES

Velle Motors Corp., in a comparative balance sheet of Dec. 31, shows assets for 1920 as \$7,729,930, as compared with \$5,478,529 for 1919. Cash on hand for Dec. 31 is shown as \$94,550, against \$104,293 for the previous year. Notes receivable are \$76,594, and the year previous \$5,400. Accounts receivable are \$564,301, while the year before they were \$666,057. Inventories total \$4,686,805, while in 1919 the sum was \$3,234,105. The company's liabilities show a gain. The figures for 1920 are \$7,729,930 and for 1919 \$5,478,529. Notes payable in the new balance sheet come to \$1,787,911. In 1919 they were \$400,000. Accounts payable are \$517,135, against the old figure of \$470,379. Other figures are: Profits discounted, 1920, \$449,592; 1919, \$387,949; surplus, \$706,178, 1920; \$1,884,970 in 1919.

International Motor Truck Corp. profits for April were \$108,000, for May \$150,000 and for June \$250,000. For the first half of the year they approximated \$500,000. This will not cover preferred dividends for that period, but it is an exceedingly good showing for a time of acute depression. Plants are being operated at about 70 per cent of capacity. The company has reduced its inventory \$3,000,000 since the first of the year, it has no bank loans and about \$3,000,000 in cash.

Peerless Truck & Motor Corp., in a comparative balance sheet filed Dec. 31, 1920, shows calls of \$14,919,065, as against \$12,928,601. The net income is \$1,063,306, as compared with \$670,628 in 1919. The assets are \$13,854,667, against \$15,651,529. Inventories, 1920, \$5,410,080; 1919, \$3,918,767. Cash, 1920, \$421,312, against \$1,327,043 in 1919. The surplus in 1920 is \$5,603,557, against \$5,259,800 for 1919.

Wire Wheel Corp. of America, in a comparative balance sheet filed Dec. 31, shows assets in 1920 of \$6,121,305, against \$6,239,580 for 1919. Accounts receivable are \$229,725, against \$336,889; notes receivable, \$54,984, against \$2,713; inventories, \$1,395,883, against \$1,049,587; cash, \$142,644, against \$624,662. Notes and accounts payable, \$398,722, against \$186,417, and surplus, \$1,563,686, against \$528,103.

Root & Van Dervoort Corp., in its 1920 comparative balance sheet, shows assets of \$7,777,984, with cash of \$631,932; receivables, \$896,360; inventories, \$3,811,917; deferred charges, \$39,052. Notes payable come to \$3,328,550. Surplus shows \$1,466,792.

Franklin Automobile Co. on June 28 paid off the last of its bank borrowings, which on Dec. 31, six months ago, amounted to \$4,510,000; on Aug. 31 of last year, when the Franklin inventory reached its peak, bank loans amounted to \$4,785,000.

Merrill, Lynch & Co. and Cassatt & Co., are heading a syndicate for the sale of a new issue of \$1,500,000 Spicer Manufacturing Corp. ten year 8 per cent. sinking fund gold bonds, due July 1, 1931 at 99 and interest.

American Motor Body Co., in a financial statement for 1920, shows assets of \$23,153,028; accounts and notes receivable, \$1,191,416; cash, \$2,002,854; notes payable, \$322,500; accounts payable, \$898,371; surplus, \$269,457.

Kelly-Springfield Tire Co. announce a quarterly dividend of \$2 per share on the 8 per cent preferred stock of the company payable Aug. 15, 1921, to stockholders of record Aug. 1, 1921.

Motor Products Corp. has declared a regular quarterly dividend of \$1.25 a share on the Class "A" stock, payable August 1 to stockholders on record July 20.

Mullins Body Corp. has declared a regular quarterly dividend of \$2 a share on the preferred stock, payable Aug. 1 to stockholders of record July 23.

Hood Rubber Co., declared the regular quarterly dividend of \$1.75 on preferred stock, payable August 1, to stock of record July 20.

Hale & Kilburn Corp., in a comparative balance sheet for 1920, show assets of \$4,632,091, against \$7,517,637 for 1919.

New Rotarian Will Make  
Transcontinental Run

HOBOKEN, N. J., July 20—The first Rotarian car to be manufactured by the Bournonville Rotary Valve Motor Co. will be given a transcontinental test run under the supervision of the American Automobile Assn. The engine, which has the Bournonville rotary valve, is the feature of this car and, during the test, the valve mechanism will be sealed. The valve will be calipered before and after the run to show that wear is negligible.

With the exception of the engine, the new car is assembled of standard parts. The important units are as follows: Columbia axles front and rear, Borg & Beck clutch, Brown Lipe gearset, Arvac propeller shaft and Parish & Bingham frame. The body work and equipment will be of the highest class and it is anticipated that the complete car will sell for approximately \$5,000. It is believed that these cars will serve to introduce and popularize this type of engine. Later it is intended to license the manufacture of this type of engine.

International Closes  
Its Springfield Works

SPRINGFIELD, OHIO, July 19—After keeping up above its schedule on light motor trucks for several months and slowing down for the past few weeks the Springfield works of the International Harvester Co. closed Saturday. Those identified with the company stated that the suspension of operations is due to a general slump in the motor truck business. They expect to see business forge ahead again in the early fall. Just when the works will resume operation is uncertain, it is stated.

Newmark Appointed  
Hawkins's Assistant

DETROIT, July 20.—J. H. Newmark, who for the past five years has been advertising manager of the Chevrolet Motor Car Co. in New York, has been appointed assistant to Norval Hawkins, who is on the advisory board of the General Motors Corp. in Detroit. Newmark has taken up his work in Detroit with his office located in the General Motors building. Newmark has been twelve years with General Motors companies, having served one year with Oldsmobile; six years with the Oakland Motor Car Co. and five with Chevrolet. Previous to his association with the Chevrolet company he was with Apperson Motor Car Co. in Kokomo, Ind.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

During the past week gold reserves of the Federal Reserve System increased \$14,738,000, and total reserves \$16,383,000. Bills discounted secured by Government obligations decreased \$55,593,000, while other bills discounted decreased \$41,790,000. The total bills on hand, July 13, were \$1,729,115,000 against \$1,832,499,000 the previous week. Total earning assets decreased \$95,913,000 to \$1,999,622,000. Total deposits decreased \$19,161,000 to \$1,693,991,000, while note circulation declined \$68,083,000 to \$2,608,803,000. As a result of these changes, the ratio of total reserves to deposit and Federal Reserve note liabilities combined, increased from 60 per cent on July 6 to 61.6 per cent on July 13, while the ratio of gold reserves to Federal Reserve notes in actual circulation, after setting aside 35 per cent against deposit liabilities, increased from 76 per cent to 78.9 per cent. Of the reduction in note circulation of \$68,000,000, the New York Reserve Bank contributed over \$30,000,000.

Money rates showed a slight tendency to rise during the week by reason of heavy Government withdrawals, necessitated by the retirement of \$132,886,500 5½ per cent certificates of indebtedness and the mid-month corporation disbursements. Call money ranged between 5½ per cent and 6½ per cent as against a range of 5½ per cent to 6 per cent in the previous week. Commercial paper rates for 60 to 90 days remained stationary at 6¼ per cent to 6½ per cent for the best grades, with quotations of 6½ per cent to 6¾ per cent for others, but the volume of transactions was comparatively light. Time money for all maturities up to six months was at 6 per cent, rising to 6½ per cent at the end of the week. There was no change during the week in the re-discount rates.

Wholesale prices for June, as indicated by the index number of the Bureau of Labor Statistics, continued to decline but at a relatively slower rate than for any previous month during the last year with the exception of May. The all-commodities index now stands at 148 against 151 for May and 154 for April. This represents a decline of 2 per cent compared with a decline of 1.9 per cent in the previous month. The rate of decline has shown a steady tendency to slacken since the maximum month's decline of 8.7 per cent in last December. Among the individual indexes, that for farm produce, which rose from 115 in April to 117 in May, declined to 113 in June. The food index dropped one point to 132 as also the cloths and clothing index which is now 180. The house furnishing goods index, which is at present the highest, declined from 262 to 250. The index for fuel and lighting declined from 194 in May to 187 in June, and that for metals and metal products from 138 to 132.



## MEN OF THE INDUSTRY

Walter C. Lindemann, M. E., of the A. J. Lindemann-Hoverson Co., Milwaukee, was elected president of the Milwaukee Engineers' Society at the annual meeting. He is 34 years of age and a graduate of the University of Wisconsin and the Imperial Engineering University at Charlottenburg. Arthur Simon, of the Cutler-Hammer Mfg. Co., was elected vice-president; Fred H. Dörner, power plant manufacturers' representative, secretary, and Albert Blatz, Jr., president Standard Separator Co., treasurer. Trustees for three years are: M. A. Beck, Milwaukee Electric Crane & Mfg. Co.; Harold Falk, general superintendent Falk Corp.; Herman Schiffin, Allis-Chalmers Mfg. Co.

Rudolf Hokanson, vice-president and general manager Nash Sales Co., Milwaukee, distributor of the Nash line, and his brother, Emil Hokanson, president of the Wisconsin Oakland Co., distributor of the Oakland, accompanied by their wives, depart July 25 from New York on the steamer Paris for Le Havre, to spend about three months in touring Europe. They will visit the battlefields and then proceed to London and Copenhagen, thence to southern Sweden to visit their parents. They will then motor to Stockholm and across Sweden to Norway and back to Gothenburg, returning to America about Sept. 29.

Donald P. Hess has become general manager of the Columbus plant of the Timken Roller Bearing Co., succeeding C. N. Replogle, who has resigned. Hess has been connected with the Timken Roller Bearing Co. at its headquarters plant in Canton, Ohio, for nearly three years as assistant works manager, in direct charge of steel and bearing production. His connection with the automotive industry extends over a period of about ten years, during which time he served as chief of the priority section of the motor transport section in Washington during the war.

H. J. Thorkelson, M. E., formerly assistant superintendent of the J. I. Case Plow Works Co., Racine, Wis., but since 1914 business manager of the University of Wisconsin, Madison, has resigned to become associated with the General Education Board, New York City, to assist colleges and other educational institutions in problems of organization, budget and financial management. Mr. Thorkelson is a graduate of the College of Engineering, University of Wisconsin, 1901.

J. A. Flannery, a well-known automobile export man, has been appointed assistant export manager for the Haynes Automobile Co. of New York, according to an announcement by E. W. Headington, general manager of the New York Haynes company. Mr. Flannery has had wide experience in the export departments of leading American automobile companies, and is a specialist in the analysis of foreign markets, from the sales point of view.

A. W. L. Gilpin, for six years manager of the Milwaukee branch of the Ford Motor Co., has been promoted to district manager, was tendered a banquet at the Milwaukee Athletic Club by 208 Ford dealers of Wisconsin. Mr. Gilpin has transferred his headquarters to Chicago, as manager of the Middle Western branches and assembling plants.

F. E. Greene, who has years of experience in designing and manufacturing in art metal products, will have complete charge of the

production and distribution of the English & Mersick Co., which will commence the manufacture of a complete line of artistic interior mountings and fittings, including dome lamps, etc., at New Haven, Conn.

H. M. Sallabury, export manager for the Maxwell Motor Sales Corp., sailed Thursday, July 14, on the S.S. Mauretania for England, France and Holland, where he will spend some time in looking over the field with a view to determining what may be expected from that quarter in the coming year.

## INDUSTRIAL NOTES

Allith-Prouty Company, Danville, Ill., has purchased the plant and good will of the D. & G. Shock Absorber Company, manufacturing various kinds of motor vehicle accessories at Crawfordsville, Ind., and has removed the machinery and other supplies to the former's plant at Danville. The D. & G. company is one of the earliest in this field and has been doing a prosperous business for many years. S. E. Kerr, who has been superintendent of the Crawfordsville plant, will be retained by the Allith-Prouty company and possibly a number of the traveling salesmen. For the past six years the purchasing company has been furnishing the castings and various other parts for the absorber company, and it was decided that the overhead expense could be greatly lessened by the consolidation of interests, much of the present administrative cost to be eliminated by the amalgamation. "We hope to increase the production greatly," announced President H. C. Smith of the Allith-Prouty company. "We will make the shock absorber one of our leading lines."

The Moloch Co., Kaukauna, Wis., a consolidation of the Kaukauna Machine Works Co., manufacturer of power hammers and other tools, and the Moloch Automatic Stoker Co., has started operations in its new plant, erected at a cost of \$200,000. There are two buildings, each 100 x 250 ft., of brick and steel, consisting of a foundry and a machine and assembling shop. The manufacture of Mayer power hammers, used widely in automotive shops throughout the world, is being increased about 100 per cent, and several larger sizes are being added. The other major department builds automatic stoking devices for boiler houses of steam generating plants.

The A. H. Petersen Mfg. Co., 1614 Fratney Street, Milwaukee, for several years one of the largest exclusive manufacturers of tools and dies in the Middle West, is discontinuing this line and will concentrate on the manufacture of portable electric drills and similar equipment for automotive shops, garages, machine works, etc. The plant is being retooled and a regular production schedule will be resumed about Aug. 1 or 15 with 200 operatives.

Transport Truck Co. has completed arrangements with Keegan, Aprahamian & Co. of New York to take charge of transport business in Japan, China, the Philippines, Dutch East Indies, French Indo-China, Malay states, Straits Settlement, Burma, Ceylon, India, Persia, Egypt, Arabia, Siam, Australia, New Zealand, Tasmania and South Africa.

The Co-operative Axe & Tool Co., Chicago, operating plants in Chicago and Cleveland, Ohio, is establishing a third works in Green Bay, Wis., in an existing building, which is being equipped for electroplating and polishing. Later a steel refining plant and a drop forge shop will be added. E. D. Woods of Chicago is general manager.

The McAvoy Mfg. Co. of Racine, Wis., a pioneer manufacturer of winter tops for passenger cars, bodies, trimming, curtains, etc., has incorporated its business as the Wisconsin Top Co., Inc., with a capital stock of \$200,000. The incorporators are C. V. McAvoy, L. M. Johnston and A. M. Kalamattiano.

Republic Rubber Co. (C. H. Booth, receiver) resumed operations in the production of pneumatic tires, tubes and solid tires Monday, July 11, at Youngstown, Ohio. The mechanical goods manufacturing departments will resume Monday, July 18.

McCord Mfg. Co., Inc., reported July 12 that the company had placed its two plants at West Pullman, Chicago, on the market.

## Electric Service Men Discuss Rate System

NEW YORK, July 18—The relation between the car dealer and the electric service station was the principal topic of discussion at the meeting of the eastern section of the National Electric Service Association held here. H. R. Cobleigh of the National Automobile Chamber of Commerce brought out the importance of taking the owners' viewpoint and discussed briefly the advantages of the flat rate system in selling service.

J. H. Hearnan of Trenton, N. J., read a paper in which he emphasized the importance of securing the co-operation of car dealers in getting purchasers of cars to register the electric equipment on the car with the electrical service station. I. McCulla, service manager of the Bijur Motor Appliance Co., presented some ideas on inventory systems.

A dinner was held in the evening at which Harry Tipper, business manager of AUTOMOTIVE INDUSTRIES, spoke on "The Value of Organized Effort."

## STORAGE BATTERY MAN DIES

NEW YORK, July 18—The death is announced of Albert Taylor, manager of the North Atlantic district for the Electric Storage Battery Co. He passed away a few hours after becoming ill in his office in this city. His home was in New Rochelle. He was born in Liverpool, England, in 1864. Taylor joined the Electric Storage Battery Co. as a salesman in 1898 after having served with the Edison, General Electric, the United States Electric, the Westinghouse and Stanley Electric companies.

## PACKARD SALES ARE HEAVY

NEW YORK, July 18—The Packard Motor Car Co. of New York reports that for the six months ended June 30 it sold 563 passenger cars and 493 trucks in the New York territory. Net profits after all charges were \$182,000. July has shown a large increase in "twin six" sales.

# Calendar

## SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair, conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28 - Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 27-Dec. 8—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 5, 1921—Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.

Sept. 23-Oct. 2—Berlin, German National Automobile Show,

Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador, Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibition in connection with the Brazilian Centenary Association Automobillista Brasileira.

## CONVENTIONS

Sept. 14-15-16—Portland, Ore., Credit Convention Motor and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## RACES

July 25—Grand Prix, Le Mans.

Labor Day—Uniontown, Pa., Autumn Classic.

## Start Dredging Hudson for New Ford Factory

TROY, N. Y., July 20—Work on dredging out the Hudson River at Green Island, near Troy, will be started this week, the first step in the erection of the new Ford Motor plant. A contract calling for four electric generators has been awarded to Allis-Chalmers Mfg. Co. Generator contract calls for the expenditure of approximately \$200,000.

Actual construction work on the building of the new power house has been started. The contract was secured by Stone & Webster, who will build the power plant on a Government dam erected some time ago and will have a capacity of 8,000 hp. As announced, Ford Motor Co. will build a tractor plant at Green Island but work on this has not yet been started.

Ford was one of the first to secure a license for erection of power plant under the terms of the Federal Water Power Bill. Permission was given by the Government last May.

## Culp Has Distributing Plan for the Tire Field

NEW YORK, July 20—A new plan of organization and distribution in the tire field is being presented by George K. Culp, Inc., this city, the head of which has been connected with the tire industry in various capacities for nine years.

The plan includes the association of a large number of rubber manufacturing companies and a large number of distributors on such a basis that all concerned will have a direct interest in the enterprise. Mr. Culp states that he is in communication with about 40 tire companies and has already practically consummated arrangements with the following:

Combination Rubber Mfg. Co., Bloomfield, N. J., to make Culp cord tires; Semple Rubber Co., Trenton, to make Culp red tubes; Chillicothe Tire and Rubber Co., Chillicothe, Ohio, for Ford size fabrics; Converse Rubber Shoe Co., Malden,

Mass.; A. J. Stevens Rubber Co. of Kansas City; C. Kenyon Co., Brooklyn.

The tire stores and distributors which have allied themselves with the proposition include: Bert A. Hosford Co., Denver; City Quick Tire Service Co., Tampa; Marathon Tire & Rubber Co., Milwaukee; H. S. Michael, Baltimore; Murray Tire Service Co., Kansas City; Pace Tire Co., Albany, Ga.; Easton Tire Co., Easton, Pa.

## Two Entries Drop Out of French Grand Prix

(By Cable to AUTOMOTIVE INDUSTRIES)

PARIS, July 20—The Talbot-Darracq and Sunbeam entries for the French Grand Prix which is scheduled for July 25 at Le Mans have been withdrawn because of dissatisfaction with the rules of the Automobile Club of France limiting the practice hours. The Fiat entries previously had been withdrawn on the ground that the race would not be representative of the best cars in Europe. As a consequence there is a possibility that the race may be abandoned.

## HAYNES ADDS NEW MODEL

KOKOMO, IND., July 19—The Haynes Automobile Co. has brought out a new model which will be known as the Haynes 75. The new car has a six-cylinder engine with cylinder dimensions of 3½ x 5 3/16 in., 132 in. wheelbase and 34 x 4½ in. tires. Prices are as follows: Roadster, \$2,685; 5-passenger touring, \$2,485; 7-passenger touring, \$2,485; Brougham, \$3,185; Sedan, \$3,485.

## FILE INCORPORATION PAPERS

STEVENS POINT, WIS., July 18—Articles of incorporation have been filed by the Hutter-Shutter Co., which is organized to manufacture a metal device designed for assisting in the heating and cooling of motor car and truck radiators. It is in the form of a shutter operated from the dash or by thermostatic device. The principals are A. D. Hutter, L. F. Hutter and H. M. Hutter.

## Suggest U. S. Hold Own Show in Great Britain

LONDON, July 1 (By Mail)—There is some outcry and protest against the refusal of the trade society—the S. M. M. and T.—to readjust the ballot process for allotting spaces at the trade show of cars. Last year's experience of the White City division of the show showed that Olympia had at least 30 per cent better attendance than the White City, and it was proposed that if the ballot for allotment were freed from the preferential or priority accorded to certain vested interests, it would reconcile the trade to a discrepancy which can only be remedied by a building big enough to house the whole show simultaneously.

The obvious course is for the importers of automobiles to frame their own show and run it as and when they like. Possibly Olympia will not be available to them, either because it is already booked up, or which is likely, the S. M. M. and T. have a restrictive bond with the owners.

## Tests of Tractor Plows in Italy Are Satisfactory

WASHINGTON, July 20—A trial giving satisfactory results was recently made at Sarissola, near Genoa, of tractor plows manufactured by the Ansaldo Co., in their plants at Sampierdarena, where they have now begun on a large scale the manufacture of agricultural machinery and implements, for which until lately Italy was entirely dependent upon foreign countries, states a report from American Consul General John Ball Osborne, Genoa.

The Ansaldo Co. has undertaken the manufacture of all the various types of plows, 40 in number, needed for the different kinds of Italian soil, which vary greatly according to the locality, so that it can now compete, both for quality of material used and accuracy of work and price, with all the foreign houses manufacturing special types of plows.

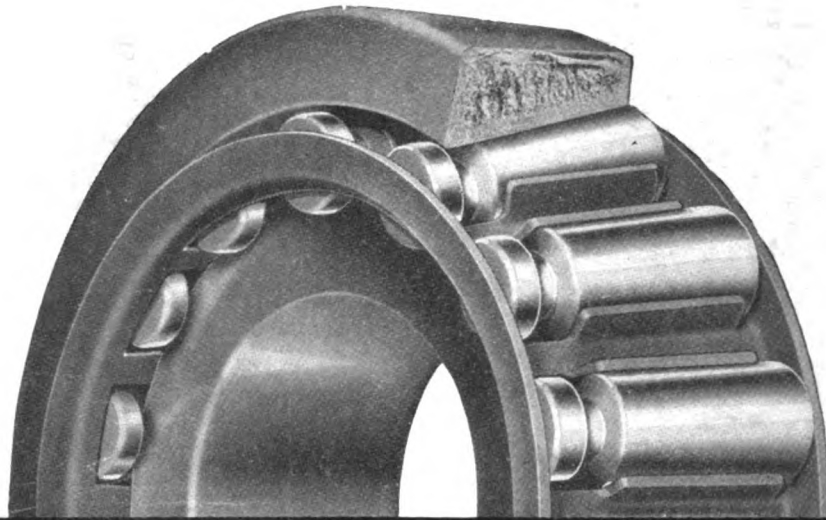
# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

Vol. XLV  
Number 4

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, JULY 28, 1921

Thirty-five cents a copy  
Three dollars a year



—because they can be taken up for the wear that *must* follow motion, Timkens mean adjustment instead of replacement

如何となれば回轉  
に從ふべき機械に  
是れを併用又は應  
用なし得、チイム  
ケインとは調節の  
意味にして取り外  
し又は附加の煩を  
省き其の代用をな  
す

チイムキン回轉機會社

オハヨー州

カントン市

The original Japanese, and the American translation, of a Timken Bearing advertisement printed in *Jiji Shimpō* of Tokyo, and *Shin Aichi* of Nagoya

THE TIMKEN ROLLER BEARING CO, CANTON, OHIO

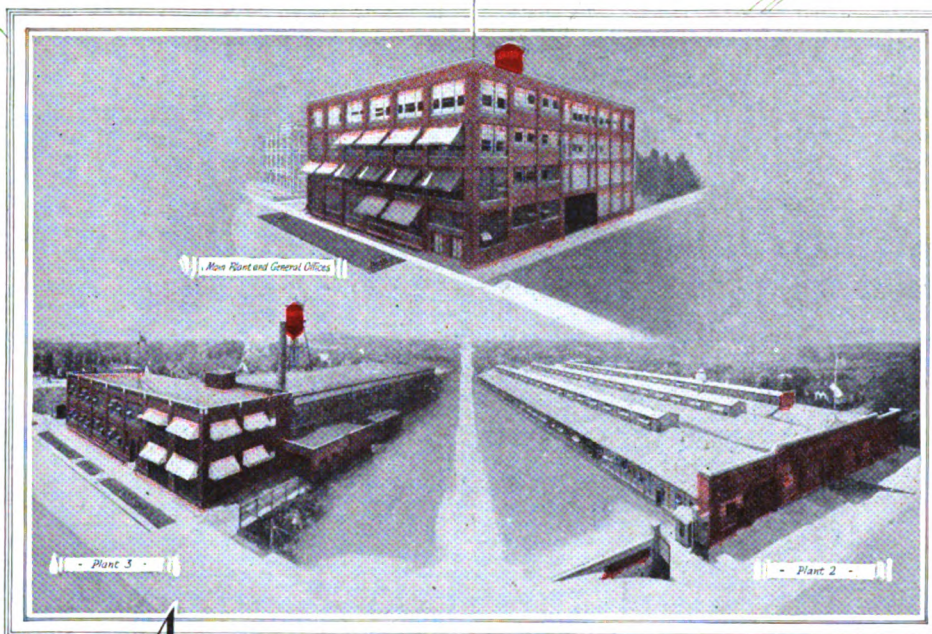
Timken Tapered Roller Bearings for Passenger Cars, Trucks, Tractors,  
Trailers, Farm Implements, Machinery, and Industrial Appliances

# TIMKEN

## *Tapered*

# ROLLER BEARINGS





### *Concentration in Buying*

There are clear, logical, convincing reasons why it is to your advantage to purchase *all* of your automobile body hardware from one source. These reasons will come to your desk and appear in your trade magazines. Look for them. Read them. Digest them.

FOUR years ago—a small machine shop with few workmen and meager equipment—but with a definite policy of building a *quality* product—the Ternstedt Window Regulator.

Today—three giant, up-to-the-minute factory structures, totaling more than 200,000 square feet of working space, echoing to the daily hum of industry—in these buildings the finest of modern equipment, manned by 1500 conscientious *workers*, each a skilled craftsman on his particular job—the same policy of *quality* prevailing, only intensified.

Today, Ternstedt will supply you with *complete* hardware equipment for all closed body work, with many of the items required for open bodies as well.

This enables you to buy *all* of your automobile hardware from one source—to concentrate your purchases in one organization—freeing yourself from the worry, expense and loss of time attendant upon the purchasing of your hardware from a hundred and one different places.

The logic of the idea quickly appeals; to such an extent, in fact, that many companies already have lined up their entire requirements for future production with us.

May we tell you more about it?

TERNSTEDT MANUFACTURING COMPANY, DETROIT

# TERNSTEDT

## *Automobile Body Hardware*

... BUILT • BETTER • FOR • BETTER • BODIES ...



# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, JULY 28, 1921

No. 4

## 9,257,575 Cars and Trucks in Mid-year Registration Census

July figures show gain of 1,354,497 over year ago. New York leads, Ohio second; Maryland has largest percentage gain with 49.15. One car for every 11.4 persons in country. California goes ahead rapidly.

**A** GAIN of nearly a million and a half is recorded in automobile registrations for July 1, 1921, as compared with July 1, 1920. Despite the serious industrial depression which has swept the country, there is a substantial gain in registrations over the corresponding period of last year. The actual gain, excluding the Minnesota figures, is 1,354,497, an increase of 17.80 per cent. The present registration total is 9,257,575. There is one car for every 11.4 persons in the United States.

For the first time in several years New York has held its lead at the mid-year mark. It holds the premier place, however, with a total registration of 650,530. Ohio is second, with 623,316 cars and trucks within its boundaries, while Pennsylvania is third, with 609,268. Illinois occupies fourth place and makes its first entrance into the 600,000 class.

This figure cannot be taken as a definite statement of the number of automotive vehicles in use at the time the figures are dated. Rather is it a statement of the degree of law enforcement this year. It is a fact that in many agricultural communities the law officer in charge of the enforcement does not require the purchase of new licenses until after the crop money is received in the community. This fact, rather than large purchases, explains the heavy registration that always is reported in the last half of the year.

The fact that the mid-year registration shows an increase of 46,032 cars and trucks over the year end, a percentage gain of .52, is a distinct and clear refuta-

tion of the many prophets who declared that the automotive transportation was a luxury and that a distinct recession in the number of vehicles used would be noted with the need of greater economy in methods of living. There can be no question that many trucks have not been licensed this year—because there is not sufficient industrial activity to demand the available freight transportation—so that the gain must be in passenger vehicles.

### Substantial Gains Made

A study of the table of gains and losses from mid-year 1920 to mid-year 1921 indicates a healthy progress for the period. Five states failed to reach the previous total, as against one that was in the minus column last year. These five delinquents, however, are all predominantly agricultural states. In such states it is reasonable to believe that the law has not been strongly enforced up to this time, because of the peculiarly bad position of the average farmer.

This explanation of delinquency being accepted, the loss in Tennessee, South Dakota, Montana and Idaho seems certain to be turned into a substantial gain before the final count is made. The only decrease of importance is in Georgia. Even there, however, the decrease is only 13 per cent of the total of last mid-year. Since it is probable that the laxity in law enforcement is in proportion to the financial status of the farming population, even Georgia bids fair to do well during the remaining months of the year.



California records the largest gain over last July with 167,536, while New York, Texas, Illinois and Pennsylvania follow, each with a gain of more than 100,000. A substantial percentage gain has been made by the chief industrial states over last mid-year. Massachusetts has gone ahead nearly 29 per cent, Michigan about 24 per cent, New Jersey about 21 per cent, New York about 33 and Illinois and Pennsylvania about 20.

It is interesting to compare the gains made in these industrial states during the last year with those made last year over July 1, 1919. The list is as follows:

	July 1, 1920- July 1, 1921	July 1, 1919- July 1, 1920
Massachusetts . . .	28.91	11.04
Michigan . . . . .	23.81	28.66
New Jersey . . . .	21.59	34.88
Illinois . . . . .	20.75	23.90
Pennsylvania . . . .	20.39	24.06
New York . . . . .	33.79	11.29

These figures indicate that there has been no unusual falling off even in the rate of increase in these key industrial states. This same condition is present to a large extent in the case of nearly all the states.

#### District Figures Confused

Difficulty has always been experienced in obtaining District of Columbia registration figures. The method of compiling registrations there is apparently very much confused, with result that it is difficult to determine accurately at any given time just what the figures stand for. This confusion has made necessary a correction in the year-end figures for 1921, and on the basis of this correction the actual and percentage gains of the District have been computed. For that reason the present gain and loss figures of the District will not be compatible with the figure given

for total registration in our previous compilation.

Neither the actual nor percentage increase in registrations is given for Minnesota, nor have the Minnesota figures been considered in determining total gains. This is because there is no basis for satisfactory comparison with the past. The total registrations for Minnesota given in the large table constitute the first figures for that State of any real value in determining the number of cars actually in use.

Previous to January 1, 1921, Minnesota had a triennial registration system in which the registrations were cumulative for three years. Thus it was impossible at any given time to determine even approximately the number of cars actually in use. The last legislature changed that system, however, and Minnesota is now on an annual registration basis. No

### Registration of Cars, Trucks and Motorcycles.

State or Territory	Total Car and Truck Registration	Non-Resident and Re-Registration	Passenger Cars	Commercial Cars	Motorcycles	Chauffeurs and Operators Registered	Total Fees
Alabama . . . . .	74,076		61,637	8,227	621	6,591	1,159,526
Arizona . . . . .	31,175	743			376	89	187,435
Arkansas . . . . .	58,281	200			132	240	
California . . . . .	588,863	90,840	557,231	31,632	15,161	801,515	6,215,936
Colorado . . . . .	132,500		125,000	7,500	2,140	5,500	858,435
Connecticut . . . . .	118,110		94,605	23,505	4,585	15,226	1,876,445
Delaware . . . . .	18,800				500	21,416	338,804
District of Columbia . . . . .	52,384		46,498	5,886	1,968	9,504	235,480
Florida . . . . .	89,698		76,350	13,348	1,153	2,236	690,000
Georgia . . . . .	118,652	1,500			1,056	3,800	1,646,107
Idaho . . . . .	46,130				734	603	656,290
Illinois . . . . .	600,982		531,382	69,600	7,614	53,604	6,247,387
Indiana . . . . .	344,890		309,450	35,440	5,739	7,189	2,151,543
Iowa . . . . .	425,356	108,000	407,084	28,272	3,466	6,790	
Kansas . . . . .	287,391	4,147	267,931	19,460	3,398		1,550,930
Kentucky . . . . .	107,493		94,414	13,079	1,034	7,680	1,678,587
Louisiana . . . . .	71,000				490		426,000
Maine . . . . .	65,990	3,120	57,742	8,248	1,168	81,805	865,672
Maryland . . . . .	112,905	5,648	103,433	9,472	4,062	53,588	2,031,536
Massachusetts . . . . .	300,027	20,515	250,778	49,249	10,013	204,399	3,842,593
Michigan . . . . .	435,508	17,002	382,630	44,244	5,252	118,764	5,932,021
Minnesota . . . . .	294,705		282,130	12,575	2,000		1,000,000
Mississippi . . . . .	56,114		48,100	8,014	122		
Missouri . . . . .	305,802	8,464			3,081	21,399	1,000,000
Montana . . . . .	51,500				370	473	
Nebraska . . . . .	215,909		199,861	16,048	1,415		2,652,933
Nevada . . . . .	9,672				125		98,000
New Hampshire . . . . .	37,091				1,894	45,246	644,974
New Jersey . . . . .	237,339	24,228	214,940	22,399	8,295	295,008	3,464,939
New Mexico . . . . .	23,865	15,086			154		207,585
New York . . . . .	650,530		505,642	144,888	22,580		9,000,000
North Carolina . . . . .	147,910		133,846	14,064	1,534		1,800,000
North Dakota . . . . .	86,310	3,419	84,942	1,368	676		632,241
Ohio . . . . .	623,316	12,650	547,013	76,303	11,661		5,907,335
Oklahoma . . . . .	183,000				1,200*		1,951,882
Oregon . . . . .	102,274	94,032			2,486	163,138	2,153,844
Pennsylvania . . . . .	609,268		557,765	51,503	18,174	112,199	8,387,106
Rhode Island . . . . .	46,574	4,142	37,676	8,898	1,524	33,230	604,654
South Carolina . . . . .	84,632	698	77,323	6,581	684		697,465
South Dakota . . . . .	113,120		105,620	7,500	625		
Tennessee . . . . .	86,610	2,064			845		1,203,944
Texas . . . . .	418,126	70,218			3,287	12,930	1,950,520
Utah . . . . .	41,136		35,730	5,406	792	899	385,053
Vermont . . . . .	32,758	1,750	29,677	3,081	843	39,824	594,550
Virginia . . . . .	120,000	5,000	110,000	14,000	1,800	4,500	1,800,000
Washington . . . . .	159,579	4,654	136,205	23,374	2,924		2,642,832
West Virginia . . . . .	94,450	3,610			1,250	9,800	1,175,366
Wisconsin . . . . .	315,774		296,675	19,099	5,505		3,453,225
Wyoming . . . . .	30,000		28,800	1,200	282		263,813
<b>TOTALS . . . . .</b>	<b>9,257,575</b>	<b>501,730</b>	<b>6,798,110</b>	<b>803,463</b>	<b>166,790</b>	<b>2,139,185</b>	<b>\$97,661,982</b>

\*Estimated.

single factor has been responsible for so great differences in various registration compilations as the Minnesota figures. It is good to know that this one difficulty, at least, has been eliminated.

Even the present figures are probably none too accurate as indicating the number of cars now in use in Minnesota, however, since the legislature made no provision for registration until just before its adjournment, and officials are having some difficulty in getting the new system into efficient operation. Our correspondent states that "hundreds of cars are still carrying 1920 numbers."

The figures indicate anew the necessity for uniform methods of car and truck registration. The increased

### Gains and Losses in Registration, July 1st, 1920—July 1st, 1921

California	167,536
New York	164,268
Texas	119,892
Illinois	103,664
Pennsylvania	103,183
Michigan	83,746
Massachusetts	66,769
Ohio	56,316
Missouri	47,324
Indiana	42,582
New Jersey	42,081
Maryland	37,205
Wisconsin	35,322
Kansas	33,495
North Carolina	24,910
West Virginia	24,362
Florida	22,580
Colorado	20,593
Iowa	20,174
Connecticut	17,560
Washington	16,018
Virginia	15,000
Maine	14,207
Kentucky	13,428
Oregon	12,341
North Dakota	9,357
District of Columbia	9,055
Louisiana	9,038
Wyoming	8,750
New Hampshire	6,676
Vermont	6,122
South Carolina	4,070
Utah	3,875
Nebraska	3,779
New Mexico	3,565
Rhode Island	2,574
Delaware	2,200
Oklahoma	1,800
Alabama	1,650
Arkansas	1,419
Arizona	1,372
Nevada	289
Minnesota	?
1,380,142	
Losses:	
Georgia	18,477
Tennessee	4,164
South Dakota	1,288
Mississippi	886
Montana	600
Idaho	230
25,645	
Net Gain	1,354,497

### Car and Truck Registration

July 1, 1921	
New York	650,530
Ohio	623,316
Pennsylvania	609,268
Illinois	600,982
California	588,863
Michigan	435,508
Iowa	425,356
Texas	418,126
Indiana	344,890
Wisconsin	315,774
Missouri	305,802
Massachusetts	300,027
Minnesota	294,705
Kansas	287,391
New Jersey	237,339
Nebraska	215,909
Oklahoma	183,000
Washington	159,579
North Carolina	147,910
Colorado	132,500
Virginia	120,000
Georgia	118,652
Connecticut	118,110
South Dakota	113,120
Maryland	112,905
Kentucky	107,493
Oregon	102,274
West Virginia	94,450
Florida	89,698
Tennessee	86,610
North Dakota	86,310
South Carolina	84,632
Alabama	74,076
Louisiana	71,000
Maine	65,990
Arkansas	58,281
Mississippi	56,114
District of Columbia	52,384
Montana	51,500
Rhode Island	46,574
Idaho	46,130
Utah	41,136
New Hampshire	37,091
Vermont	32,758
Arizona	31,175
Wyoming	30,000
New Mexico	23,865
Delaware	18,800
Nevada	9,672

prominence of territorial analysis in merchandising has rendered accurate registration statistics of even greater importance to the industry than ever before. Such statistics can never be obtained while the present confusion of State laws and methods remains.

The difficulty lies not so much in the deficiencies of particular State laws as in the lack of uniformity of practice, which makes it impossible to accurately correlate the figures of the various states. It is true, however, that the actual practice in many states is loose, inaccurate and confused.

As long as this is the case it will be necessary to compile and interpret registration statistics with extreme care. Gross errors can be made by a superficial acceptance of figures obtained from State officials, or even from published compilations, unless the factors of variation and error are understood.

Mid-year figures, in particular,

should be accepted for what they are—an indication of the trend for the year. It is not always possible to get the totals as of July 1 exactly, and it is obvious that one day or week in variation in the date at which the figures were given would mean considerable difference in the totals.

### Basis of Comparison

It is possible to compare only like units, if the results obtained are to be fair. The July 1, 1921, figures, for example, can properly be compared in every way with those of July 1, 1920. It is fair to judge the present status on the basis of the status at the same time last year, and it is in this way that the chief comparisons in this article are made.

Mid-year and year-end figures are not commensurate. The enforcement of the law varies greatly, for in-

### Percentage of Gains and Losses in Registration, July 1st, 1920—July 1st, 1921

Gains:	
Maryland	49.15
Wyoming	41.20
Texas	40.00
California	39.98
West Virginia	34.75
New York	33.79
Florida	33.50
Massachusetts	28.91
Maine	27.50
Michigan	23.81
Vermont	22.96
New Hampshire	21.89
New Jersey	21.59
District of Columbia	20.90
Illinois	20.75
Pennsylvania	20.39
Colorado	18.38
New Mexico	17.78
Connecticut	17.51
Missouri	16.81
Louisiana	14.60
Kentucky	14.59
Indiana	14.28
Virginia	14.28
Oregon	13.75
Delaware	13.25
Kansas	13.16
Wisconsin	12.59
North Dakota	12.31
Washington	11.19
Utah	10.40
Ohio	9.94
Rhode Island	5.84
South Carolina	5.05
Iowa	4.95
Arizona	4.59
Nevada	3.08
Arkansas	2.49
Alabama	2.38
North Carolina	2.02
Nebraska	1.15
Oklahoma	.99
Minnesota	?
Losses:	
Georgia	13.60
Tennessee	4.60
Mississippi	1.58
Montana	1.15
South Dakota	1.09
Idaho	.49
Average gain	17.80%

**Gains and Losses in Registration, January 1st—July 1st, 1921**

Pennsylvania .....	39,104
Illinois .....	32,223
Michigan .....	22,791
Wisconsin .....	22,476
Kansas .....	21,995
California .....	19,971
Florida .....	15,784
West Virginia .....	15,588
Indiana .....	12,183
New Jersey .....	9,602
Missouri .....	8,883
Ohio .....	7,919
North Carolina .....	7,050
Wyoming .....	6,074
Louisiana .....	5,000
Colorado .....	3,549
Maine .....	3,083
New Hampshire .....	2,411
New Mexico .....	1,756
Vermont .....	1,133
Delaware .....	500
Minnesota .....	?
<hr/>	
	259,075

<b>Losses:</b>	
Georgia .....	25,770
Oklahoma .....	21,300
New York .....	18,760
Tennessee .....	15,242
Washington .....	14,341
Virginia .....	14,000
Iowa .....	11,944
Texas .....	9,567
Montana .....	9,146
South Carolina .....	8,186
Mississippi .....	7,370
South Dakota .....	7,275
District of Columbia .....	7,225
Nebraska .....	7,091
Kentucky .....	5,192
Idaho .....	4,743
Massachusetts .....	4,604
North Dakota .....	4,530
Rhode Island .....	3,801
Maryland .....	3,436
Arizona .....	3,384
Oregon .....	1,516
Utah .....	1,442
Connecticut .....	1,024
Arkansas .....	801
Nevada .....	792
Alabama .....	561
<hr/>	
	213,043

Net gain..... 46,032

stance, in the different states, and a State may appear below normal in July simply because no attempt has been made to enforce the law until late in the year. Especially is this true of agricultural states and communities where the sheriffs frequently make no attempt to collect license fees until crops are harvested.

The past record of New York illustrates this point clearly. Every year, recently, New York has been behind Ohio on the basis of July 1 figures, but always shows a proportionately large gain during the last six months and passes Ohio in the final tabulation by many thousands.

Thus the failure of a State to attain last year's total by July 1 is of little significance. Where a State has passed the final figure of 1920,

however, some importance may be attached to the fact, since a gain for the year is already assured.

**Comparison of Year-End and Mid-Year Figures**

It is with this thought clearly in mind that an examination of these mid-year figures, as compared with the year-end figures for 1920, should be made.

The mid-year total is 46,032 in excess of the high point reached last December. This is a gain of .52 per cent and insures a 1921 gain in automobile registrations. The previous discussion of delayed law enforcement applies with equal force in making this mid-year and year-end comparison.

While 27 states have thus far failed to reach their year-end total, the 21 which did surpass their previous record more than overcame the losses. The big industrial states, which may be said to reflect the business trend of the country, practically

**Motorcycles****Gains and Losses, July 1, 1920, to July 1, 1921.**

(Based on available figures from 36 states)

<b>Gains:</b>	
New York .....	7,416
Dist. of Col. ....	1,395
Nebraska .....	315
Georgia .....	152
Oklahoma .....	134
Idaho .....	77
Maryland .....	62
North Carolina .....	34
Wyoming .....	8
Florida .....	4
Maine .....	4
<hr/>	
	9,601

<b>Losses:</b>	
Ohio .....	8,339
Pennsylvania .....	2,103
California .....	2,038
Wisconsin .....	1,929
Massachusetts .....	1,870
Indiana .....	1,631
New Jersey .....	1,370
Washington .....	985
Kansas .....	864
Colorado .....	607
Missouri .....	464
Alabama .....	323
Illinois .....	297
Texas .....	269
Mississippi .....	233
Connecticut .....	215
Virginia .....	200
Montana .....	180
Kentucky .....	159
Arizona .....	98
New Hampshire .....	74
Delaware .....	73
North Dakota .....	52
Iowa .....	46
South Carolina .....	6
Nevada .....	2
<hr/>	
	24,472

Net loss ..... 14,871

**Percentage Gains and Losses in Registration, January 1st—July 1st, 1921**

<b>Gains:</b>	
Wyoming .....	25.40
Florida .....	21.36
West Virginia .....	19.76
Kansas .....	8.29
New Mexico .....	7.99
Wisconsin .....	7.68
Louisiana .....	7.60
Pennsylvania .....	6.85
New Hampshire .....	6.02
Illinois .....	5.68
Michigan .....	5.51
Maine .....	4.92
North Carolina .....	4.90
New Jersey .....	4.24
Indiana .....	3.66
Vermont .....	3.58
California .....	3.39
Missouri .....	2.98
Delaware .....	2.73
Colorado .....	2.68
Ohio .....	1.29
Minnesota .....	?

<b>Losses:</b>	
Georgia .....	17.80
Montana .....	15.10
Tennessee .....	15.06
District of Columbia .....	13.81
Mississippi .....	13.11
Virginia .....	10.44
Oklahoma .....	10.40
Arizona .....	9.85
Idaho .....	9.34
South Carolina .....	8.84
Washington .....	8.27
Rhode Island .....	7.59
Nevada .....	6.79
South Dakota .....	5.99
North Dakota .....	4.99
Kentucky .....	4.61
Utah .....	3.39
Nebraska .....	3.18
Maryland .....	2.98
New York .....	2.86
Iowa .....	2.73
Texas .....	2.24
Massachusetts .....	1.53
Oregon .....	1.47
Arkansas .....	1.36
Connecticut .....	.87
Alabama .....	.24

Average gain..... .52%

all show substantial gains. The four leaders in this respect, for instance, are Pennsylvania, Illinois, Michigan and Wisconsin. This is a decidedly encouraging sign. New York's drop is simply consistent with its normal course every year, as previously explained, while the Massachusetts decrease is only 1.5 per cent.

The largest decrease, both in actual numbers and in percentage, is shown by Georgia. This State has 25,770 less registrations than on January 1, 1921, a decrease of 17.80 per cent. Seven states showed a decrease of more than 10,000, while nine states gained more than 10,000.

Comparison of mid-year motorcycle figures is not possible in all cases, because midyear figures were not available last year from every state.

# Handling Light Railway Passenger Traffic With Motor Trucks

How some short line roads have met prohibitive operating costs of steam equipment by the use of motor trucks fitted with steel wheels to run on rails. Details of mechanical arrangement, operating cost, etc., are given.

By Donald A. Hampson

IN the western part of New York State there is a 57-mile railroad running north and south through an old settled region typical of the East. Not lying in the direction of the country's commerce, there is no through business, but connections are made with trunk lines at each terminus; the villages along the line total 6500 inhabitants, besides which there is the customary rural population found in every farming and woodland region. This road was built more than 50 years ago and enjoyed the usual career of so many short lines, going from bad to worse, until in 1917 the owners gave up operation rather than face the ever-mounting costs.

This was a hard blow to the region—the full value of any service is never so keenly realized until after it is gone. In 1920 a group of local business men bought the road and put the two 50-ton locomotives and the track in shape for freight service. The volume of latent business in the territory is reflected in this service as it exists to-day; a train is run up one day and back the next—its average load is 22 cars per trip.

But the seven passenger stations have not been opened. A train that consumes nearly a day in making 57 miles cannot offer even "mixed" service (the crew does the switching at more than twenty sidings on the way). The management has not the capital to buy a locomotive and coaches for the traffic, and the remains of former equipment were too dilapidated to think of patching up—moreover, while they know the traffic is there, the returns from passenger business, even at present high rates, are not sufficient to warrant the expenditure, and the business would have to be carried on at a loss, just as it was formerly. An idea of what business lies dormant, the receipts from the passenger train in 1917 are quoted as passengers, \$15,506; mail, \$3,309; express, \$1,622; excess baggage, \$155; making total gross receipts of nearly \$21,000—present rates would increase this one-third, but even that is ridiculously small, compared to the cost of adequate steam service.

The above is a good example of the railroads that adopt service by gasoline-propelled vehicles. The population is there, they have the money to ride, the roadbed is there—all that is lacking is a low-priced, self-propelled car. Such a population does not ask for Pullman service or excessive speed—what they want is to be able to get back and forth once or twice a day for shopping and business purposes.

Two gasoline cars on this line could make a round trip each day, affording speedy, comfortable service the year around at such a cost that if there were only three passengers per trip, they would pay the expenses, including amortization in three years. There are but fifteen miles of improved highway parallel to the railroad mentioned, and for six or seven months in the year the only way to

reach the several communities is by wagon or sleigh. One-man cars geared for 20 miles per hour would make good time and negotiate the grades on high—the driver would collect cash fares, doing away with ticket and agent expense.

The photograph, Fig. 1, shows a car for this class of service. It is a stock speed wagon truck with standardized body and railroad equipment. Its leading dimensions follow:

Engine—4 cyl., 4½ x 4½ in.  
Maximum engine speed—1700 r.p.m.  
Transmission—3 speeds forward and 1 reverse.  
Gear ratio—3.73 on high, 14.5 on low.  
Car speed—42 m.p.h. maximum.  
Chassis—Reo 1¼-ton.  
Weight empty—5400 lb.  
Rear axle—Full floating.  
Track gage—56½ in.  
Driving wheels—30 in.  
Truck wheels—20 in.  
Fixed wheelbase—128 in.  
Total wheelbase—144 in.  
Seating capacity—19 plus the driver.  
Body length—146 in. outside posts.  
Body width inside—84 in.  
Body height, center—78 in.  
Seats—Heywood Wakefield, rattan cushions and backs.  
Starting and lighting—Electric.  
Price—\$4,500, approximately.

For the purposes of the railroad to which it was delivered—a 15-mile steam line through a fairly level

2d Class								Distance from Middletown	STATIONS
17	15	13	11	5	9	3	1		
Mix.	Mix.	Mix.	Motor	Motor	Motor	Motor	Motor		
Daily	Daily	Daily	Sat. only	Daily except Sun.	Daily except Sun.	Daily except Sun.	Daily except Sun.		
p m	p m	a m	a m	p m	p m	a m	a m		
5 12	1 35	10 05	12 25	8 25	6 40	1 05	8 02	0	M. & U. R. R.
					f	f	f	1	Ar. Middletown Lv.
					f	f	f	2	Dolston Av.
					f	f	f	3	Pounds
					f	f	f	4.5	Onleys
									Springside
5 00	1 20	9 41	12 10	8 11	6 24	12 48	7 51	5.5	Slate Hill
4 54	1 10	9 35	12 04	8 05	6 17	12 41	7 45	8.0	Johnsons
4 48	12 55	9 20	11 54	7 57	6 09	12 34	7 38	10.8	Westtown
			f	f	f	f	f	12.5	Waterloo
4 40	12 41	9 10	11 45	7 48	6 00	12 25	7 30	13.8	Unionville
	12 40	9 05		7 46				14.6	Lv. M. & U. Jet. Ar.

country—this car is geared to run 40 m.p.h. at a little under maximum engine speed. A time card of this run is given; it shows that the car works in conjunction with the steam mixed train, but that the car has several flag stops to make—its schedule is faster than the train's.

From the train record sheets, it is shown that this car ran 2577 miles in the first month of its operation with a consumption of 266 gal. of gasoline and 19 gal. of oil. The first few days of operation the gasoline consumption was high, but as the mechanism "found itself" the curve dropped enough to show an average mileage of 10 per gal. for the whole month. The following months the average mileage was higher. A 31-passenger car of similar construction on the same road geared to run a maximum of 30 m.p.h. has shown practically the same mileage.

Taking these figures, we may arrange a chart of operating expenses as shown below. Explaining the items, the driver's pay is figured at 60 cents an hour, a helper at 40 cents an hour, four hours a day to clean the car and assist in filling tanks, etc., and the chief item of repairs includes a proportionate mileage charge for replacing a master gear and pinion installed near the 6000th mile when a thrust collar loosened up and chipped off a tooth.

Gasoline .....	\$79.80
Oil and waste .....	21.00
Insurance .....	25.00
Driver .....	162.00
Helper .....	43.25
Repairs .....	20.00
Depreciation .....	125.00
	<hr/>
	\$476.05

Dividing this by the mileage, 2577, we find the investment and operating charge amounts to 18½ cents a mile. The railroad is permitted to charge a passenger rate of 5 cents per mile. Without a doubt, no other type of rolling stock would show as well under a similar analysis.

### Features of the Body

The body is designed to provide maximum seating capacity in minimum length, the primary object being to avoid overhang at the rear. Overhang is objectionable because of the swing on curves, especially in yards, and it puts a greater load on the rear axle. The body follows somewhat that of "safety" street cars in offering maximum capacity with simple operation and light weight, though the construction is much heavier than

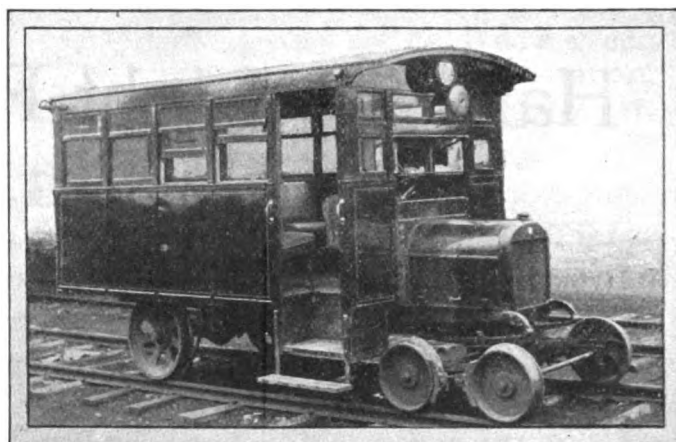


Fig. 1—A Reo Speed Wagon with special body, fitted for operation on rails

ordinary bus jobs. One feature of construction follows a truck design described in *AUTOMOTIVE INDUSTRIES*, Aug. 12, 1920, in that there are no longitudinal center sills—the chassis frame answering for these—the cross sills, 2 x 3-in. ash, rest on and are bolted to the frame, with their ends leaded and mortised to the side sills. Not only is weight saved but the body is that much lower.

Fig. 2 is a floor plan and shows the seating arrangement. There is a safety door at the rear, normally blocked by a seat cushion, and an entrance at the right of the driver with a leaf door operated by him. Hand holds are provided inside and out. The inside finish is natural wood, matching the rattan seats and presenting a bright, clean appearance. The seats are full size and comfortable, spaced according to street car practice, and the general riding effect is equal to or better than that of street cars and far better than highway buses.

The seating arrangement insures maximum traction with any load; cross seats are always preferred to longitudinal ones and these, directly over the driving wheels, always fill up first. Designed for 19 passengers, this car is often grossly overloaded, records of the afternoon trip showing as high as 33 carried. It is customary to estimate passenger loads at 160 lb. per person—this rating makes the ratio (full load) of paying load to dead weight 3040 to 5400—a most unique record in railroading!

Two points in body construction are different from bus body practice—they may be noted in the photo. Windows set a few inches higher become a safety feature because they guard against hands and arms thrust out of them. Bodies ordinarily have swinging front windows which may be adjusted and held by a fastening—this construction is frail and develops a bad case of rattling after a few weeks' service. In this car the windshield is left in place and the body built to surround it; by so doing, first class steel and glass construction, permanent and quiet, takes the place of ramshackle parts.

### Railroad Equipment

Some of the features applied particularly for railroad service may be noted by reference to the photograph. These are the electric marker lights, front and rear, electric headlight, sand boxes and brakes. The wheels conform to Master Car Builders' shape and have hard faces. A lever at the driver's right, under his seat, operates the gates in the sand boxes, which are of the hopper bottom type and located inside the car under the seats where it is dry. An exhaust whistle is used for signals. At the rear of the car is an M.C.B. automatic coupler. This is attached without draft gear, which has been found unnecessary for starting one trailer.

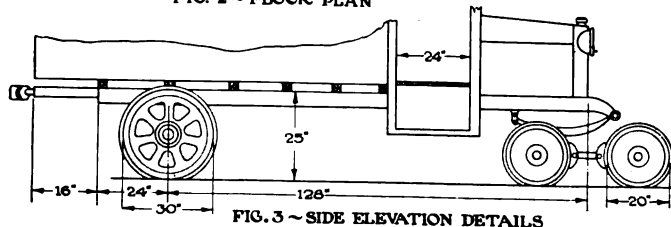
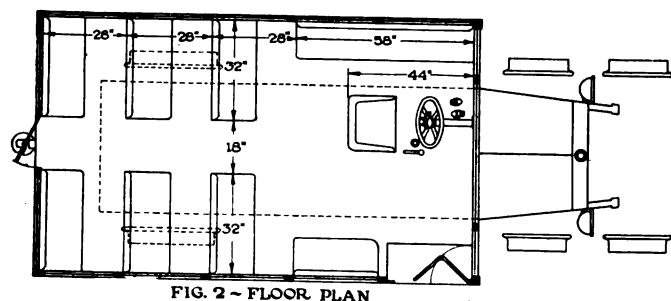


Fig. 2—Plan and Fig. 3, side elevation of body layout employed



The car is ball and roller bearing throughout. It offers a resistance of 15 lb. per ton in starting, dropping off to 10 lb. at 4 m.p.h. One man can easily push the car on a level tangent. It has a theoretical tractive effort of high gear of 182 lb. and has shown its actual pulling ability by hauling the larger car as a trailer (weighing 9000 lb.) and making its time card schedule.

Brakes are provided all around. They make for rapid deceleration and consequent improved running time. A pedal operates the band brake on the rear wheel drums just as in automobile practice. The front truck has regulation brake shoes carried on I-beams, inside hung.

The method of hooking up the front truck brakes is novel and proved successful from the start. Fig. 4 shows the scheme. It was evolved to allow the front truck the greatest swivel movement ever necessary, to avoid the use of cables or chains or radius bars, and yet to have the brakes always in position to be applied with the same amount of hand wheel movement, this to be the least possible consistent with brake shoes free from drag. The otherwise useless steering wheel is used for a hand brake wheel, as in all front truck braking systems. A ratchet and pawl are unnecessary with such a brake on a gasoline car as holding the pressure for the few seconds at a time required imposes no hardship on the driver.

Referring to Fig. 4, power applied to the 18-in. wheel is transmitted through arm and drag link to a ball joint at the end of the lever H, which engages the square head of the truck king bolt J at whose lower end is keyed the cam K, which spreads the brake beams. A turnbuckle (not shown) in the drag link and the substitution of a sector D, which is nearly half a circle in extent, permit adjustments for wear and position. It is evident that as the truck swivels the brake beams turn the cam between them—there is no backlash to take up and this turning merely rotates the steering wheel. The greatest movement of the latter is that necessary to take up the running clearances and the spring in the parts—track layout has nothing to do with it. The front truck has a swivel center bearing and it has a tubular center "pin" surrounding the king bolt and relieving the latter from binding.

#### Applying Railroad Equipment

Disregarding the matter of bodies, the process of applying these standardized railroad members is very simple. The easiest way when possible is to do the work where there is a pavement flush with the rails. If not this, the car is run on a crossing or planks are laid ad-

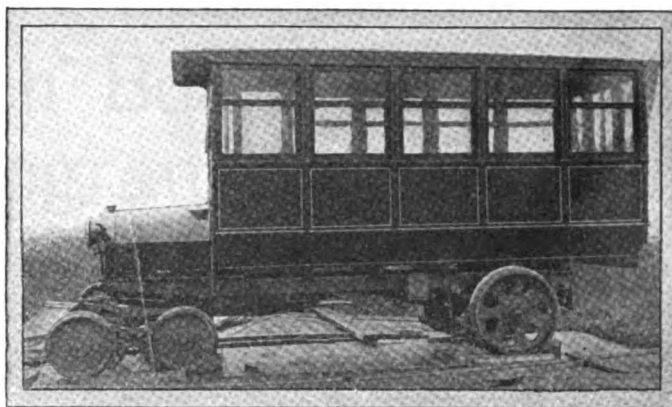


Fig. 5—Narrow gage car designed for use on a South American railroad

acent to a crossing or a spot selected with earth the full height of the rails. The chassis is run to the selected spot on the rubber tires and placed directly over the rails. Jacking up the rear end, the wood wheels are disassembled from the hubs and the metal ones put in place, using the same bolts. Then the front end is jacked up and the axle with wheels intact removed; the front truck, already on the rails, is run back, the car lowered and the spring clips attached to the body bolster. Not even an extra cotter pin is needed. With the engineering work properly done, the change can be made in three hours and the erstwhile motor truck becomes a railway car—such are the essentials, other equipment is a matter of selection.

#### Narrow Gage Roads

Heretofore, we have considered only equipment for the U. S. standard gage of 56½ in. Fig. 5 illustrates a narrow gage car that has been running in South America for about a year. Its run is over the line of a 42-in. gage steam road with a first class roadbed about 150 miles in length. Part of the line is situated on the high plateau at an elevation of 3½ miles, then it descends to the lowland country, where it is intensely hot and moist. As is usual with these Andes railroads, the curves are sharp and the grades are steep; to successfully cope with these, a swivel front truck is applied, powerful brakes all around, 30-in. drivers are used, and the gear ratio made 4.7 to 1 on high.

So great an elevation and temperature range is a severe test of engine operation. Trouble in this respect was foreseen and the original layout included additional cooling capacity for the hot region and protection for the radiator and circulating water when traveling in the section of rarified air—these units to be controlled by handles placed within the driver's reach. However, it was finally decided to try the car without these and up to the present time, the dash carburetor adjustment has taken care of thermal conditions fairly well.

Altering the rear end for 42-in. track forced the removal of the brake drums. In their stead brake shoes and a brake beam were installed. Both here and on the front truck, extra leverage is provided to serve on the numerous steep descents. The truck brakes are of the design shown by Fig. 4; a leverage of 95 to 1 is provided. Brake shoes and holders are standard M.C.B. pattern and interchangeable with like parts on the road's steam equipment.

The chassis is the same as that of Fig. 1. The photograph shows the car about to be boxed for export. It shows also the sand boxes with operating connection terminating in a lever convenient to the driver's hand; a spring catch holds this lever so the pipe opening is

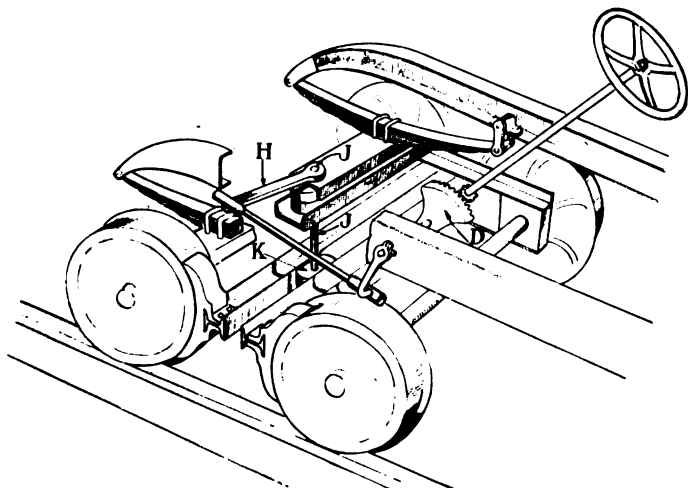


Fig. 4—Sketch showing method of applying brakes to wheels of the truck

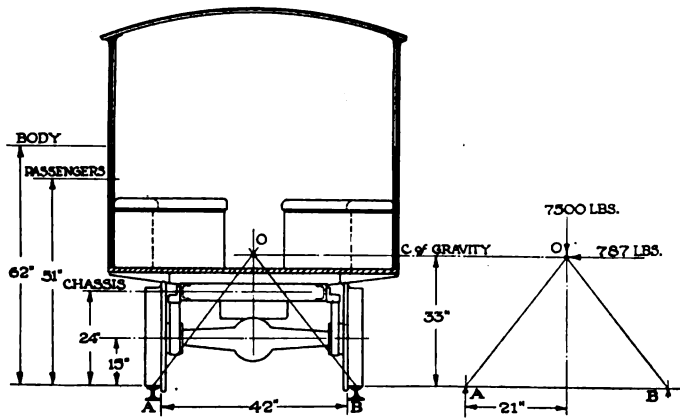


Fig. 6—Diagram showing effect of centrifugal force in rounding curves

normally closed. The body is one of the familiar bus bodies seating 15 passengers on longitudinal leather-covered seats. The seat cushions are tilted to the rear and extra padding put in cushions and back to make more comfortable riding over long distances. Provision is made for exhaust heating.

### The Matter of Stability

In analyzing the various conditions and possibilities in connection with operation on the narrow gage railroad mentioned above, the question of overturning was considered. This has frequently been raised in connection with safe operation of motor passenger cars at high speed.

Refer to Fig. 6. The various units that go to make up

the weight were separated and their center of gravity determined; from these the center of gravity of the whole was found to be located at a point 33 in. above the rail. This is 21 in. below the maximum allowable height for safety on a 42-in. gage of track. The triangle O A B in Fig. 6 outlines the case. The total weight of car and load is 7500 lb.—it may be resolved into components bearing on each rail head.

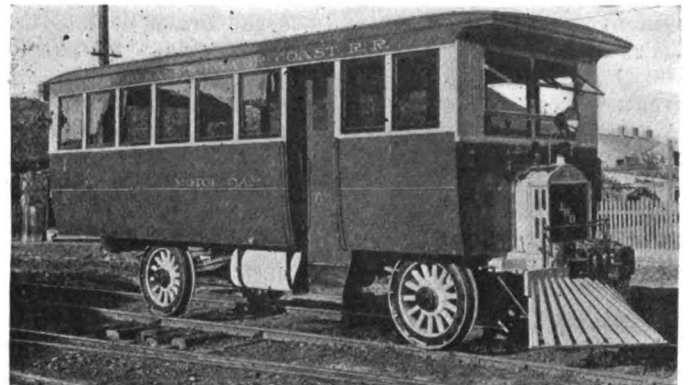
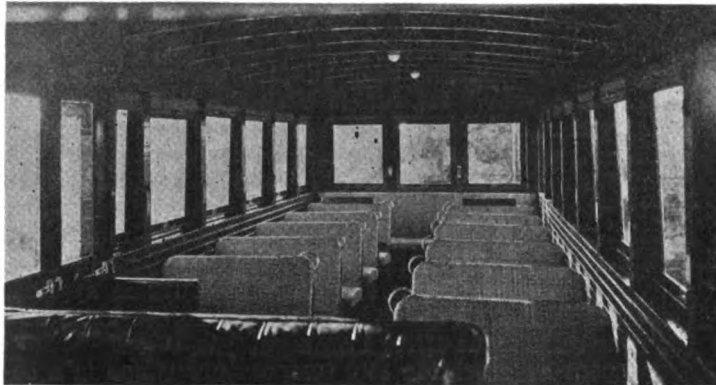
The forces tending to overturn the car or cause it to mount the rail are (1) centrifugal force in rounding a curve, (2) wind pressure against side of car, (3) sway of the body. Consider the last first as it is least important; it is the lurch or swing of the body about spring joints as the leaves bend—a 72-in. wide body on springs spaced 36 in. with properly selected springs has negligible power to create serious sway.

Centrifugal force is figured directly from the car speed and degree of curve and car weight by the equation

$$F = 0.00001167 V^2 D W$$

which for the 7500-lb. car entering a 10 deg. curve at 30 m.p.h. is only 787 lb. Assuming this to act at the center of gravity and tending to overturn the car at either the point A or B, its moment is  $787 \times 33 = 25,791$ -in.-lb. This must lift the weight concentrated at the center which reduces its effect at that point by dividing by half the track gage, giving 1238 lb. that is resisted by a weight of 7500 lb. A factor of safety of 6 is thus revealed.

Wind pressure at 35 miles an hour would exert an effect equal to that of the centrifugal force, though slightly higher up. The combined stresses are even then well on the side of safety—rational operation would never place a car in position to receive the extreme conditions named.



(Left) Interior of motor-passenger car, showing seating arrangements for thirty passengers and two operators. This car was made by building a passenger car body on a three-ton F.W.D. motor truck and has been installed on the run of 50 miles between Algiers, La., and Buras, La., by the New Orleans and Lower Coast Railroad. (Right) Three-ton, Four-wheel-drive truck converted into passenger car and installed on the New Orleans and Lower Coast Railroad, near New Orleans, to replace entire passenger train of locomotive and five cars, formerly operated over a fifty-mile run between Algiers and Buras, La.

## Automotive Interest in Chemical Exposition

AT the urgent requests of numerous automotive engineers and manufacturers, motor boat and airplane builders, special attention will be given to the requirements of the automotive industry in the Seventh National Exposition of Chemical Industries during the week of Sept. 12, in the Eighth Coast Artillery Armory, Jerome Avenue and Kingsbridge Road, New York City. The setting for the chemical display this year will be in the building that housed the last N. A. C. C. motor truck show. The display promises to be the largest ever held.

Dyes are, of course, of interest to the automotive industry, since the enduring qualities of body and upholstery coloring mean so much to the looks of a car after it is some months old. Enamels, paints and processes will

be illustrated at the exposition and illustrated lectures on these subjects will be given by experts. Members of the Society of Automotive Engineers will be invited to attend these sessions.

Fuel and substitutes for gasoline are of interest to automotive men, and the lectures and demonstrations that will be part of the exposition will tell of the progress made in these lines. Recent discoveries in the manufacture and use of low test fuel will be of value to engineers, likewise many new metals and alloys will be on view. Studies made in aviation materials—the treatment of woods, fabrics, etc.—will be exhibited.

There will be more than 450 exhibits in the exposition and these will cover five city blocks of space.

# Highway Research Board Outlines Its Program

Selection of Prof. W. K. Hatt as director marks beginning of definite steps toward carrying out of work outlined at the conference in New York last November. Influence of the highways on design one problem.

**T**HE Advisory Board on Highway Research of the National Research Council announces that it has engaged as director, William Kendrick Hatt, Professor of Civil Engineering and Director of Materials Testing Laboratory of Purdue University. He is a member of the American Society of Civil Engineers, the American Society for Testing Materials, the American Railway Engineering Association and other technical societies. His work as an investigator in organizing the timber investigations of the United States Forest Service and in other engineering and scientific fields for the past twenty years is well known. His office is in the building of the National Research Council, 1701 Massachusetts Avenue, Washington.

This Advisory Board was established by the Division of Engineering of National Research Council, with the co-operation of Engineering Foundation, as the result of a conference held in New York, Engineering Societies' Building, last November, attended by many representatives of national engineering societies, associations of vehicle and road materials' manufacturers, Federal Bureau of Public Roads, State highway departments and universities.

By the terms of the by-laws, the membership of the Advisory Board is composed of those organizations of national importance interested in design, construction, economics, maintenance and financing of highways, in materials and equipment therefor, and in vehicles used on highways; governmental departments and bureaus of similar interests, and higher educational institutions. The present organization members are:

American Association of State Highway Officials.  
American Concrete Institute.  
American Institute of Consulting Engineers.  
American Society of Civil Engineers.  
American Society of Mechanical Engineers.  
American Society for Municipal Improvements.  
American Society for Testing Materials.  
Association of American State Geologists.  
Bureau of Public Roads, U. S. Department of Agriculture.  
Corps of Engineers, U. S. Army.  
Engineering Foundation.  
Federal Highway Council.  
National Automobile Chamber of Commerce.  
National Highway Traffic Association.  
Society of Automotive Engineers.

The officers of the board are: Anson Marston, chairman, director, American Society of Civil Engineers, member of Iowa State Highway Commission, and Dean of Engineering, Iowa State College; Alfred D. Flinn, vice-chairman, secretary, Engineering Foundation, and vice-chairman, Division of Engineering, National Research Council. Other members of the Executive Committee are Thomas H. MacDonald, chief, Bureau of Public Roads, Department of Agriculture; George S. Webster, president, American Society of Civil Engineers, consulting

engineer, formerly director, Department of Wharves, Docks and Ferries, Philadelphia; Henry M. Crane, chairman, Research Committee, Society of Automotive Engineers; W. K. Hatt, director.

In addition to the member organizations, thirteen State highway departments and more than forty universities have definitely signified their interest in the work of the Advisory Board and their willingness to co-operate.

The purposes of the board are:

- a. To assist existing organizations in outlining a comprehensive national program of highway research and co-ordinating their activities thereunder;
- b. To organize committees for specific problems;
- c. To act in a general advisory capacity;
- d. To serve as a clearing house for highway research information.

Three technical committees have been at work for a number of months. These are:

1. Committee on Economic Theory of Highway Improvement, Chairman, Professor T. R. Agg, Iowa State College.
2. Committee on Character and Use of Road Materials, Chairman, H. S. Mattimore, Engineer of Tests, Pennsylvania State Highway Department.
3. Committee on Structural Design of Roads, Chairman, A. T. Goldbeck, Engineer of Tests, Bureau of Public Roads, Department of Agriculture.

The Executive Committee of the Advisory Board has the creation of additional committees under advisement, such as committees on Vehicle Design as Related to a Road, on Economics and Cost of Transport, on Financing Highway Improvements, on Traffic Studies, and on Organization of Construction Plants.

Much valuable experimental research work is being done by the Bureau of Public Roads, the United States Army, several State highway departments, the universities and a few associations of manufacturers of vehicles and materials.

Two of the most important elements of the strength of the Advisory Board are the membership and the active participation of the Bureau of Public Roads and the army engineers. The bureau is represented by its chief, Thomas H. MacDonald, who is supporting the research work most loyally and intelligently. To represent the Engineer Corps of the Army, the chief of engineers appointed Colonel E. Eveleth Winslow, stationed at New York, and the appointment was officially confirmed by the Secretary of War. Major Mark L. Ireland of the Quartermaster's Corps is a member of the Committee on Economic Theory of Highway Improvement. During the summer, with the co-operation of the Massachusetts Institute of Technology, Major Ireland will conduct at Cambridge, Mass., an important series of tests on the traction resistance of vehicles and of road surfaces. Equipment and supplies have been provided and the necessary assistants assigned by the Army.

Director Hatt's work is expected to stimulate experimental work by such organizations to much greater activity, just as the work of the existing committees of the board has already had a stimulating effect. The director, in consultation with the Advisory Board, will prepare a comprehensive plan of the field of highway research, including economics, design, construction and administration, and will arrange a program of committee work for those fields that need to be occupied immediately.

The personnel of these committees will include active research workers within the State highway commissions, the universities, the governmental departments and other research organizations. A census will be taken of the research work completed and current, and the various research agencies will be invited to co-operate in an attack on those urgent problems upon the solution of which the future success of highway transport depends.

The Advisory Board will not duplicate the efforts of existing research groups. Indeed, it will not do any research work directly, but will act rather to promote a co-ordinated effort in a consistent national program, suggesting problems to those organizations best fitted to attack them. It will also serve as a clearing house for information.

As one highway commissioner has expressed the present need: "I have \$10,000,000 to spend on roads in my State this year. I know that I could save \$500,000 by properly directed research studies. If your board will

tell me what other states are finding out and what research work I should do to supplement their efforts, I will supply all the necessary men and funds." When it is considered that the funds available for the road construction program alone in the United States represent the expenditure of \$1,000,000,000, the cost of the overhead organization, such as that of the National Research Council, to unify research, is insignificant. There is abundant money available for the research itself. The Advisory Board on Highway Research of the National Research Council is in a position to co-ordinate such expenditures in a comprehensive national program.

An informational service, giving the results of current studies and advances in the art, will be supplied to various co-operating bodies at frequent intervals.

The program for highway research will not be limited to problems concerned with the construction and maintenance of roads from the ordinary engineering standpoint. It will also consider those important problems of economics of transport upon highways in relation to other transport agencies, the relation of the design of vehicles to the character of road construction, and the important problems of administration involving traffic regulation, fees and maintenance.

This is the first effort seriously to attack the whole problem of highway transport. With the earnest desire of all interested to co-operate, the efforts of the National Research Council, seconded by Engineering Foundation and national engineering societies, should be effective.

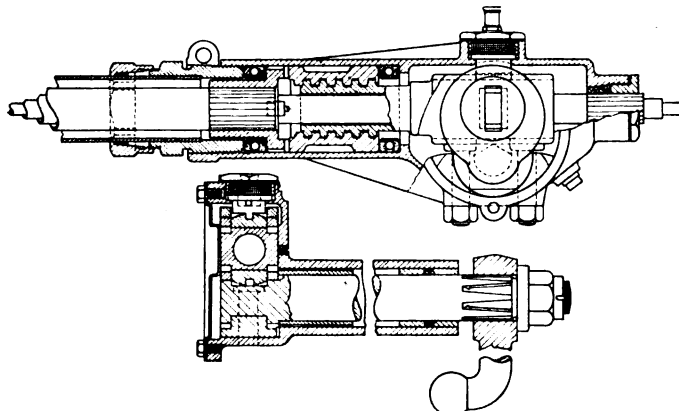
## A Steering Gear for Passenger Cars

A PASSENGER car steering gear of similar design to models produced heretofore for truck applications only is now announced by a well-known parts maker. In the new design the connection between the steering tube and the nut is a four-jaw connection without brazing. The screw threads are turned on one end of a forging, on the other end of which there is a rectangular opening. In this opening a rectangular piece of steel is inserted, which projects far enough on either side of the screw to engage rectangular openings in two swivels, one of which operates on either side of the screw forging. The rectangular openings in the swivels are long enough to permit the swivels to move transversely with the center line of the steering column. These swivels operate in two circular openings which are machined in two fingers projecting from the trunnion shaft. The distance between the center line of the openings in the fingers and the center line of the trunnion shaft is  $1\frac{5}{16}$  in. The resulting action when the nut is turned by turning the

steering wheel is that the screw moves up or down with the rotation of the nut. In so doing it carries along the rectangular block, which in turn carries the swivels, and rotates the trunnion shaft. The rotation of the trunnion shaft moves the steering arm forward or backward.

The advantages of this type of steering gear lies in the large bearing surfaces between the various operating parts. Large bearing surfaces tend toward safety, reliability and easy steering, as well as toward a reduction of wear on the threads. The new design is 2 in. wide at its lower part and the upper part of the housing, which also contains the ball thrust bearings, is only  $2\frac{1}{2}$  in. in outside diameter. This narrowness facilitates installation of the gear in passenger cars.

Ball thrust bearings are provided to take the end thrust of the nut in both directions. The trunnion shaft is  $1\frac{1}{4}$  in. in diameter and the steering arm is secured to the trunnion shaft by means of six taper splines. The steering gear is manufactured by the Ross Gear and Tool Co.



Ross steering gear for passenger cars

ACCORDING to W. T. Bonner, where both sets of brakes act on the same brake drum, it is a much better plan to secure the friction lining to the brake drum than to the brake bands, as is now the common practice. The heat generated by the friction of the brake no doubt is carried off quicker if the lining is on the drum, as it does not have to pass through the lining. It is claimed that the wear of the friction lining is more uniform and the lining wears much longer. Only one set of rivets are required for securing both the inner and outer linings. One objection would seem to be that since the service brake is used practically all the time, its friction lining will wear out much sooner than that of the emergency brake, and if both linings are secured by a single set of rivets, renewal of one lining alone involves difficulties.

# Effect on Fuel Economy of Refinements in Engine Design

Views of a British engineer specializing in carburetion, in regard to numerous factors of design which affect performance and economy. Pulsating flow, valve timing, scavenging, manifold design, combustion chamber shape and carbureter characteristics among items considered.

By L. Mantell\*

**T**HE factors which determine fuel economy in so far as they are at present understood in England, can be grouped under three general heads:

(1) The production of a well-disintegrated spray intimately mixed with air, a mixture not in constant proportions but varying as regards its air-gasoline ratio, according to the characteristic of the engine;

(2) The reduction to a minimum of all depositing agencies which may act upon the spray in its passage from the carbureter to the engine; and

(3) A design of combustion head and implacement of valves which will permit the highest possible charge turbulence, and maintain, by correct distribution of heat, the utmost uniformity of temperature throughout the mass of burning charge.

Were the current of air through the carbureter of a perfectly steady nature, such as would be produced by a rotary blower and the flow of charge in all parts of the induction pipe absolutely uni-directional it is probable that carbureter adjustment would be mathematically determinable; but the current is, of course, far from regular and by no means uni-directional, hence the wide discrepancies shown by comparing the carbureter adjustments and thermal efficiencies of different engines of the same capacity.

## Current Pulsations

Consider first the question of current pulsations. These are produced by exhaust back pressure, inlet back pressure, and by some other cause which is at present a little obscure, but appears to come either from the shock imparted to the moving current of gas by the closing inlet valve, or by certain shapes and areas of the induction manifold which intensify vibrations.

The predisposing causes of exhaust back pressure will be evident if we consider the progress of the exhaust stroke in the case of an ordinary touring engine with a muffler fitted. If the latter is very well designed with a view to the avoidance of back pressure and placed well to the rear where the exhaust velocity has decreased to a minimum owing to the contractive effects of cooling, its obstructive tendencies may be negligible, and at exhaust top center the residual pressure in the combustion head may be almost at atmosphere. But in the great majority of cases an engine so fitted will have a certain degree of positive pressure in the head at top center and therefore if the valve is closed at this point and the inlet opened very shortly after, it is most probable that a slight shock of back pressure will be communicated to

the entering column of charge before the action of the piston corrects its direction. Apart from this there will be in such circumstances an increased ratio of carbon dioxide present to vitiate the incoming gas and thus retard the rate of combustion. For this reason, among others, it is common practice in England to close the valve a few degrees late, generally about 10 or 12 deg.

Certain designers, however, favor the top center position for the reason that the small proportion of carbon dioxide present has the effect of softening the shock of the combustion, and imparting in this way an increased smoothness to the running of the engine. In the opinion of the writer this is fallacious practice, for the reason that an engine so timed must be very well designed as regards the shape of the combustion head and the size and disposition of the valves, otherwise, even with a thoroughly open and free exhaust system a slight vibratory blow-back is almost sure to set in.

It is found that engines timed in this manner invariably require unduly small choke areas in order to obtain good consumption, the reason apparently being that without an increased induction depression to damp out the tendency to blow-back this symptom develops to the detriment of a requisitely fine degree of spray suspension. It must be remembered that a pulsating series of gas-shocks has the effect of coalescing the finer particles of fuel into coarser globules which enter the combustion head insufficiently mixed with oxygen to burn at a useful speed, and are therefore ejected at the exhaust in a cracked or partially burned state, where their presence can be detected and measured by analysis of the exhaust gases.

Apart from this, an engine originally timed to close its exhausts on top center will do so before top center after a certain amount of cam wear and tappet side play has set in. Also, there is no margin left for such exigencies as a dirty silencer, or late or weak ignition. It seems, therefore, much sounder practice to close this valve at an appreciable distance over the top center.

The object in giving the inlet valve a closing lag is to cope with the wire drawing to which the induction current is subjected, and thus permit time for a more complete charge to enter the cylinder. If the valve is held open beyond the point where the minus pressure in the cylinder, which obtains during the induction stroke rises to normal, the action of the ascending piston will surely impart a series of shocks to the incoming current.

It might appear that the retarding effects of the throttle when running at a moderate pace and load would obviate any chance of a shock being imparted to the current in this way. It seems, however, to be the case

\*The author is connected with the Solex Carbureter Co.



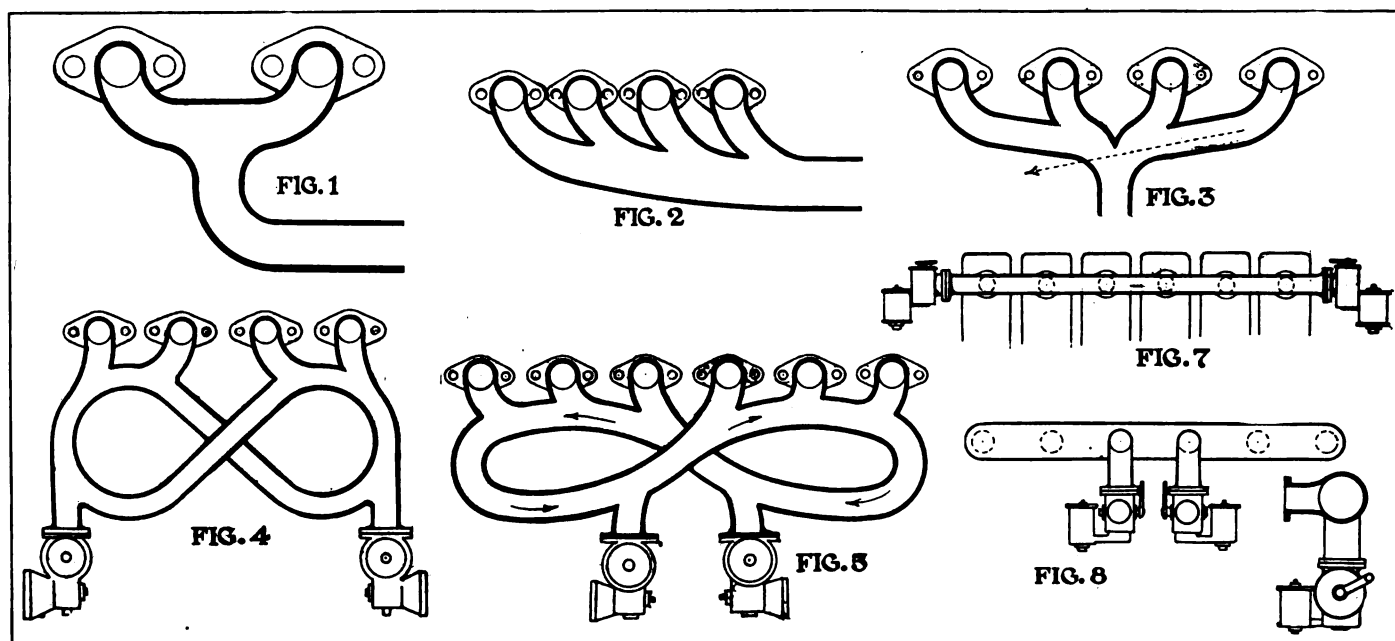


Fig. 1—Example of two-port T pattern exhaust manifold. Fig. 2—A well-designed four-port exhaust manifold. Fig. 3—A slightly defective Y pipe. Note the direction part of each discharge tends to take in its passage to the main pipe. Fig. 4—Unidirectional flow pipe for four-cylinder engine using two carbureters. Fig. 5—Unidirectional flow pipe for six-cylinder engine with two carbureters. Fig. 6—Straight induction pipe with carbureter at each end. Fig. 7—Side and end views of induction pipe with carbureters opposite ports 3 and 4.

that an unduly late inlet closing point, although in many instances it undoubtedly increases power at high speed, has a bad effect on consumption when running at low throttle positions.

The prevailing tendency among English designers is to close this valve rather too late, and the writer has seen many instances in which considerable improvement in economy has been effected by regrinding the cam so as to give less closing lag. It must be admitted, however, that cases are occasionally noted when quite good economy is obtained with timings that in an average engine would certainly cause waste.

From about 40 to 45 deg. late seems to be a favorite position for closing the inlet in English cars, but the writer has seen many cases in which this lag has been reduced to half that amount without appreciably impairing the power and with a considerable increase in economy. In slow speed truck engines particularly is this true.

There is more than one engine on the British market, which, in other respects well designed, is spoiled by an undue inlet closing lag. The simplest remedy, which is only in the nature of a compromise, is to use a small choke, or as the case may be—a heavy spring or gravity valve, where a carbureter of the constant vacuum type is employed.

#### Inertia Factors

If the exhaust valve still remains open too late the column of moving gas in the exhaust tract sometimes causes a minus pressure in the clearance space. Advantage may be taken of this by opening the inlet valve at the point where the minus pressure sets in and thus permit the head to be flushed and scavenged, while the piston is, comparatively speaking, at rest. An overlap of this nature occasions waste owing to the charge from the inlet tract escaping via the exhaust when the overlap is carried to excess, but a limited amount of overlap is economically advantageous.

Since the velocity of the exhaust column affects greatly the completeness of the scavenging, it would appear that the position of the opening point of each exhaust

valve in a four-cylinder engine must control to an appreciable extent the value of the auto-scavenging vacuum of the previous cylinder in order of firing. A careful study of the variations in carbureter adjustments called for by alterations in the opening points of the exhaust would appear to show that the fixing of this point is very potent, not upon its own cylinder, but evidently upon the preceding one.

#### Exhaust Manifold Design

The manifold has a considerable effect upon pulsations, and the design and shape of the exhaust passages and manifold are important.

While most engine makers are fully aware of the necessity for providing the utmost freedom and constancy of direction where high efficiency engines are concerned, it would seem from the frequency with which errors occur in the design of these parts that many British manufacturers are under a considerable misapprehension as to the extent to which this rule applies in the case of ordinary touring car engines.

While, for instance it is neither necessary nor desirable that a touring engine should be fitted with a long and open main pipe into which the port leads are very gradually swept by wide bends, it is, on the other hand, going to be quite the opposite extreme to cast the manifold integral with the cylinder block, and add to that offence by placing it in such a manner in relation to the valve pockets that the gases on emerging therefrom are bent sharply at a right angle.

The effects, of course, are two-fold: An incurably pulsating current owing to exhaust obstruction and, in many cases, overheating.

Few engines are now designed with cast-in exhaust manifolds, but, in their place another form of pipe seems to be attaining a certain popularity, namely, the "T" pattern, in which the main pipe is placed in the center and fed by leads from each end. While this is not so grossly undesirable as the enclosed variety it cannot be commended as sound practice.

In the type of pipe shown in Fig. 1, with which a few engines are fitted, consider the alternate firing orders—

1-2-4-3 and 1-3-4-2. In either of these cases two successive explosions will always come down the right and left branches respectively and interference will occur.

The first effect of this will be that the obstructed pair will be more vitiated by residual carbon dioxide and their fuel supplies arrive in a coarser and less combustible state than the other pair, and the final effect will be that one pair will require a richer mixture than the other.

The leads from all exhaust valves, both inside and outside the cylinder casting, should be of identical dimensions and internal shape and should enter the main tract or merge with each other at an acute angle, the apex of which points in the direction in which the gases are moving, as in Fig. 2. By this means only can identical degrees of scavenging be assured, assuming similar valve timings.

Now, while the "T" pipe is not good practice, the same is not necessarily the case with the "Y" pipe; especially a 4-port "Y" pipe. Considerable care, however, must be exercised in designing the curves. Note, for example, Fig. 3. It will be obvious that absence of interference is by no means assured here. The port leads enter the respective branches at the desired angle, but the angular relations in which the two branches themselves stand are clearly too obtuse, and interference as indicated by the dotted line will in all probability set in.

It would seem that a two-port arrangement is wholly inadvisable, for, in almost every instance observed there is evidence of interference according to the firing order as above; and a careful inspection of the single port system will readily show how this can well be so. At the critical scavenging point of one cylinder comprising the pair, the succeeding one in the order of firing is almost at full blast, and in a comparatively restricted area when no particular direction has yet been imparted to the exhaust gases. It is inconceivable that interference will not take place. All experiments go to show that this is one thing to be guarded against.

The highest grade of English engines is provided with external manifolds of the general design shown in Fig. 2, or alternatively on the lines of a deep Y, which is equivalent from a functional standpoint.

#### Inlet Manifolds

With regard to the inlet design, it must be admitted that British makers are by no means happy, especially where six-cylinder engines are concerned.

The main functions of an induction system are to provide by suitable dimensioning a maximum and if possible a constant peak velocity at all points from the carburetor to the valves, consistent with the maintenance of volumetric efficiency, having regard to the horsepower curve required, and to avoid corners, pockets and any local enlargements that will produce depositing whirls and eddies.

Where four and six port engines are concerned and appearance and expense no object, the unidirectional "figure 8" manifold (Figs. 4 and 5) with two carburetors seems to be as near perfection as any that have been tried, gas shock being apparently reduced to a minimum and the utmost steadiness of current assured. But cost, appearance and mechanical inconvenience place these designs quite outside the pale of the ordinary production job. We are obliged, therefore, to try to obtain similar results by less cumbersome and expensive means and must choose between an external manifold of simple design and the internally cast induction system.

In either case experience shows that the prime necessity is constancy of area. Where angles or bends are employed, they should be so designed as to impose an

identical number of deviations of the same angles between the carburetor and each inlet valve. This is easy enough to do in the case of a four-cylinder engine by means of the ordinary "T" or "Y" pipe, and it would seem that there is little difference in the respective efficiencies of these designs provided one does not ignore the internal disposition of the valves in relation to the port, in engines where there are two cylinders per port. In such cases it is desirable to avoid a large space of nondescript shape inside the port, for, although located within the cylinder casting and subject to the surrounding heat, this space is virtually still the induction pipe and, with the present low volatility fuel, deposition can easily take place.

Again, it is generally found to be better where a wide "Y" pipe is used, to straighten up the ends before approaching the ports, for the reason that otherwise deflection can easily occur at high speeds, and the outer pair of valves receive by centrifugal action more than their due share of the heavier parts of the charge.

#### Surface of Manifold Interiors

It is usually considered that internal roughness of the induction tract is inadvisable unless the surface is well heated, as in the case of the cast-in manifold, the reason being that the rate of movement of that portion of the charge adjacent to the rough walls is reduced by skin friction and a depositing tendency set up.

Certain research authorities are said to have found that the section of moving charge illustrated graphically may be represented by a parabola when moving at a comparatively low rate; as the velocity of the moving mass increases the top becomes flattened into a series of small parabolas until, at maximum velocity, these span the distance from wall to wall, with the exception of a small annuli near the actual surface of the tract, which is always at low speed (Fig. 6). The richness of the mixture is said to be such that the minimum of fuel is in the center and the maximum at the outside.

It appears from actual experiment that with the cast-in manifold the heat of the surroundings neutralizes to a great extent the depositing effects of surface roughness, for, in respect to economy, there is little difference to be noted.

For high volumetric efficiency purposes, however, there seems little doubt that the external pipe is the better. Hot surroundings are undesirable in this case owing to the volumetric losses which accompany a heated charge and conversely a smooth interior is essential.

#### Six-Cylinder Gas Distribution

One of the greatest troubles in the design of induction systems is the question of distribution in the six-cylinder engine. Ever since the inception of this design this has been a much debated point. The principle of employing two carburetors on high-grade productions seems to have more or less solved the problem.

Strangely enough a perfectly straight pipe with a horizontal carburetor at each end (Fig. 7) has been found to answer very well indeed on certain engines despite the apparently well established theory that unidirectional flow is desirable. On the other hand, at least one well-known French maker employs very successfully a straight pipe with two vertical carburetors feeding into it opposite ports No. 3 and No. 4 (see Fig. 8). An over-rich mixture to these cylinders and starving of the end pair with such an arrangement would be expected, but in practice it seems to work well. No doubt the troubles foreseen for the middle pair are prevented by the spreading effect of the right-angled bend imposed upon the gases on leaving the carburetor; but it is difficult to

see why the rebound and consequent gas shock at the ends does not play havoc with the distribution.

The only thing that we seem to have established with certainty is the futility of having an acute angled supply to one port, or pair of ports and an obtuse bend leading to the others. Apart from this it is painfully evident that we have still much to learn regarding the subject of distribution, and it is needless to emphasize the importance of this matter, for bad distribution must inevitably cause waste.

### Combustion Chamber Design

The relation of combustion chamber design to thermal efficiency must receive attention. The desirability of smallest possible metallic area exposed to the flame and of reducing the heat absorption to a minimum by machining and polishing of the head are well understood, but some of the more recent researches into the question of charge turbulence and detonation, which have lately been occupying the attention of European investigators cannot fail to be of interest, as they have a great bearing on fuel economy.

It has long been obvious that in order to permit of the pressure developing at a suitable rate to exercise a useful driving action on the piston crown the propagation of flame throughout the charge must take place at a considerable speed, and the original impression was that it increased by a definite and high rate of acceleration. It is now established, however, that the rate of flame travel in a still charge is a fixed figure and is in the neighborhood of  $7\frac{1}{2}$  ft. per sec.

The establishment of this fact led to further investigations, with the result that the spread of flame is now known to be solely dependent upon the mechanical action of the whirling charge which carries it throughout the mass, and that the efficiency of the combustion is therefore directly concerned with the speed of the whirling. The effect of this discovery was, of course, to throw a considerable light upon many points in connection with combustion head and valve design which had previously been debatable, and in some cases completely misunderstood. The superiority of the overhead valve is now seen to be in great measure due to the increased turbulence permitted by the more symmetrical shape of the head.

### Detonation

So far as our present knowledge goes detonation appears to be produced as follows: While at normal temperatures and pressures the progression of the flame of combustion throughout a mass of charge will be at a speed which depends upon the rate at which it is mechanically carried by turbulence, there is a top limit to the temperature at which this gradual propagation can continue. When, owing to various causes this critical point is exceeded, the mass, or portions of the mass, so raised will spontaneously ignite throughout its bulk, giving rise to an exceedingly sudden and very high pressure, which is of no driving value whatever and represents so much wasted fuel. In its more advanced stages this action is so momentary and violent that it imparts practically a hammer blow to the cylinder, causing molecular movements in the wall which are popularly described as "knocking." By means of high speed cinematography the cylinder can actually be seen to "breathe" under the influence of violent knocking and only the very momentary nature of the excessive pressure saves it from disruption.

Having regard to the predisposing cause of this trouble, namely, heat, it is not hard to follow the stages of its development. As the first portions of the charge are

burnt at their normal rate the resultant pressure is communicated to the residue, raising its temperature. Should the original temperature of the unburnt part be already unduly high owing to the heat of its surroundings it is easy to realize that its critical point can readily be reached, and it will further be evident that the higher the original temperature of the gas the greater will be the proportion of the residual bulk that will detonate.

Keeping in mind these two primary facts in regard to charge turbulence and detonation, a very interesting line of thought is opened, for it will be evident that the shape of the combustion head has a marked effect on both. The more rapidly we can whirl the charge the more homogeneous will be its temperature, and from this it naturally follows that as the speed of turbulence depends largely upon the emplacement of the valves and the symmetry of the head, the presence of valve pockets, unless carefully placed in relation to the main chamber, will act as local hot spots and stagnant areas, the contents of which will probably attain a degree of heat well in excess of the mean temperature of the charge. In practice this theory is well borne out, for it is known that the overhead valved engine is much less prone to knock than either the "T" or the "L" headed types, and that sleeve valve engines are particularly free from this trouble.

### Equal Distribution of Heat

The lesson which is learned from the establishment of these principles is that the prime objective is not so much keeping down the mean temperature as distributing the heat equally over all parts of the combustion head. It is much more difficult to do this in an L or a T head than in an overhead engine, and conversely it is easier to accomplish in a sleeve valve type than on either of the others.

It would appear from experiments that the exhaust valve itself is the principal cause of local overheating. A certain racing "L" head engine having a compression ratio approximately 7 to 1, once used at Brooklands, could be driven to a standstill on a hill without changing down and with scarcely a sign of knocking in evidence. The secret of its ability to perform this remarkable feat was that its exhaust valve guides were drilled with a small channel through which a fine spray of water was directed on the under side of the valve, which was thus kept cool. Such an arrangement would, of course, be quite useless for standard production work, but its effect on the functioning shows very clearly how great is the necessity for avoiding local hot areas. In those days the principles of detonation were unknown and the success of the scheme was erroneously attributed to the prevention of pre-ignition which, as we now know, is quite a different thing.

What is the most economical shape of combustion chamber from the fuel consumption standpoint? There can be little doubt as to the reply, namely, that with overhead valves. Here we have a combination of all the desirabilities—minimum of exposed surface, maximum reduction of local hot spots, the most direct entrance and exit for the gases, the most favorable shape for charge whirling, no possibility of stagnant charge areas, and last, but by no means least, the capacity in virtue of the above advantages to use a much higher compression than would be possible in the "T" and "L" heads without detonation losses, for it must be remembered that thermal efficiency rises directly with the compression ratio provided partial detonation does not set in.

There is much misapprehension in England regarding the utility of high compression.

An L or T head engine on which the compression can be successfully raised must be so dimensioned that, (1) the piston does not rise appreciably above the floor of the valve pockets, (2) and that there is still a suitable space in which the charge may whirl. The isolation of a large part of the charge in a valve pocket which would result were the piston brought very near the roof of the combustion head is obviously undesirable.

While the functional superiority of the overhead design is recognized it is well to see in what way the L head as such can be improved.

#### Detachable Cylinder Heads

One of the most useful innovations in this direction originally introduced in America, and subsequently adopted in England, is the separate combustion head.

Apart from its convenience from a production point of view, this principle has certain functional advantages which justify its development; (1) it enables the inside of the head to be machined more easily, (2) it permits of better heat distribution owing to the absence of the uncooled masses of metal forming the valve caps and (3) it allows a better choice of places in which to put the spark plug.

The advantages of (1) have already been dealt with. As to (2) it is occasionally argued that the valve cap masses are merely eliminated at the expense of the introduction of other masses. While this is perfectly true it must be remembered that other masses, for example, the thickenings necessary for the anchorage of the head, are much less unfavorably placed as regards their effect in producing local hot areas, which is, of course, the chief objection to their presence. The position of the plug is also important. Its position determines to a great extent the direction of the flame whirl. There is little that can be done as regards positioning on a theoretical basis. By using trial and error methods in the individual case it will be found that in some locations detonation is much less in evidence than in others.

The advantages of reducing tendencies to detonation are important. It is not the mere fact of freedom from knocking which counts, although that in itself is a great acquisition from a standpoint of comfortable driving. It is rather the ability to employ greater compressions that matters. Compression is one of the most potent factors in economy, provided it can be raised without causing detonation.

#### Carburetion

It remains now to deal with the question of producing a proper charge. There are remarkably few engine designers in England who ever attempt to understand the seemingly inconsequential manner in which carbureters demand extremely varied choke areas, induction depression values and air-gasoline orifice ratios.

In France the position taken up by designers is much more logical than in England with regard to the question of carburetion. There it has recently become the custom with many manufacturers when preparing the drawings for a new model, to consult carbureter specialists on those points of design which are directly concerned with carburetion; for example, the induction and exhaust system, the valve timing and certain details concerning the shape of the combustion chamber are submitted for criticism. But in England, with few exceptions, the design of these parts is undertaken without any reference to specialists on this subject, with the result that many engines fall short of the thermal efficiency figure which is merited by their design in other respects. There exists an erroneous impression that the carbureter is in the nature of an independent accessory,

instead of being one of the most important details of the engine and intimately interconnected functionally with those parts which the designer is apt to regard as purely mechanical or productional propositions.

#### Disintegration v. Vaporization

To analyze the requirements of the engine and consider the respects in which an average carbureter is capable of satisfying them, consider first the state in which the fuel must be delivered. The prime requisite here is intimate admixture with oxygen, hence the necessity for fine disintegration. Could this be carried to a sufficiently advanced state, heat would be neither advantageous nor desirable, for the thermal efficiency of an engine depends upon the amount of oxygen that can be usefully employed—that is, at the necessary speed with a minimum of free or partially cracked fuel in the exhaust. Assuming, therefore, that the fuel can be sufficiently disintegrated by purely mechanical means the presence of heat would be undesirable in that it must cause volumetric losses owing to (1) charge rarefaction and (2) displacement of oxygen, which must follow upon a partial vaporization of the fuel, for the smallest possible space is obviously occupied by disintegrated but unvaporized fuel.

While these conditions can be approached at very high induction velocities combined with an engine regulation and design which give the utmost freedom from depositing pulsations, it is clearly impossible to fulfill them at low velocities. We must, therefore, fall back on heating, which is the only alternative measure.

The degree of heat is of considerable importance, for whereas too low a temperature will permit of the fuel entering the cylinder in an insufficiently pulverized state to insure that it is completely and quickly burnt, too high a temperature will cause unnecessary rarefaction.

Careful experiment shows that the essential degree of heat varies considerably in different engines and conditions of carburetion; but it would seem that the heat applied should be such as to give the charge a final temperature of 90 to 100 deg. Fahr.—that is, in the induction pipe, after the latent heat losses have already taken place.

Apart from the question of induction heat the general engine temperature itself has a considerable effect upon economy; an over-cooled engine is well known to be a great fuel waster.

There is a critical engine temperature at which the thermal efficiency is at its best, and for economic results a means should be provided to enable this point to be maintained, for example radiator shutters or thermostatic control of the water circulation.

#### Heating the Carbureter System

As for heating the carbureter system there are two ways of accomplishing this adopted by British designers, namely, by hot air obtained from an exhaust muffler and by jacketing the induction pipe in cases where the manifold is external.

The latter method is generally considered the more accurate, for the two reasons that (1) there are less volumetric losses and (2) the degree of heat is more constant, for, in this connection, it must be remembered that the exhaust manifold is very greatly influenced by such factors as load, spark advance and mixture strength. Admittedly, water circulation is also affected by these irregularities but to a relatively slight degree.

The next matter for attention is the actual production of spray, and here carbureters fall very short of practical requirements. While at high engine speeds all may be well, in touring practice the wide-open throttle con-

dition to which this figure applies is only occasionally attained; medium and low-throttle positions are much more frequently used, and in these conditions of driving the carburetor is found wanting, first for the reason that its spray-producing qualities are not constant throughout the throttle curve, and second because it is in the majority of cases quite accidental if the instrument suits the characteristic of the engine.

The point of maximum velocity is at the opening edge of the throttle until such times as its progressively increasing area becomes equal to or greater than the choke area, in the case of open carburetors with a variable vacuum. The main jet situated in the choke is not operating to its fullest advantage until the throttle is well opened, while the auxiliary jet, which is placed either at the edge of the butterfly valve or in the case of a barrel throttle, generally near the center of the barrel, is not at any time the point of maximum velocity.

When a butterfly throttle is used part of the air goes round the other side of the disk, thus reducing the local velocity; while in the barrel type there is a high velocity point at its top and bottom closing edges, but comparative stillness in the intermediate area in which the jet is placed.

The best design would incorporate a variable venturi with a perfectly controlled jet in its waist. This presents very great mechanical difficulties, however, for the jet must be dually controlled, that is, it must be mechanically variable to conform exactly to the extreme variations of the velocity in the venturi, and must also be controlled for automatic correction to deal with variable loads and speeds at constant throttle positions.

#### Carburetor Characteristics

It is, however, in respect of their "characteristic" that carburetors are principally found wanting. A constant mixture at all speeds is not desired. Note the diagram (Fig. 10) showing an average throttle curve chart. The air-gasoline ratios are shown on the left and the degrees of throttle openings at the top.

Taking now 15.3 to 1 as the perfect combustion ratio it will be seen that for easy starting and slow running the fuel proportion is a little high, but as the throttle opens a weak area is shown from about one-eighth to three-eighths opening, namely, in the average driving position. For purposes of acceleration, however, which is usually done at half to three-quarter throttle, the mixture is chemically correct; but for extreme power, at the last fraction of opening, the proportion of fuel is increased about 25 per cent.

The necessity for the last-mentioned enrichment arises from the fact that a chemically perfect ratio is not the most powerful. Owing to the specific heat changes at the high temperatures of combustion it is found desirable to increase the percentage of fuel by about 25 in order to keep down the flame temperature and thus gain a few per cent of extra power, not through improved combustion, but due to cooling effect of the latent heat of the additional fuel. It will be obvious that this addition must only be made at the very last fraction of opening and thus be used solely for emergency purposes, where extreme power is desired.

Apart from the fact that there is no carburetor on the English market in which means are provided to shape the throttle characteristic as desired, that of the engine is itself a variable quantity and complicates still further efforts to balance the two curves.

The difference in the inertia values of air and gasoline is important. The former being light will readily respond to varied impulses, but the latter because of its much greater weight will follow them less readily. Con-

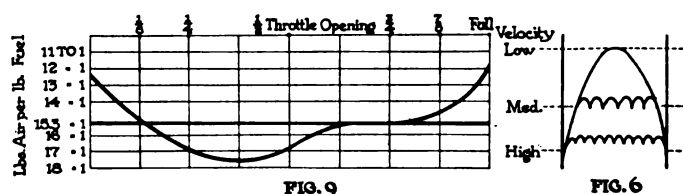


FIG. 9

Fig. 6—Graphic section of induction current, showing effect of increased velocity. Fig. 9—Diagram showing the throttle mixture curve suitable for an average touring car engine

sequently, the more pulsating the current the larger is the jet or, as the case may be, the smaller the choke necessary to give a stated mixture.

If, therefore, we have a well-considered valve timing, strong valve springs to prevent lag and bounce, and an intelligently designed induction and exhaust system, we can count on a fairly straight engine characteristic. But where there is any tendency to variations in the nature of the periodic impulses troubles commence.

An engine designed for very high output at high speed has exhaust inertia, a big overlap of inlet and exhaust valves, and a steady current which will advantageously take a large choke results, but at low engine speeds there will normally be insufficient spraying velocity at the main jet, consequently a flat area will develop here unless the throttle is placed near enough to the choke to take over its duties to an extent pending the attainment of sufficient air speed in the latter to permit of its functioning unassisted. Lowering the throttle would cure matters were it feasible.

On the other hand, if the throttle is, as is frequently the case, too near to the choke, the proximity of its opening edge to the jet will cause the latter to function too soon and give rise to a rich area in the throttle curve at a point of partial opening which is difficult to eliminate.

The correction cannot be done at the auxiliary jet in either of these cases, for this would, in turn, upset the curve at small throttle openings. One solution is to have a main jet of some type in which the correction does not start until this point is passed, and this is difficult to secure in the case of constant vacuum carburetors where the jet is automatically controlled by a taper needle set in the gravity valve and moving therewith.

Consider next the case of the engine in which the exhausts close early, but which have springs of sufficient lightness to allow the valves to develop a progressive lag as the speed increases, and thus eventually close by accident where they should have closed by design. It will be quite evident that the result of such an unintentional variation in the valve timing will be to provide a jerky current at low speeds which suddenly steadies as the automatic closing lag sets in.

Imagine a set of circumstances such that the current will be steady at low speeds and gradually develop periodic vibrations as the speed rises. A badly designed exhaust manifold, for example, will have this effect, or a combustion head so designed that there is a great predisposition to knocking and, therefore, a late ignition is essential. The inevitable effect of a late spark is that the explosion will be slow in developing and the residual pressure will, therefore, become progressively higher as the speed mounts up, and from this will naturally follow a periodic vibration which will rise in intensity directly as the residual pressure. In this case, instead of requiring mixture correction, we need a gradual enrichment to balance the inertia disturbances offered to the gasoline column in the spraying member, and this, of course, is not a condition normally cared for by any standard carburetor.



It will thus be evident that a large number of different engine characteristic curves can readily be arrived at by various combinations of defective details of engine design; that is, in respect of induction and exhaust tract and combustion head shapes, valve spring strengths, cam contour, etc. If the different proportions of mixture demanded by the engine with increasing speeds happen to be within the capacity of the correction device of the carbureter, all may be well; but otherwise the instrument is called unsuitable, whereas the real facts frequently are that the engine designer, through lack of knowledge of the more intricate side of engine functioning, has imposed a set of conditions which no ordinary carbureter could possibly be expected to deal with in a satisfactory manner.

### Ignition Timing

Ignition is another question which seems to be insufficiently studied; that is, in its relationship to the carbureter. The average engine should take at medium speeds an advance of about 30 deg., assuming a normal magneto or any other form of ignition which maintains its spark intensity at high speeds, and which does not develop a progressive lag as the speed increases. In badly designed combustion chambers, however, where there is a great tendency to detonation on increasing the load, the ignition timing is often made unduly late to prevent knocking. This always leads to complications,

for residual pressure is almost sure to develop above a certain engine speed, assuming a large throttle opening and load, and thus the carbureter becomes the scapegoat for faults which are directly due to some fundamental error in design and not attributable to this instrument at all.

The measurement of fuel consumed per brake horsepower-hour as determined by bench tests should be conducted both on a basis of load variation and throttle variation at constant and at varying loads. In this way defective characteristics can be located and traced where an ordinary load curve would disclose nothing.

The average modern instrument of reputable design is quite capable of dealing with all ordinary engine characteristics if correctly adjusted. When it fails to do so it would be well if engine designers would consider the probability that all is not well with the engine and investigate accordingly, instead of unequivocally writing off the carbureter as defective and searching for one which is able to deal with abnormalities. For, as can readily be appreciated from the above examples of abnormal characteristics, a carbureter which will suit such an engine where others of repute fail will, in many cases, simply mean that, far from being a first-grade instrument, it is in actuality quite defective from a point of view of standard requirements, and eventual troubles are probably in store for an engine passed out on the former assumption.

## A Viscosity Temperature Chart

**A** CHART for determining the viscosity temperature relation of various mineral oils is given in the accompanying cut. By the use of this chart it is possible, according to *Lubrication* in which the chart is published, to determine, if the viscosity at two points on the curve are known, the viscosity at any other point on the temperature scale, since for all mineral oils the lines on the chart are straight, at least above the temperature of the cloud test.

Oils A, B, C, D, E and F, which are all straight-run distillates from the same base crude and differ but little in gravity, have lines which are almost parallel. Oils N, P and U, which differ considerably in gravity, being from a different crude, have lines of different slope.

Below the temperature of the cloud test, the viscosity rises rapidly, due to the precipitation of the paraffine, and the curve turns upward. In well-refined naphthene base oils, A to I inclusive, there is practically no paraffine content, hence it will be noted that there is no deviation from the straight line.

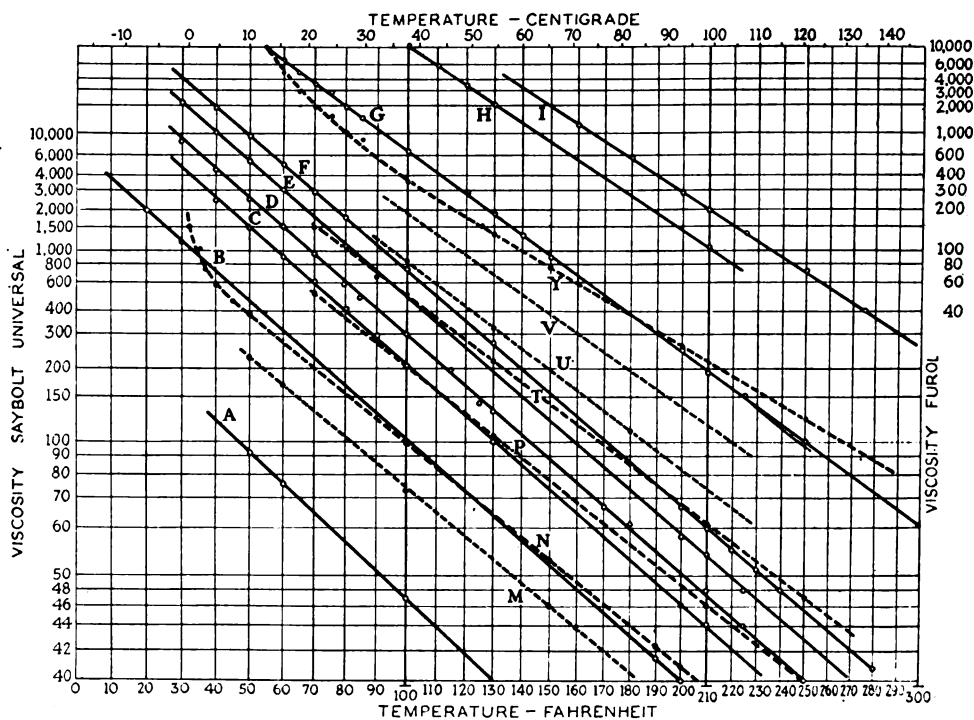


Chart showing relation between viscosity and temperature of various mineral lubricating oils

**A** RECENT U. S. Consular Report makes the following statement as regards motorcycles in Australia:

"The average price of a motorcycle at present in Melbourne is \$826. In 1911 it was \$315, and in 1914, \$365.

It appears necessary for every motorcycle to have a side car, which costs \$207. Apparently it is now cheaper to purchase a second-hand motor car than a fully equipped motorcycle."

# How an Effective Labor Policy Has Increased Production

The most important factors of human relationships in industry are those which cannot be photographed or charted. The successful labor policy discussed has recognized that fundamental fact and has proceeded along sound production lines. A carefully planned wage system is a feature.

By Norman G. Shidle

THE journalist often speaks of going out to "dig up" a story. The expression indicates that he must make special effort and inquiry to locate the material desired. It often happens that the story most difficult to "dig up" is the best story on the particular subject. This is specially true in the field of labor and industrial relations. The story that is easiest to find and easiest to write is that which deals with definite schemes and plans, that contains formulas, brass bands, pig roasts and other perfectly tangible things, pictures of which can be shown and diagrams drawn.

But the difficulty with such stories is that, because of these very tangible characteristics, they deal with the superficial rather than the fundamental factors of human relationships in industry. The fundamental factors are intangible to a large extent; they deal with the feelings and actions of individuals and the reasons for those actions and desires. The factory in which the management has caught the vision of these fundamentals and in which the labor policy is being worked out along basic lines may have few surface indications of a "story" at all. And even when the facts are discovered it is no easy task to reduce to common terms the psychological and intangible factors involved.

Since such factors are fundamental, however, and are essential to the understanding and operation of any labor policy, a discussion of a particular plant in which definite progress has been made is always of value. Through a study of various individual instances, each of which is developing along constructive and permanently progressive lines, it may be possible to build up a philosophy and a series of principles for practical application which will solve the labor problem for those making the study.

The methods in use at the Autocar plant are worth attention from this point of view. The interesting feature of the work at this plant is not so much the detailed working out of methods as the excellent results achieved through a working out of general ideas based upon sound fundamentals. The methods revolve around several basic factors, the chief of which may be listed as follows:

1. A carefully planned, installed, and operated method of wage payments
2. A successful promotion policy
3. A definite effort to develop leaders
4. Some study of monotony work and attempt to reduce its detrimental effect upon the individual
5. A broad vision of the labor problem in general and an intelligent conception of the relative importance of the various factors involved
6. A realization of the necessity for slow growth in the development of a labor policy.

7. Belief that ultimate progress in industrial relations depends upon an understanding and proper handling of the individual.

## Wage Payments

The striking thing about the system of wage payments in use at this plant is the care with which it was installed. The system itself is a form of bonus payment similar to that often found elsewhere. The payment of bonus rests upon a time and piece basis. The man is paid a certain base rate. Then a task is set. When the man accomplishes 90 per cent of that task his bonus begins. The bonus then increases in certain definite proportions as the production of the man increases.

This system, it is obvious, rests fundamentally upon the establishment of accurate times for the performance of the various operations. This company recognized the great trouble which might occur from the setting of inaccurate task rates. It realized that every change in rate is a cause for suspicion in the minds of the workmen. For this reason it went about the setting of task rates very slowly and very carefully.

The management decided some two or three years before installing this bonus system that the system was to be used. Then work was begun in gathering data, making tests and experiments, correlating material and checking up results. In other words, every reasonable precaution was taken to make certain that all the task rates set should be accurate.

The man in charge of task setting and bonus work is a former shop man in whom have been developed the qualities other than mechanical necessary for such work. This man had worked in the Autocar shop for years and knew practically all of the men as friends before taking up this work. The men liked him and had confidence in his fairness and honesty.

The attitude of the workers toward the man in charge of rate setting and bonus adjustment is always, of course, an important factor in determining the success or failure of any such plan.

When the task rates were finally ready for installation, the bonus system was started in two departments only. The men were told that the sky was the limit on production, and that the task rates would not be increased unless there was a change in design or machine equipment.

For some time only a slight production increase was noticeable. The men had seen systems of this kind operate and had heard of their operation in other plants. They knew that when a statement of this kind was made it did not always mean exactly what it said. They knew

of many instances in which the piece rates had been cut or task rates increased, regardless of what was said at the beginning. So they were cautious in advancing production and were afraid to earn a large bonus.

The management said nothing and made no attempt to drive them, but reiterated its statement that task rates would not be increased. Gradually production increased. Little by little the men began to earn more bonus. Finally it became evident to the men that the management honestly meant what it said and they "went to it." The experience of the men in these first two departments spread to other parts of the plant, of course, and the installation of the system in those other departments was a comparatively simple matter.

The long period of preparation that had been gone through, however, should be recognized as an important factor in the success of the plan. Careless and hastily set piece or task rates have probably been the real cause of more labor trouble than any other single factor. In this plant it took a long while for the management to gather and correlate the data which they considered essential to the proper establishment of rates. But the result has been a permanent benefit to both management and men. This is simply another illustration of the fact that it is not so much the system as the method and spirit in which it is installed and operated that is the chief factor in making for success or failure.

#### Promotion Policy

When men are promoted from within the organization a desire to advance is likely to be common among the employees. Such a policy has been pursued at this plant. Practically all of the foremen have been developed from among the workmen, while the plant superintendent, as well as the production manager, was formerly a workman in this shop. The advantage of this policy is that it presents a definite promise to every workman that he will have an opportunity to rise through increased effort.

There are dangers, of course, to a promiscuous adoption of the policy of promotion from within. The promotions must be made with discrimination and the selection of leaders be on the basis of merit and not favoritism. When a man who has been unpopular as a workman is made foreman there is trouble in store for that department; far more trouble than if an outsider were brought in.

Taken as a general thing, however, the policy of promotion from within is an excellent one, and will go far toward obtaining better spirit among the workmen.

To develop leaders from within the plant, however, is not always an easy task. "There are a few natural leaders," says H. A. Butler, superintendent of the Auto-car plant, "but most leaders have to be developed. There are not nearly enough of the natural leaders to fill all the foreman jobs.

"It is possible, however, by training to develop certain men into leaders. The chief things we try to instil into our foremen is that they are representing the company and that they must, therefore, be absolutely square and honest in all their dealings with the men. Our management never promises the men anything it does not fulfill, and we make our foremen understand that they must carry out this policy to the utmost."

#### Monotony Work

In this truck plant the problem of monotony work has not become serious up to the present time. While there are, of course, numerous routine jobs throughout the factory, production has not reached the large quantity stage. Nevertheless, the presence of the problem is recognized. Superintendent Butler has considered this matter rather

carefully and expressed some interesting thoughts along this line. He said in effect:

"While only a few men are natural leaders, I think the majority of men in our shop desire change. That is, they become tired of performing the same operation over and over again. We had two men on a crankshaft machining job, for instance, not very long ago. One of these men had been on that job for two years. Finally he came to me and said he would either have to be changed to another job or leave the plant. He was seeing crankshafts go round in his sleep.

"We try to watch this sort of thing and not let it get that far. We changed that man, of course, but we usually try to change them before they get that way. The normal man does not like to have his mind dulled and be tied down to doing exactly the same thing in the same way day in and day out. And you can't blame him.

"Once in a while you run into an exception. I told the foreman the other day, for example, to change a man from a Fellows gear shaper job, on which the man had been working for several years. The man had made no kick, but I thought he must be nearly "fed up" on that routine job. So we changed him over to a lathe. Two days later he was in here asking to be put back on the gear shaper. But that is an exception. The average man likes a change and does better work if he gets it; his production is better, both as to quantity and quality, in the long run.

"It might be possible to establish cycles of change for men on certain jobs, routing the cycles in such a way as to progressively improve the man's production ability and worth to the company. That would require years of study and a very careful investigation of all the factors involved. We have not come up against the monotony work problem to a serious enough extent at present to make such procedure feasible."

The men here are encouraged to use their intelligence and are given the benefit of results which they obtain. One man, for instance, was running two automatic machines on the task rate bonus system. As the bonus man passed through the shop one day and happened to speak to him, this workman said:

"I wish I had another machine here. I could run a third machine all right. What would you do if I ran three machines?"

The bonus man took the matter up with the superintendent and it was decided to pay this man as though he were one and one-half men and let him run the three machines. The suggestion was made by the man; the company profited by the increased production and the man was given the entire benefit of his increased production. Such actions as this on the part of a management go further toward gaining confidence and co-operation from the workers than any number of speeches and editorials.

#### Service Feature

Along with these more important fundamentals, this concern has in operation a number of the more usual service aids for its employees. It maintains a dental department, a dispensary, an x-ray department, a company restaurant, an oculist and a legal service. The legal service has proved especially popular with the employees. One afternoon each week it gives advice to any employee wishing it. A practical nurse or matron has charge of the girls' rest rooms. This woman acts as intermediary between the female employees and the production manager, as many situations arise that cannot be taken care of by male foremen.

Resting as they do on the sound basis of the fundamentals previously described, these various employees'

service activities fill a proper and useful place in the working out of the labor policy.

### Results Achieved

Excellent results have been achieved by following out the general principles outlined. Production per man has been materially increased over a period of years. Superintendent Butler is authority for the statement that this increase can be attributed largely to the co-operation of the individual workers and to the way in which the company has handled its labor problem.

In normal times the plant employs about 1300 men, and is running at about 60 per cent of capacity at present. Every effort has been made to hold the old men during the time of depression, and men have been switched from one job to another in an effort to limit unemployment. Neither the base rate wages nor the bonus rates have been cut.

### A Slow Growth

At the present time this company has the confidence and co-operation of its workmen. Some idea of the reasons for this fact have been outlined. There is behind it all, of course, a spirit of justice and a real desire on the part of the management to be on the level with the men. This is fundamental.

There is in the shop an atmosphere of "this is a pleasant place to work" that is caught by even the casual visitor if he stops to talk here and there with workmen. We have discussed this matter of "plant personality" at great length in previous articles, but it must be mentioned again, since it does play its part in helping along

the general problem. Like human beings, every plant has a personality. When that personality is pleasing, relations between management and men are always better. But it must be recognized that these important intangible factors cannot be developed in any plant overnight. The general conception of this labor policy has been built up over a period of at least ten years at this factory. The present state of confidence and co-operation is the end of a long journey. Management and men have proved each other through many practical tests. Suspicions have been overcome, not by short talks, but by continuous actions over a long period of time.

A spirit of co-operation, a true friendship, a community of purpose and thought—these things are not achieved by an efficiency engineer, nor by a series of "loyalty letters," nor by a new bonus scheme or stock ownership plan, nor by baseball teams and summer picnics, nor by any purely material and easily installed or obtained things. They are achieved by a long period of honest dealing, of close study of individual workers, by a thorough investigation of every job in the plant, and by a constantly progressing development of all the factors affecting human relationships in industry.

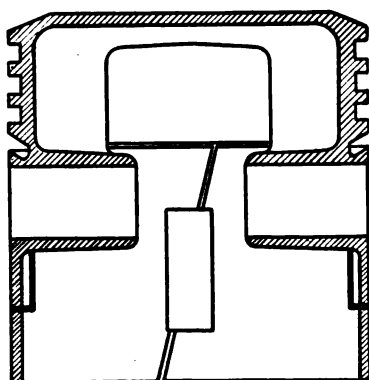
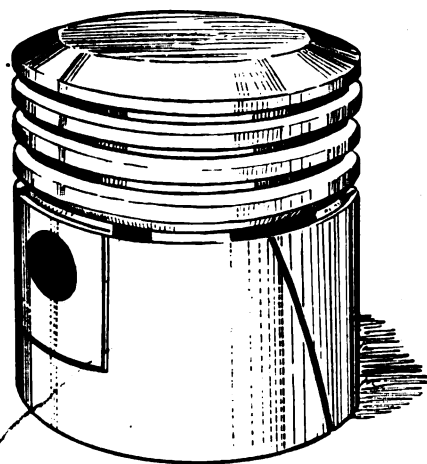
It may be objected that such methods take too long and are too much trouble. But they are permanent and pay for themselves as the development takes place. The labor expert who offers a sure and quick cure is just as much a charlatan as the patent medicine man of old. The permanently progressive things of industrial success come from careful experiment and hard work and study—in industrial relations as well as in mechanical development.

## A New Aluminum Piston

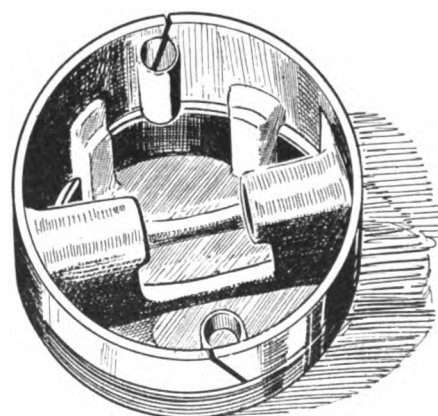
**T**HERE is much evidence that the aluminum piston is in a new period of development, for new designs are being brought forward constantly. The objectionable features of the earlier designs are fully understood, and inventors are endeavoring to overcome them. The illustrations herewith show a piston manufactured by the Waddell Motor Corp. In this piston the skirt is partly detached from the ring belt and the lands between the ring grooves are turned with sufficient clearance so there can be no trouble from seizing. Only the skirt is depended on for bearing surface. Those portions of the skirt around the ends of the piston bosses are relieved and are detached from the rest of the skirt by saw slots. The bosses connect with the piston head and the ring belt by two substantial ribs running parallel with the piston pin axis.

The skirt is split on the pressure sides by inclined saw slots, but round bosses are cast on the inside of the skirt where these slots come and these are later drilled out and form a springy connection across the slot. The only connection between the skirt and the ring belt is furnished by four shallow ribs extending from the head to the skirt.

**F**INLAND imported in 1920 751 automobiles valued at 31,500,190 Finnish marks, and 264 metric tons of oil and steam tractors valued at 7,211,970 marks. At the present time motor vehicle business with Finland is rendered practically impossible by an embargo decreed on Feb. 12 last from which exceptions are made only in very urgent cases.



Waddell aluminum piston



# A Novel Method of Hobbing Worms

A helicoidal cutter is one of the features of this new method. The action of the hob is in the nature of a progressive roughing and finishing operation. The metal is removed progressively and the cutting action is distributed over all the teeth. This article discusses the process in detail.

**T**HE screw or worm and its mating gear constitute an extremely ancient combination. The compactness and simplicity of design, and the large speed reduction attainable, make it peculiarly applicable to many types of mechanism. When rigidly mounted and properly lubricated, this gearing is noiseless and one of the most efficient means yet developed of transmitting power between shafts lying in different planes.

Worm gearing has not been used in the past to as great an extent as its merits would seem to indicate. This has been due, principally, to two reasons: First, difficulty of producing correct multiple-threaded worms and worms with an excessive helix angle, and, second, inability to successfully produce correct worm gearing of small velocity ratio, approaching one to one.

Most worms are made with helicoidal teeth, and this article will deal with worms having teeth of that contour. The axial plane of a helicoidal worm is a plain, involute rack section, and the teeth of the mating gear, at the central plane, will have involute curves thereon, unrolled from the basic rack.

A single-threaded worm with a moderate helix angle can be successfully threaded in the lathe. The lathe tool used can be set parallel to the axis of the worm, or can be set normal to the tooth helix. In the first case, it would be necessary to reverse the worm after finishing one side of the thread, and then cut the opposite side, due to the impractical cutting angles otherwise obtained on a double-sided cutting tool. When a straight-sided tool is set normal to the tooth helix of the worm, a modified form is produced in an axial plane, and the hob used to cut the mating wheel must be changed to correspond.

With the evolution of the machine tool industry, and the development of machines which in production far outstripped their predecessors, the process of milling worms with a disc cutter was originated. This method answers very well for single-threaded worms, and is much faster than cutting the threads in a lathe.

To obtain a worm with true helicoidal teeth, with straight sides on the linear or axial section, it is necessary to correct the shape of the disc cutter, owing to the interference of the cutter and the helicoidal surface on the worm tooth. This is done by forming a lead or cast iron disc to the proper contour, and using it as a template in making the cutter.

If the above process is not employed, the advantage of having a basic rack section and conjugate teeth on the mating wheel unrolled therefrom is lost. Such a formed cutter, of course, can only be used to thread worms for which its tooth contours were intended. Worms of dif-

ferent diameters, threads or linear pitches require cutters made specially therefor.

The Gould & Eberhardt Co. have developed a novel method of hobbing worms, which is claimed to be as far in advance of worm milling with a disc cutter as the latter was superior to the old process of cutting the threads of worms in the lathe.

The production of multiple-threaded worms by the lathe or thread-milling process, necessitates intermittent indexing motions, either hand or automatic, with their inevitable resulting inaccuracies. The hobbing method, with progressive and continuous indexing, entirely eliminates this objectionable feature.

In the hobbing of worms, either single- or multiple-threaded, a hobbing machine is used with the gearing ratios throughout so chosen that a velocity ratio of one to one is readily obtainable between the cutter and work spindles and the machine operated just as when cutting helical gears.

One of the novel features of this new method of hobbing worms is the helicoidal cutter employed, which also permits worms to be hobbled which have a shoulder on either or both ends.

The hob, illustrated in Fig. 1, possesses several distinctive features. The teeth are arranged in a helical formation similar to gear hobs. There are about fourteen roughing and three finishing teeth. It will be noticed that there are only about one and one-half convolutions of teeth, thus making this hob much shorter than gear hobs, the length being about twice the normal

circular pitch of the worm.

The action of the hob is in the nature of a progressive roughing and finishing operation. The roughing teeth have their tops and sides reduced in regular decrements, starting with the last finishing tooth and ending with the first roughing tooth. This portion of the hob has somewhat the appearance of a spiral. The lowest tooth is made high enough to cut into the periphery of the worm as far as its center line, while each succeeding tooth takes out a little more metal, ending with the finishing teeth, which smooth and complete the worm tooth shape. The arrangement of teeth just described, and the cutting action secured thereby, make this hob analogous to a broach coiled around a cylinder. The removal of metal is accomplished progressively, and distributes the cutting action over all teeth.

If the hob is made in the ordinary manner, it will be found that the following side of the hob teeth will, if uncorrected, cut away a part of the worm tooth from the pitch line to the outside diameter of the worm.

This necessitates a different lead on the two sides of

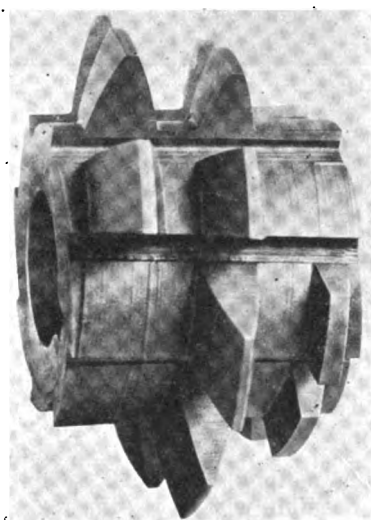


Fig. 1—Worm hob



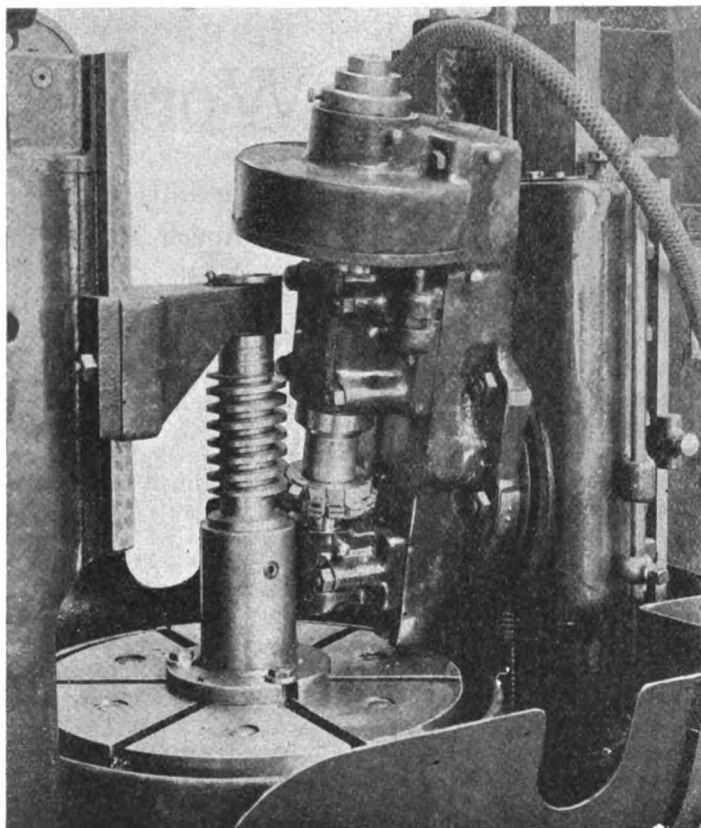


Fig. 2—Machine cutting single-thread worm

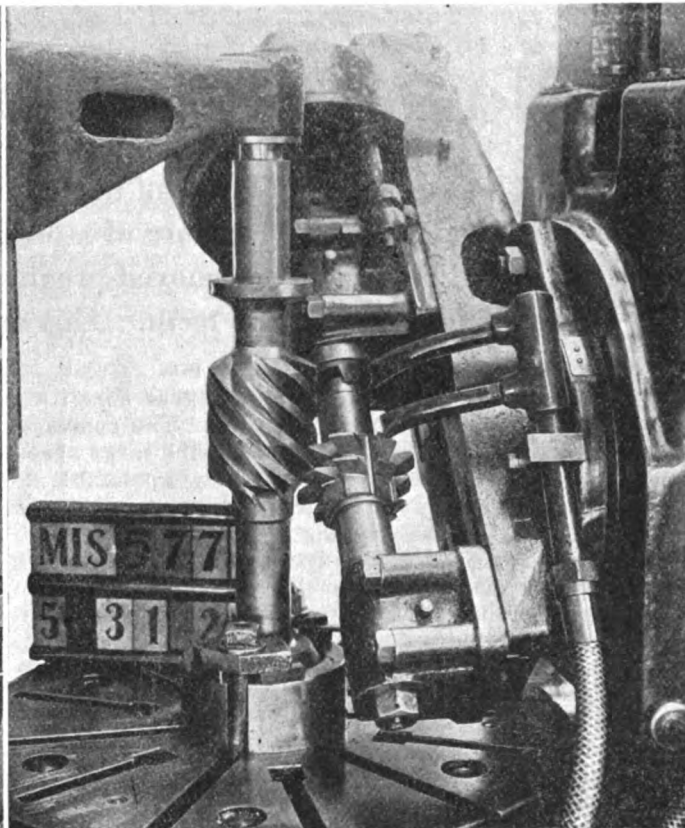


Fig. 3—Machine cutting seven-thread worm

the teeth, the leading side being made to the basic lead calculated from the normal circular pitch. The following side is recut to a shorter lead, sufficient to clear the theoretical contour of the worm tooth.

When the machine is set up, the middle finishing tooth is centered with the axis of the worm. The roughing teeth lead, and the finishing teeth follow, in the direction of hob rotation.

The production and accuracy attainable with any worm-threading process are to the practical man the outstanding features by which the merits of a given method are mainly judged.

The production possible with the hobbing method is said to be much greater than that which is possible with the late or disc cutter method. This is especially true of multiple-thread worms, as the machine is geared for the number of teeth, just as in hobbing helical gears. This obviates the necessity of indexing by hand and taking a fresh cut through the worm for each tooth, which must be done with a lathe tool or disc cutter.

The accuracy of worms produced by the hobbing method as outlined is said to be superior to any of the other known methods for the reason that in this system the cutting action is progressive and continuous and produces accurately spaced multiple-threaded worms, which is an essential feature in efficient and successful worm drives. The cutting action is a result of the generating characteristics of the machine, and not dependent upon other devices which may be inaccurate or inaccurately operated.

The amount of feed to the cutter and worm blank relatively to each other in an axial direction is dependent upon the helix angle of the worm. That is to say, the greater the helix angle of the worm with the axis, the less the axial feed.

The hobbing method is also adaptable to roughing worms which are subsequently heat-treated and then ground. In roughing with this system the amount of

metal remaining to be removed by grinding is uniform and the spacing of teeth on worm is accurate, permitting a high degree of accuracy in the final grinding.

The fixture for holding the worm blank should be of a very rigid design, with powerful means for driving, because the strains on this mechanism are severe.

Fig. 2 shows one of these hobs mounted in a gear-generating machine finish-threading low-carbon steel worms, single-threaded, of 2.7-in. pitch diameter, 0.666-in. linear pitch, with an output of one every 17 minutes, floor to floor.

Fig. 3 shows the rough-threading operation on an alloy steel, seven-threaded worm, 4.3 in. outside diameter, 4½-in. face, 1.37-in. linear pitch. The time to thread this worm is 60 minutes, floor to floor. The teeth are, of course, ground to final size later.

Another example of production is the threading of alloy steel quadruple-thread worms, 2.8-in. outside diameter, 4½-in. face, 1.06-in. linear pitch in eight minutes each, floor to floor.

Another field in which worm hobbing has proven very successful is in the threading of multiple-threaded automobile steering worms. The worms were produced with very accurate spacing and a good finish. A double-threaded steering worm for one of the well-known cars, of 2.09-in. outside diameter, 1¾-in. face, 0.52-in. linear pitch, has been finished in 15 minutes each, floor to floor.

**A**N abstract report of investigation conducted by the Bureau of Standards on scaling of enamels has been submitted to the Journal of the American Ceramic Society. A co-operative committee of the Enamel Division of the society met at Cleveland on June 20 to consider recommendations of the Bureau for co-operative work, both in the steel and iron mills and in the enameling plants. It is believed that results of the Bureau's work can be put into actual commercial practice through the efforts of this committee.

# Relative Value of Aluminum and Steel as Body Panel Material

The writer believes the field for composite aluminum bodies to be where production is limited to 10,000 or less. This construction is also valuable in the development of new body designs. The pressed steel body is specially adapted to quantity production.

By E. J. Bartlett\*

**T**HE purpose of this paper is not to discredit the use of materials other than aluminum for the metaling of automobile bodies of the passenger type. It is, rather, to define, in a non-technical way, the limitations of the fields for use of the two principal materials used for the sheathing of bodies—annealed sheet steel and sheet aluminum. Any other materials, such as laminated wood panels, cast aluminum sections and the fibrous compositions, are so little used that we may omit them from further discussion for passenger car service, except as occasionally used auxiliaries.

There are three distinct types of automobile bodies, from a constructional standpoint, in every-day use. These are the aluminum composite body, the steel composite body and the all-steel body, using the terms common to the industry.

Aside from the standpoint of quality, which will be discussed later, which of the three types of construction to use is economically determined by just one factor—the quantity produced.

To illustrate, a single body can, naturally, be produced more cheaply by using a wood framework and sheathing it with a ductile metal, such as aluminum, than by the use of a less ductile and more difficult metal to smooth and finish, such as sheet steel. Of course, an all-steel body would be prohibitive.

This same situation is undoubtedly true for ten bodies or 100 bodies or 1000 bodies or possibly 5000 bodies. The border line where the economic use of the composite aluminum body gives way to the composite steel body can be accurately determined for only each individual case where the die cost for the particular design of body can be determined, together with a comparison of labor costs for the two constructions. Somewhere there is a volume point where the composite steel body is the cheaper, and in spite of its disadvantages, none of them vital, economy will compel its use.

For average conditions this point may be conservatively taken at a minimum of 5000 when little regard is given to smoothness and quality, and a maximum of 10,000 when economies of production will probably offset all advantages of the composite aluminum construction. Often in this intermediate field a part aluminum and part steel body is the best solution, as one type of construction gradually merges into the other.

For larger quantities the composite steel body has the field. Here the quantities are sufficiently large to permit a considerable expenditure for dies of proper completeness to produce finished steel stampings. A point

often overlooked is the quality which can be built into steel stampings with proper dies. A cheap die job only passes the buck, as to expense, on to the finishing operations, which to some extent accounts for the seemingly high point where aluminum really gives way to steel in economical production.

The field of the composite steel body is then a minimum of some 5000 to 10,000 bodies with a maximum of perhaps 30,000—the exact quantity governing the change depending upon the design of the body, facilities for building, etc., exactly as in determining the lower point.

## The All-Steel Body

Beyond the quantity of 30,000 or thereabouts comes the field of the all-steel body. Large dies and assembling fixture expenses may then be assumed. An equipment for such work would possibly not exceed \$5 or \$10 per body, and, while this amount might have to be spent in finishing, a speed of production would be attained entirely impossible with composite aluminum construction.

We may then summarize the three distinct methods of body construction about as follows:

Up to 10,000, composite aluminum bodies; 10,000 to 30,000, composite steel bodies; over 30,000, all-steel bodies.

Few bodies are ever built in the quantities first planned without change, and therein lies one of the prevalent false economies of the steel body of either type.

New body types require a period of perfecting and seasoning before they are ready for quantity production. The tendency is to shorten this necessary development through the investment in a die equipment, with the result of an early abandonment of the type or continual dissatisfaction with it.

Aluminum is the ideal metal to use during this seasoning period, as it is cheaper, better in numerous ways and more truly represents, even in small quantities of bodies, the excellence which may be expected in the larger quantities when the dies and stampings are perfected.

The value of this flexibility during the period of stabilizing a body design is often difficult to reduce to a dollar-and-cent basis, although it has a very marked worth. It is to quite an extent the little niceties of a body, not necessarily expensive, which stamp the finished car with an individual sales appeal and, in a close competitive market, assist in making retail sales.

In the foregoing, arguments have been advanced to show why the hand-formed steel panel body has no true field, as from a cost viewpoint it has nothing to recommend it.

\*Vice-President, The Baker R. & L. Co.

When quality is considered, this method of body metaling is at a further disadvantage. Therefore, from both cost and quality considerations composite bodies should be sheathed in aluminum panels until properly pressed steel panels are practical.

Aluminum has the advantage over steel in that, when hand-formed, smoother surfaces and truer contours result. It is easily file roughened and presents a better paint surface, therefore a more lasting paint finish can be applied. It is lighter than steel, although requiring a slightly more extensive wood framework. It is less resonant than steel, hence in an inclosed body lessens drumming. It is more readily repaired than steel, is more

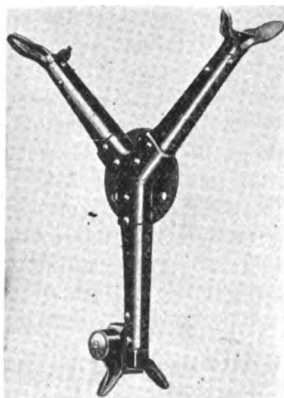
easily welded and is more uniform in welds as to strength and finish. Aluminum is rustproof and requires no rust-proofing treatments, or if paint is scratched through, a wound does not occur which gradually spreads, due to rust. Bodies in storage do not rust when sheathed in aluminum.

Some of these advantages of aluminum panels are offset by the single advantage of steel panels—their additional strength. Where the volume of bodies of a fixed type make steel die pressed panels practical from a cost standpoint, the relatively minor advantages of hand-formed aluminum panels are not essential to a satisfactory body product.

## Some New Automotive Parts

### A Pressed Steel Tire Carrier

A TIRE carrier recently introduced on the market is so arranged as to be interchangeable with the dummy hubs used to carry spare wire or disk wheels. This permits the car manufacturer to mount a standard carrier support bracket on each car as it moves forward in production. If the car uses wood wheels as regular equipment, the carrier is bolted to the face of the bracket, whereas if disk or wire wheels are to be used, the car maker bolts an ordinary dummy hub to the bracket.



The Oakes tire carrier with lock to prevent tire theft

The carrier is made of pressed steel parts riveted together. It requires no straps or fittings to hold the tire rim firmly in position, a simple rim clamp of conventional type being used on the lower arm of the carrier, and the tire is readily mounted or demounted by unscrewing or tightening one nut. The carrier is made in a wide variety of wheel sizes to fit all demountable rims and in single and double carrier styles.

As optional equipment a locking device, shown in the illustration, is installed in the lower arm of the carrier. It comprises a rim wedge-clamp integral with a barrel-shaped casting which has a circular lock flush with the outer face. This device serves to prevent unscrewing the nut and demounting the tires. The lock is firmly held in the housing by its two lugs which expand behind the circular flange, yet it is easily removed from the housing by using the proper key, after which a socket wrench is used on the clamp nut which holds the tire. The carrier is manufactured by the Oakes Co.

### Transmissions for Speed Wagons

ONE of the chassis components that has had to be redesigned to meet the new requirements arising from the use of pneumatic tires on trucks is the transmission. In order to take advantage of the possibilities of the pneumatic equipment in the way of higher speed, the final drive reduction ratio must be kept small. But this calls for a high low gear reduction ratio in the transmission, as the low gear ability of the truck must be maintained the same.

Two transmissions of the unit power plant type, for speed trucks, have been developed by the Warner Gear Co. and are now in production. They are suitable for

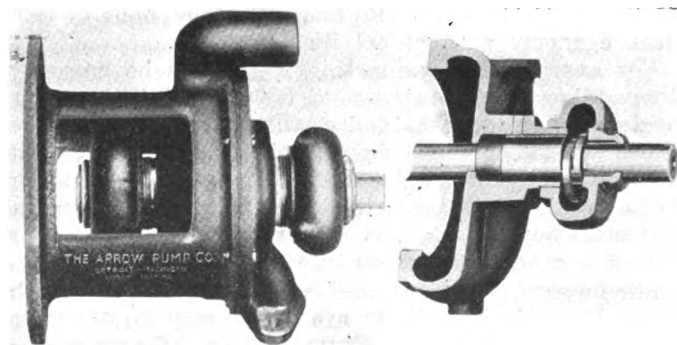
trucks of  $\frac{3}{4}$  to 2 tons capacity.

One model carries a reduction of nearly 4 to 1. In the other design, the reduction is nearly 5 to 1, a new development in three-speed transmission design.

Double row bearings at the main shaft rear take propeller shaft thrusts. Different length control and brake levers are available. The clutch is of serrated tooth, multiple disc design. The housing is cast iron. An opening is provided for a tire pump or a power take-off attachment.

### New Design of Circulating Pump

THE weakest part of the ordinary circulating pump is undoubtedly the shaft packing, which often becomes leaky and requires repacking. This is largely due to inefficient lubrication. A new design of pump intended to overcome these troubles has been brought out by the Arrow Pump Co. This pump employs oil lubrication by the so-called ring oiler method and has the packing at the inner end of the bearing instead of at the outer end. The sectional view herewith shows the arrangement. At the present time the bearings of circulating pumps are lubricated with grease by means of compression grease cups. The bearing of these pumps is next to the water chamber and the packing at the outer end of the bearing. This is open to the objection that the hot water is likely to get into the bearing and cause it to rust. Moreover, any foreign matter in the water, such as scale from the water jacket, sand, etc., may find its way into the bearing and start cutting. The new construction, in which the packing is on the inside of the bearing, is said to make it impossible for water and sand to get into the bearing, thus prolonging the life of the bearing and obviating the need of frequent repacking. A metallic, non-abrasive type of packing is used. The packing gland also forms an oil reservoir, thus permitting of the use of the ring method of lubrication.



The Arrow circulating pump

# The Trailer's Place in Transportation Merchandising

## Part II

This second article discusses the problems of dealer representation in the trailer field, together with the difficulties of truck makers adding a line of trailers. Mr. Perry believes the factory branch system best for trailer marketing, but shows it to be a heavy burden.

By H. W. Perry\*

IT has been suggested that a large truck company might undertake the production of a line of trailers and their distribution through its own branches and dealers. There have been intimations that this has been contemplated. Such a policy has its logical aspects. The truck factory, of course, has all the facilities for economical manufacture of trailers and has stocks of parts and materials suitable for the purpose. The work is very similar to truck manufacture and, with the factory operating far below capacity, it would be easy to begin making trailers. The company would have an immediate outlet through its branches or distributors and its established dealers, as it might force them to contract for a certain ratio of trailers to trucks. So the idea has its allurements.

But, while such a method might be successful, there are some important factors that militate against it. In spite of the similarity of manufacture there is an essential difference between the truck and trailer. The truck is a standardized product, designed as a compromise to meet general rather than specific hauling requirements and the factory is operated on the system of quantity production of a few standardized models. Trailers, on the contrary, have been evolved to fill the gaps left by motor trucks and to meet a wide variety of special uses. There has been no standardization of trailers and even the largest trailer companies feel under compulsion to produce as many as twenty or more different types and sizes.

According to the particular work to be done, there must be four-wheel trailers, semi-trailers, pole, pipe or logging trailers and two-wheel balanced trailers. Each type must be made in several sizes and some of the types in several forms; for example, the four-wheel type is furnished in straight frames for ordinary trucking and in drop frames for side-dump bodies. Both the four-wheel and the two-wheel types may have to be supplied with hinged frames to permit of rearward tipping for discharge of loads of lumber. Some semi-trailers require platforms that are very low at the rear end to facilitate loading and unloading of cotton bales, heavy cases or hogsheds.

Thus it will be seen that there is as much variety in the manufacture of trailers as in that of truck bodies, and the demand for any one model is so limited as to make it almost impossible to get into quantity production on a systematic basis. The same reasons that caused

truck companies to forego the building of bodies will keep them out of the trailer field. Special jobs disarrange the factory system, cause annoyance and are seldom profitable. A truck company embarking in trailer manufacture might decide to produce only a few standardized models, but would soon find that these would not meet nearly all the requirements of purchasers of its trucks and would have to add more models or let the customer go elsewhere. All considered, the truck manufacturer would do better to capitalize the development of trailer transportation by adding road tractors to his line of standard trucks.

### Selling Differences

There is even more difference between the selling of trucks and trailers than in the manufacture of the two lines. Neither factory nor dealers would know in advance what relative numbers of trailers of different types and sizes could be marketed with a given number of trucks. The sales records of leading trailer companies show curious fluctuations in demand for different types and sizes from month to month and year to year. The market is still unsettled. Trailer makers themselves have not yet been able to determine to their satisfaction what types and sizes will be in greatest demand and most profitable. And even with a wide-open field the manufacturers individually are not producing and selling in large numbers. A truck company entering the business would not have as broad a market as a trailer company, because its sales would be confined largely if not entirely to users of its own make of trucks. Other truck companies and dealers would not send a trailer customer to a competing truck company or dealer but would naturally recommend to their customers the trailers made by an exclusive trailer company.

A glance over the brief history of the trailer industry indicates that the manufacture of trucks and trailers by the same company has not been successful. A number of companies that began the manufacture of both have dropped one line or the other and it is believed that today there is not a single company actively manufacturing both lines.

Some disposition has been shown for a truck company to tie up with a single trailer company to handle trailer sales through its dealer organization. This is open to the same sales objections as already mentioned and to the further obstacle that unless the trailer company makes a very complete line of all types and models, the organization will not be in position to meet all demands

\*Recently general manager of the Trailer Manufacturers' Association.

of its customers. An arrangement of this kind would be more advantageous, however, to the truck company than to the trailer maker, since buyers of the truck could go into the open market for trailers, but the trailer maker would be limited in sales principally to users of the one make of truck. The owner of any other make, if he became interested in trailers, would be most likely to consult the man who sold him his truck, and if that dealer did not handle trailers himself, he would either discourage the idea and try to sell him another truck or at best would refer him to some trailer man who did not sell trucks.

Confronted by the various difficulties of marketing their product through the truck trade, the trailer manufacturers have had to seek other outlets. The only way they had of interesting prospective purchasers and informing them of the merits of trailer transportation was to get in direct touch with the users of motor trucks. This has been done with considerable success and enough demand has been created in some localities to make dealers eager to take on a line of trailers. It has been necessary, in the larger communities at least, to have a representative sell trailers exclusively or in connection with other lines than trucks. Thus, some of the best trailer representatives are distributors of truck bodies, hoists, loaders, etc., while others handle farm tractors and agricultural machinery, building materials, iron work or other lines. But in each case it is a matter of finding the right man, regardless of his business—a man who can grasp the essential advantages of trailer trucking and has the necessary faith in its future, the ability to convince others, determination to stick to it and wait for profits, and no conflicting interests. Such a man is a valuable find and usually the trailer manufacturer goes as far as possible to help him, sometimes making him a branch manager.

#### Exclusive Trailer Representative

Experience to date indicates that, until the manufacturers have succeeded in educating truck owners generally to the many advantages and economies of trailers, they will find it absolutely necessary to have exclusive representation and to sell direct to users rather than through truck dealers, although they would greatly prefer the latter method. This makes the marketing slow, difficult and expensive and restricts sales promotion chiefly to the larger centers of population. Sales possibilities in the small communities are yet too limited to afford living profits to exclusive representatives, and

without a widespread distribution system, national advertising is ineffective because scattering inquiries cannot be followed up advantageously. This condition will be overcome gradually as trailers become better understood and more extensively used and the attitude of the truck dealer changes. The truck dealer may quickly come to the conclusion, with encouragement of the truck manufacturer, that under present conditions it will be worth his while to sell a line of truck auxiliaries, including not only trailers, but standardized bodies, hoists for dump bodies and other equipment. In short, it will be his function to sell motor haulage equipment, to become an expert in highway transportation and to recommend and sell whatever equipment best meets the requirements of each particular customer.

Lack of understanding and interest on the part of truck dealers has forced the largest trailer companies to establish their own branches in the principal cities and the smaller companies to create very close affiliations with specialty men that result in relations closely approaching those between the factory and the branch. Distribution through factory branches is most satisfactory provided good managers are found because this system avoids all the disadvantages of trying to create sales through motor truck agencies and because intelligent and interested advice and service can be and is given to prospective buyers and actual users.

The matter of service is not very serious where there is a proper amount of interest in the success of trailer installations. In the first place, there is not much in the mechanism of a trailer to go wrong, and in the second place the trailers made by established manufacturers are constructed of parts that are practically standard in the automotive industry, except for relatively few special parts, such as drawbars, couplings and certain steering gear castings or forgings. Bearings, tires, springs and other parts most subject to wear are identical with truck parts. The factory branch can give fairly good service even at considerable distances and smaller towns need not suffer seriously from lack of service. Truck dealers could give excellent parts service in their territory, but good service consists in more than supplying new parts; it calls for supervision of trailers at work, with advice to the user how to get the best results and tactful dealing with drivers who may, for one reason or another, find fault with the trailer.

The establishment of branches involves a great deal of initial expense and they are seldom self-sustaining for the first year or two. The financial burden is greater



Underground storage tank weighing 7 tons hauled with  $3\frac{1}{2}$  ton Army truck and two-wheel pole trailer



Train of steel side dump trailers with loads of ashes at city dump in Indianapolis. The city uses 25 of these trailers for ash removal



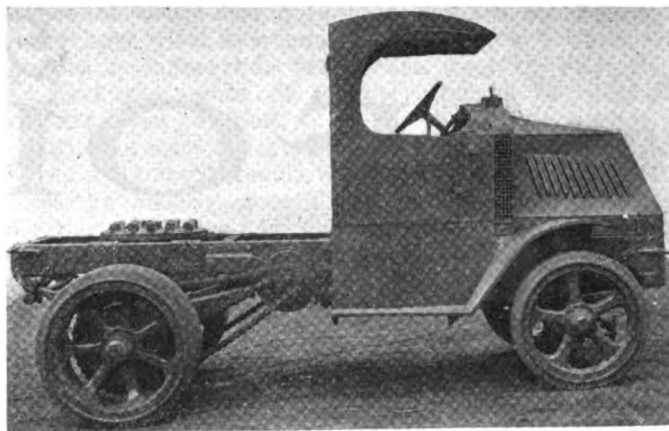
than most of the trailer companies are in position to stand, but the tendency is in this direction and it is believed that the branch system will ultimately be the most successful and economical method of distribution. There will still remain, however, the problem of desirable representation in the smaller places. A relatively larger potential market exists for trailers than for trucks in the remoter places, as among farmers, ranchmen and plantation owners and in lumbering and mining regions. Many possible small sales or doubtful fleet sales possibilities in such fields are neglected owing to lack of nearby representation and the time and cost involved in investigating them.

Local representation is therefore highly desirable even if it only serves the purpose of seeking out possible buyers and making first investigations to determine the desirability of having the branch or the distributor send a man to follow up the lead.

### Future Selling Policies

Only time and changing conditions will bring a solution of the problem of merchandising trailers. Perhaps no hard and fast policy will prevail. Probably the best general plan will embrace a combination of trailer branch houses in the principal cities, exclusive representation wherever possible in second-class cities and truck-trailer dealers in smaller communities, provided the truck dealers follow the lead of the truck makers in taking the trailer seriously. As the truck manufacturers continue their investigations and become convinced of the practicability and economy of trailer transportation in various industries and under certain operating conditions, they will pass their findings on to their distributors and dealers and these in turn will co-operate better with trailer representatives in the field. No doubt in time mutually satisfactory arrangements regarding division of commissions will be made between truck and trailer dealers.

At present the truck dealer or salesman who tips off a trailer man on a prospect expects some recompense, but has not yet reached the point where he feels he should give up any part of his own commission on the sale of a truck to the trailer man who digs up a purchaser. There must, of course, be fair reciprocity. Truck and trailer sales will go hand in hand more and more as time goes on. The truck gained great headway over the trailer during the first decade and a half of the twentieth century and there are to-day about 1,000,000 commercial motor vehicles in service in America as compared with an estimated total of 50,000 trailers, based on registrations of 20,000 trailers in fourteen States last year. The bulk of trailer sales will therefore be made separately to present truck owners for some time, but as municipalities trailerize their garbage and ash removal and special indus-



15 ton tractor used by Southern California Edison Co.

tries equip with tractors and semi-trailers or pole or pipe trailers, the power unit and carrying units will be purchased at the same time. Buyers will prefer, no doubt, to deal with a single seller and to make the purchases in one transaction. This will tend to bring the truck and trailer interests closer together.

### Furnishing Transportation

While the interest of the truck and trailer sales managers in this subject is or should be based on the desire to furnish the best means of highway transportation, the fact remains that the former is concerned primarily with the increase in truck sales through the trailer as an auxiliary. He cannot take the same interest in the trailer as in the truck so long as the two lines are manufactured and sold by different organizations. It is through the tractor end that the truck industry will be compelled by force of circumstances to give a great deal of attention to trailers and to advocate their use, as the writer is convinced that eventually most heavy haulage will be done with tractors and semi-trailers—that is, six-wheel outfits. The four-wheel trailer may be expected to find its greatest field of utility in long-distance work, such as intercity hauling, and in operations where road trains of several units will best meet the requirements.

It is most desirable that in all cases the power unit and the trailing unit be suited to each other so as to form a properly functioning combination, but it is not necessary that the two should be made or marketed by the same organizations, any more than in the case of locomotives and railroad cars, or of horses and wagons. But the truck and trailer industries will have to work in harmony and help each other in the common undertaking to make motor transport 100 per cent efficient and satisfactory.

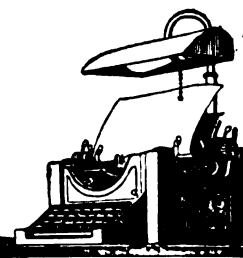
## A Pyrometer Made from a Camera

A SIMPLE pyrometer can be constructed from a photographic camera, according to an article by Dr. Lux in the *Elektro-technische Zeitschrift*. To this end a small box is screwed onto the camera, which takes the place of the plate of ground glass and contains in the plane of the sensitive plate a small incandescent bulb provided with screens. Into the rear wall of this small box is inserted a lens, the ocular of an old telescope or opera glass serving the purpose well. The complete outfit includes also a pocket flashlight battery, a movable coil milli-ammeter and a simple sliding rheostat. In use, the operator focuses the object whose temperature is to be determined, which can be readily done by means of the pho-

tographic adjuster, and then regulates the current sent through the bulb by the flashlight battery in such a manner that the filament of the bulb disappears in the field of the sliding object. The current strength read off at that instant, in conjunction with an easily determined calibration table, permits of reading off the temperature sought to within 2 per cent, as the eye is very sensitive to any differences in the luminosity of the filament and the incandescent body. This pyrometer is suitable for temperatures between 600 and 2100 deg. Cent. if an ordinary osram bulb is used, but can be used also for temperatures up to 3600 deg. if the objective is shaded off and even up to 6000 deg. if a slightly blackened glass plate is inserted.



# The FORUM



## Seating and Other Car Improvements

Editor, AUTOMOTIVE INDUSTRIES:

(1) "The Forum" in your issue of June 16 is very interesting and it would certainly be of great advantage to your readers, as well as of value to your paper, if more of the engineers engaged in the manufacture and design of cars would continue to contribute their views and in the end perhaps succeed in eliminating some of the existing defects of all automobiles.

(2) Of course, each engineer's own design may be perfect from his point of view, but if, as pointed out in one of the letters, before driving and maintaining their own machine they tried out the other fellow's, they should recognize his defects and might, in the end, see that they themselves were not so far behind.

(3) **Inaccessibility.** The first great defect to which all cars are subject is inaccessibility, and this applies to all cars, whether selling for \$1,000 or \$10,000. Apparently the only aim of the engineer is to get the car together and get rid of it, for he knows mighty well the poor purchaser can never get at it if anything goes wrong, and, no matter how trivial this may be, he will have to run it into a service station if he can get it there.

(4) If, on the other hand, as suggested by Mr. Anglada, every designer were compelled to run and maintain his own car for a given time he would eventually see some of the shortcomings, especially if they would put him on an isolated island and give him only the beautiful set of tools usually sent out with each machine.

(5) **Mechanical Defects.** The mechanical defects, of course, will always exist and these are in a class by themselves.

Great improvements have already been made and a full discussion of these in the Forum should be of great advantage and lead to still further improvements, but in addition to these there are many fallacious ideas of details and standards that have been introduced into automobile construction that it is necessary to get away from.

(6) **Body Design.** The matter of seating capacity mentioned in Mr. D. Ferguson's letter, is one of the fallacies or myths of the automobile industry and he is quite right in regard to designing the body for two, four or six passengers and to carry only two passengers on the rear seat, for the automobile has never yet been made that will carry three full-grown persons comfortably on the rear seat. The rear seat will not even carry two and one-half persons as Mr. Ferguson says; three persons of three-quarter normal size is the limit. The minimum space required for comfortable riding for a full-grown person with overcoat and wraps is 20 in. or 60 in. for three persons. Three three-quarter persons require  $3 \times 20 \text{ in.} \times .75 = 45 \text{ in.}$  or 2.25 persons, and this is the maximum width of rear seat inside it is possible to get. Now three  $\frac{3}{4}$  persons can ride comfortably on the rear seat as they are nicely wedged in and don't slide about, and in cold weather when bodily contact is not objectionable, are the only ones that can ride comfortably on the rear seat. It is most uncomfortable

for one or two persons as they slide all about and no way is provided to hold themselves against the sway of the car in rounding curves, turning corners and in passing other vehicles and the result is that the rear seat, which the owner uses and pays for is the least desirable seat in the car.

(7) The fact is, that the rear seat can never become a comfortable seat for one, two or three persons until the seats are individual and the back conforms to the body to hold it for side sway and it is also fitted with a fixed or folding arm to separate the two parties and so give them the ease of riding of an easy chair.

The easiest riding seat in the whole car is the divided or separated front or driver's seat, provided the width of the body is sufficient to allow a suitable width of seat after allowing for a 7 or 8-in. passage between the front seats. The incline of the foot board helps to make this seat easier riding than the rear seat, as the feet rest in a natural position and one can brace oneself. When foot rests are provided for the rear seats they should be of soft material and similarly inclined and adjustable or made wide to accommodate the different size passengers.

(8) Usually these separate front seats are made in part uncomfortable by having no supporting arm and back on the inner side, especially in many sedans, and so giving no lateral support to the body. You are compelled to grab the side of the car or slide off into the space between the two seats. Every sedan the writer has ever seen or ridden in has this defect, although most cars with touring bodies and separate seats are much better.

(9) This is probably due to the fact that the front sedan seats are made more or less separate from the body and the width of body itself is not sufficient. Taking the overall width of the front seats at 20 in. you have 20 in. plus 20 in. plus 8 in. or 48 in., which is impossible for the inside width of body and you have either to narrow the seats or passage or both.

(10) **Folding Seats.** The folding seats on nearly all cars could be greatly improved and the only ones at all practical are those having arms that fold also. The narrow flat disappearing seats may be pretty to look at when folded, but are of no use for continuous or long rides. When a purchaser pays \$4000 to \$10,000 for a car he expects to have every person ride in comfort, and further, he only buys a six or seven-seater because he expects to utilize the extra seats, and it is rather surprising to see what some of the makers have the temerity to offer.

(11) **Seating Arrangement.** The seating arrangement of all closed cars, limousines, sedans, etc., would be greatly improved if all seats were separate and could be revolved and fixed in any desired position, as they would be much easier for long rides and the individual could adjust the seat to his own convenience, and this would be very restful and would be much more sociable. This would also apply in great measure to the touring car, as it is not essential that any one except the driver should have a fixed seat facing front and even this could

well be adjustable and quite distinct from the body. It would certainly simplify and cheapen the body construction to have the seats independent of the body and the seats would then interchange for all types of bodies whether touring, sedan, close coupled, coupe, coupellette, etc. If these seats were mounted on tubular pedestal the entire inside of the car would have a clear open space to carry loose packages and parcels and be much easier to clean. Further, all of these seats might be adjustable for height to suit the different individuals.

(12) **Depth and Incline of Seats.** The depth and incline of seats required for comfort for the individual vary with the height of the seat; whereas, if these are adjustable both a fixed incline and any depth of seat can be used, but now oftentimes these seats are very uncomfortable.

(13) **Cushions and Upholstery.** The present cushions and upholstery are very heavy, clumsy, dirty and uncomfortable and would be much improved by using pneumatic cushions and backs, which might be separately attached to the body and easily removable. They would be much easier and softer riding, cheaper to make, lighter and more sanitary. Where you now have a 6 to 12-in. depth of cushion and back you would require only 4 to 6 in., or even less on the back, which would make a considerable saving in space required. As regards comfort in riding, there would be no comparison as you would eliminate entirely the vibrations of the car, especially if a pneumatic foot rest cushion were used.

(14) **Carrying Extra Tires and Detachable Wheels.** The most unsightly and disfiguring thing about the automobile is the carrying of the spare tires and the detachable wheels, exposed and in the dust and dirt. All close coupled cars and single seaters now have a rear projecting housing sufficient in size to carry one or two tires or wheels within the housing and free from dust and dirt and this would greatly improve the appearance of the car. All types of bodies could very easily be provided with a similar arrangement and in addition to carrying the two wheels or tires would have space around them available for carrying tools, dress suit cases, etc., and give a space that would be accessible at all times without having to disturb any of the passengers. The present arrangement of carrying pump, jack, tools, etc., outside or under the seats and disturbing the passengers in case of puncture of tire or any other mishap is quite objectionable.

(15) **Width of Body.** Whatever the width of the body may be or the width of the tread, the body should be free of the mud guards and these should always be attached to the chassis and form a part of the complete chassis, the same as the front mud guards. Any type of body can then be mounted on the chassis free from all attachments and any type of standard body interchange on a standard chassis. This would simplify and cheapen both the body and the chassis construction.

(16) The body construction is more or less delicate and can never be designed to carry the weight and vibrations of the mud guards in a satisfactory manner, and moreover, in the event of a slight collision, is apt to seriously damage the expensive body and add much more to repair cost.

(17) **Standard Width of Tread.** Where does Mr. Ferguson get his standard width of tread of 56½ in.? The S. A. E. standard is 56 in., which presumably comes from the old carriage tread. This country has 56-in. tread here in the north, although in the south 60 in. is standard and formerly much complaint was made because automobile makers were forced to make a 60-in. tread for the southern market. Undoubtedly many of the diffi-

culties of body design pointed out by Mr. Ferguson would have been overcome by adopting a 60-in. tread, especially where wide bodies are used and which as Mr. Ferguson points out, is done on practically all cars, whether large or small.

(18) The most fallacious of all standards is the adoption of a standard tread. We spend hundreds of millions a year in making smooth, hard roads and after years of experiment have only now succeeded in making a concrete or cement road that will not rut, and yet the engineers' mind conceives the existence of ruts, and as Mr. Ferguson points out, must design the car to run in these preconceived ruts, and which can only become realities by adopting the absolutely fallacious standard tread whose only function is to create the undesirable rut which the road maker must remove by repair or building an entirely new road.

(19) Instead of a standard width of tread what is wanted is a law that no two cars may be constructed having the same tread but rather as many widths of tread as possible.

What would be more logical would be to have the width of tread vary with the wheel base and the greater the wheel base (and presumably the larger the car) the greater the width of tread.

(20) If the widths of tread varied from, say 48 to 72 in., we would in great measure, if not entirely, eliminate any tendency of even soft or dirt roads to rut, and the different treads would tend to smooth out the roads.

If car treads, say, varied from 48 to 63 in. and trucks from 63 to 72 in., this would be accomplished. Practically now the larger trucks do have this variation of tread and do not produce ruts and except only that all cars have a standard 56-in. tread there would be no tendency to form ruts, and this is the very reason why the width of tread should vary with the length of wheel base and might well be a percentage of the wheel base.

(21) Assuming the width of tread as not less than 48 to 50 per cent of the wheelbase this would work out as follows: Wheelbase 100 in., 110 in., 120 in., 130 in., 140 in., 150 in. Width of tread 48 in. to 50 in., 52.8 in. to 55 in., 57.6 in. to 60 in., 62.2 in. to 65 in., 65.2 in. to 70 in., 70 in. to 75 in.

(22) The great advantage of a variation in tread would be most apparent on a soft or dirt road, for even if a hole or rut were temporarily formed the other following treads would "knead" it out more or less smooth again rather than increasing the depth.

(23) **Fixing Body to Chassis.** The fastening of the body to the frame should also be greatly improved and it should be so fixed that it may be easily and quickly removed and if necessary changed from a touring to a sedan, limousine or other type of body and arrangement made for lifting the body off and suspending it when the other body is substituted. Different conditions and times make it highly desirable and necessary to have either an open or closed or other type of body.

(24) The three-point type of suspension of body would also be highly desirable so as to protect the body from all the warping and bendings of the frame, and if this is done the body can be much more lightly constructed, besides being cheaper to make. The frame cannot be made that will not warp and it is absurd to try and prevent this by bracing the body to it.

(25) **Squeaks and Rattles.** Probably many of the squeaks referred to by Mr. Anglada are spring shackles, pins and leaves of springs and will always exist as long as the springs are exposed to dirt and dust and not properly enclosed and lubricated. The way to overcome the exposure would be to enclose them in a hollow frame, which can be easily and cheaply done, and then all these

can be continuously fed by oil and thoroughly lubricated, and would be entirely out of sight and add greatly to the appearance and simplicity of the entire machine.

(26) **Riding Qualities of Cars.** The riding qualities of all cars should be greatly improved and the amount of vertical motion of the body greatly reduced or eliminated. Any form of suspension that allows the body to deflect downward 4 in. more or less and rebound 8 in. when the wheels fall into a hole 1 in. must be eliminated and the body prevented from surging and vibrating back and forth for an indefinite period until it finally comes to rest and this initial deflection and rebound of flat metal springs can never be effectively prevented by shock absorbers. What is wanted is to absorb the shock instantly and "damp" out the vibration.

(27) This could be accomplished by the pneumatic tire itself on an absolutely smooth road (as smooth as the surface of the railroad rail) provided the air pressure was low enough, say 20 lb., but this is impractical as even if the tires would stand up the pressure is too low for safe steering of the car. On any smooth cement road, when the springs are not in motion the riding is satisfactory.

(28) To "damp" out greater shocks or vibration a secondary and lighter air pressure is required to suspend the body and frame pneumatically, just as the springs now suspend them, and this can be accomplished by an oval-shaped tire of standard section (but without built-up tread), completely surrounding the axle; at 20 lb. pressure. This will allow sufficient motion to the body and instantly check it and prevent all vibration.

(29) This pneumatic suspension would be much lighter and cheaper than the springs, shackles, pins, etc., and eliminate at least 100 parts. Triple pneumatic suspension could be obtained by using pneumatic air cushions with a still lighter air pressure 10 lb., utilizing, say, 60-20 and 10 lb. and giving an ease of riding and comfort that is not obtainable with any other method of suspension.

(30) These pneumatic frame suspension tires would also take up all horizontal road shocks and pneumatically cushion and absorb them, as well as dispense with all torque and radius rods and give a simple and ideal Hotchkiss form of drive.

(31) **External Brakes.** The most surprising thing about American cars is that, with a single exception, all are fitted with external contracting brakes, which are universally recognized as about the worst possible construction. It simply shows that force of habit beats competition and common sense and good engineering every time. Fortunately none of the designers of trucks have ever been guilty, but have invariably used internal expanding brakes arranged side by side and how any engineer or designer, especially of the more expensive car has ever had the temerity to continue to offer external brakes is beyond comprehension. The lives of the occupants depend on the brakes and it would seem that these require as much protection as 5 tons of coal.

(32) The external brakes are always covered with mud and dirt and all pins, etc., quickly wear out, as well as the soft braking material used. They are always out of adjustment and are loose or dragging 75 per cent of the time. It is bad enough to use soft braking material on an inside brake, but to use it on an outside brake is almost a crime. Imagine a railroad engineer substituting a soft-braking material for the metal to metal car brakes, and yet the railroad brake runs under relatively good conditions.

(33) There should be no more difficulty in arranging internal brakes side by side in a touring car than in a truck. Excessively wide brakes are not required, as it is

easy to make the drums of large diameter and again the brakes need not completely encircle the drum, but can be arranged to overlap or pass by each other.

If the adoption of four-wheel brakes would eliminate the external brake it would be the best thing that ever happened to the American car.

(34) **Pedals.** The pedals should normally stand flush with the incline of the foot board and should be the form and shape of the foot or like an organ pedal and when declutched or braked should depress below the fixed floor board and which, if necessary, should have a depressed lip or edge around the pedals. The foot is then always in a normal and easy position on the pedal and is instantly ready to slightly extend to declutch or brake without any lateral movement of the foot and will operate in one-fifth the time required when the foot is not on the pedal as at present.

(35) **Foot accelerator.** The present arrangement of the foot accelerator is very dangerous, for if the foot slips off the pedal and strikes the acceleration it opens the throttle wide and makes the car jump ahead and may cause a serious accident. It would be better if the action of the accelerator was reversed then it would stop the car. Pushing the other pedals stops the car and this should apply to the accelerator as well.

(36) In the form of pedal suggested above, the accelerator could be arranged within the right pedal so the foot would always be upon it, and by slightly elevating the front of the foot the throttle valve would be opened and when returned to normal position the throttle closed to any degree desired, and when the accelerator and right pedal was further depressed the accelerator could be arranged to pass into a neutral zone and not completely shut the throttle or further affect it.

W. J. P. MOORE.

## Improved Engine Cooling

Editor, AUTOMOTIVE INDUSTRIES:

S. D. Heron, in the "Forum" in the July 7 issue, does not specifically mention the comments that I made on "Water and Air Cooling" in the Engineering Number. However, I have the good fortune to be very well acquainted with the views of G. J. Mead, and believe that we are in fairly close agreement.

I believe that almost every engineer has a feeling that direct air cooling is logical, particularly for aviation. A few years ago there was a general belief, amounting to much more than a mere feeling, that air cooling would rapidly become universal for aviation. Probably the development of air cooling for motors was to some extent hampered by the war, because the water cooled engine was easier to build for the simple reason that more was known about it.

I believe that Mr. Mead and Mr. Pierce in their papers did not intend to do much more than compare the best air cooled engines of the present day with the best water cooled engines. In my brief article I tried to point out that while air cooling was admittedly going to be improved, there was also considerable scope for the improvement of water cooling.

The case seems to be analagous to that of the two-stroke cycle. Theoretically the two-stroke cycle has many advantages. Practically, twenty years and more of experimenting have not sufficed to make the two-stroke competitive with the more complicated four-stroke engine.

No open-minded engineer would ever say he believed the two-stroke engine would never be perfected. It can be regarded as one of those problems which is intensely stimulating but exceedingly difficult of solution. It is doubtful whether either air cooling or the two-stroke engine are

waiting for any great invention. To bring them to practical commercial perfection calls for a lot of petty experiments rather than for the discovery of new systems.

Cooling as an automotive engineering problem has been given extremely little attention by comparison with the labor which has been lavished on other details of the automobile and airplane. I expect to see both water cooling and direct air cooling steadily improve. Improvement in one will stimulate improvement in the other system. Mr. Heron very rightly says that "enthusiasm is a primary necessity for success in most mechanical fields of investigation." The enthusiasm which seems most desirable is the enthusiasm for *improved cooling*. If this be the ideal, then it can be worked out either in terms of direct air cooling or in terms of water cooling, or a possibility which is very seldom considered but quite alluring—a combination of both systems. There are just a few among us who can remember De Dion's tricycles of 1900 with air cooled cylinders having water cooled heads and valve chambers. These carried a very small quantity of water but they cooled wonderfully well.

A. LUDLOW CLAYDEN,  
United States Cartridge Co.

## Possibilities of the Air-Cooled Aircraft Engine

Editor, AUTOMOTIVE INDUSTRIES:

I have read the article by Mr. Heron in the "Forum" of the July 7 issue of AUTOMOTIVE INDUSTRIES, in defense of the air-cooled aircraft engine, in response to the paper by Mr. Pierce and myself, read at the S. A. E. summer meeting.

It seems that Mr. Heron's principal criticism was that we had overlooked the fact that much better air-cooled engines could be built. Unfortunately, he did not, apparently, understand one of the premises of the paper; namely, that it was dealing with the actual performance of existing engines. I entirely agree with Mr. Heron that there is a possibility for considerable development of this type of engine. I will, however, take up the points in the order they were discussed in Mr. Heron's article, with the hope that our ideas on the subject of the air-cooled type of engine may be more clearly set forth.

(1) **Parasitic Resistance.**—The statements in regard to the parasitic resistance were based upon a mathematical consideration of a large radial of 375 hp. and approximately 50 in. in diameter. The values derived were stated in Table 1, as compared with those of a water-cooled, V-type engine of similar power. The conclusion drawn from the figures was that a ship with the air-cooled engine would have a loss in high speed of some 5 per cent compared with the same ship with a water-cooled engine. As Mr. Heron says, there are no figures from actual performance available, at least not to our knowledge. It seems reasonable to suppose, however, that an engine with such a large frontal area would require additional power for its propulsion through the air at a speed corresponding to that of another engine of equal power with less frontal area in the same ship.

Smaller radial engines, by that I mean smaller in diameter, 40 in. or under, will not be subject to this criticism, since they fair into the fuselage very nicely.

(2) **Vulnerability.**—Our information on this subject and Mr. Heron's seem to differ somewhat. The consensus of opinion of some of the pilots who were on the western front seemed to be that more planes came down because of being set on fire than because of injury being done to their cooling systems.

(3) **Mean Effective Pressure.**—Our paper stated that

relatively low mean effective pressures had been secured so far in this country, which was correct at that time, I believe, and did not discuss the probable mean effective pressures that could be secured. The mean effective pressure of 120 lb. mentioned by Mr. Heron was only very recently secured with a single experimental cylinder, I understand.

(4) **Temperature Control.**—It is a more difficult problem mechanically to control the temperature of an air-cooled engine than of a water-cooled engine, which, I believe, will be granted. Whether or not it is necessary to carefully provide temperature control has yet to be proven.

(5) **Weight.**—Attention was drawn to the fact that, so far, air-cooled engines weigh very nearly the same, per horsepower, as the best water-cooled engines, complete with water and radiator. Mr. Heron himself makes the statement that successful air-cooled cylinders have proved to be fairly heavy. For that reason it is necessary to increase the mean effective pressure in order to make these engines capable of competing with water-cooled engines in the 400-hp. class.

In conclusion, the whole radial air-cooled situation, as I see it, is as follows:

Whether or not large radial air-cooled engines are to supplant or compete with water-cooled engines depends first upon developing cylinder constructions, which will permit of high mean effective pressures, and also to develop the mechanical parts of the engine so that they will be sufficiently durable for the service expected of them. I see no reason why air-cooled cylinders will not be developed which will give high mean effective pressures. Naturally, there is a great deal of careful experimental work to be done before the maximum efficiency of this type of cylinder can be obtained. Mr. Heron himself is doing some very conscientious work on this problem and undoubtedly in the near future will be able to tell us of the cylinder limitations. In the meantime, development work must be carried on with the mechanical parts of the engine, including the crankcase, crankshaft, connecting rods and valve gear, since in this type of engine the designer is seriously limited by the inherent compactness of the type in securing the proper strength and accessibility, as well as durability, of its various parts. With the cylinder and crankcase assembly satisfactorily developed, we will be ready to determine the advantages of this type in flight, which will involve testing its ability to work under various conditions of temperature, the powers available at various altitudes and the advantages in maneuverability due to the compactness. There is a great deal to this whole problem, and I am glad to say that it is being attacked with enthusiasm both by the Air Service and by individual engine designers in this country.

GEORGE J. MEAD, Chief Engineer,  
Wright Aeronautical Corporation.

THE Customs officers in Flanders have, it is announced, recently captured one of the very latest type of armored motor car in use among the smugglers on the Franco-Belgian frontier. It is a large truck, the front part being protected with heavy sheets of steel. In front of the radiator is a contrivance which looks rather like a snow plough, but which is, in fact, a steel bar intended to cut through obstacles placed across the road. The Customs officers who captured the vehicle only took it after a hot fight, in which firearms were freely used. More than 7000 packets of tobacco were found in the lorry, vehicle and cargo representing a total value of 45,000 francs.



# Increasing Individual Efficiency Through Decentralized Responsibility

Accuracy of information is not an end in itself. The information must result in time saving or waste elimination in proportion to the cost of getting the accuracy. As individual responsibility increases, the need for system decreases in proportion.

By Harry Tipper

**I**N the building up of the centralized systems of operation in industry to-day we are in danger of forgetting that the object of industry is to produce a salable article in accordance with the requirements of the market and to sell that product at a profit.

It is desirable to standardize operations, because by this method of standardization and repetition the products can be made more cheaply and in a much greater quantity in a given time.

It is desirable that the records involving the cost of the operations, the materials required in the operations and all the elements entering into cost shall be determined, with sufficient accuracy to facilitate the reduction of waste and improve the productive capacity.

Some of my friends in industrial pursuits have shown me the accuracy of their systems and have dilated upon and emphasized the accuracy as though the whole aim and end of a system was to produce accurate information.

Unless the accuracy of the information permits of saving in time and motion in proportion to the cost of discovering the accuracy, it is not worth while and it may result in a burden upon the business for which there is no concomitant return.

The human error cannot be entirely eliminated. It is not reduced by accurate information, but the information will enable the intelligent man to see where the error might be reduced and to take such steps as are necessary to secure its reduction.

Departments in industry that are concerned with the keeping of records regarding materials, the movement of materials, the cost of operation, the inspection of materials and the fabricated product, time studies and other matters, have a tendency to lose sight of the main object of the factory and to believe that the justification of their own work arises from the accuracy of a record and not from the usefulness of the information itself.

It is quite possible, and, indeed, is not unusual, for a slightly increased degree of accuracy to cost a great deal more money in record keeping, just as it does in shop operations.

Production men know well that a decrease in the tolerance allowance when it gets into the minute fractions increases the cost of the operations very materially and is not to be considered unless its importance is established and its usefulness thoroughly justifies the additional expense.

Similarly, in the records which are kept of the various factors which enter into operating wastes and costs, a certain degree of minuteness will cost so much more to determine that it is not worth while unless the usefulness of the information is very well established and its importance in the operating calculations justifies the additional cost of securing it.

All systems of this character tend to grow faster than the business with which they are connected and tend toward an increased cost in their operation beyond that which was originally or reasonably contemplated.

The same things have been discovered in systems of office practice many times.

A friend of mine who was very much enamored with the creed of accuracy in his advertising work had a most wonderful system for following up the inquiries received so that accurate information would be secured as to what happened to them, what they were worth, and so forth, until they could be considered as dead or completely sold. Products sold by his company entered into a number of industries and were used for a variety of purposes, so that the volume of inquiries was considerable. It required a very large force of people to follow these up and see that accurate records were kept of all the intermediate information and the final information.

One day somebody inquired as to the value of all this work, how much it actually forwarded the sale of the articles to those inquiring and to what extent it was justified by its effect upon the sales conditions. The result of that examination was the elimination of about two-thirds of it as unnecessary and not justified by the extra usefulness involved in its calculations. Apparently very little was done with it when it was secured, and the cost of getting it was very high.

The advantage of system is to increase the usefulness and the advantage of accurate information is to determine the wastes and to indicate the prospects of further use. Beyond this there is no special advantage of carrying into extreme detail the records, except in the research laboratory, where minutiae is of great importance.

The constant reference of all matters to the systematic development of information and records has a tendency to increase the slavish following of rule and precedent which is responsible for the lack of efficient judgment conspicuous in much of the business operation of to-day.

In one of the plants where they make automobile bodies and have a very large run of one type for one concern, one of the operations in the finishing line is the riveting of a particular piece in a certain part of the body. This operation had been performed for a long time on this particular type of body by a worker whose sole job it was to handle this rivet. In the course of time the manufacturer changed the design of this body somewhat, putting the rivet one inch farther up. For weeks the man on the job automatically reached to the old place, and it cost more for the adjustment of his errors than the work of riveting.

Because he had been on the job, considerable patience

was exercised in the attempt to get him started along the new lines, but finally the foreman solved the problem by making a board one inch high and getting the worker to stand on it. The man's judgment, his capacity for adaptation and his whole mental and physical skill had become so specialized in one direction and so atrophied in other directions that he could not accommodate himself to this slight difference in this operation even in a number of days.

There are many men who are engaged upon the work of keeping records, systems, etc., for factories who are just as incapable of thinking outside of their line of work as this man. Their judgment is lost, as far as its flexibility is concerned, and beyond the rules and precedents governing the matter they are without any means of adapting themselves or their work to any slight change in the conditions.

From the examination of many industrial establishments in the last few years and a consideration of the supervisory costs, methods and systems, I am rapidly coming to the opinion that we are over-systematized in most industries; that we have almost forgotten the reason for system, and the systems themselves have reached the point where a good many of their detail developments are no longer useful and may be detrimental to the process of production.

Personally, I think it would be an excellent thing to check the value of the systems by finding out what the foreman and the workman think of it as far as it affects their department. The man who does not run a machine, the man who does not handle the material and is not responsible for getting the work out is not likely to be able to distinguish the essential features of a system of records or operations from the unessential features. With him every precedent is as important as every other precedent and every rule as important as every other rule.

The old-time foreman frequently kept his records of material on pieces of paper stabbed on a file and his drawings of his shop plan of work were not accurate drawings. Nevertheless he was a good foreman, a better man in his day than many foremen at present. Almost always he knew what things were and where they were. His method of cost keeping was not so accurate, but his knowledge of costs was pretty thorough.

It may be necessary for us to decentralize our systems, give the foreman the tools of the system, make him responsible for the working out of these things in his own department in order to grow efficient foremen and to keep the systems down where they are 90 per cent useful and not merely 90 per cent accurate.

## Unemployment Statistics

THE status of the unemployment problem in some of the European countries is digested in a recent issue of *Labour Overseas*, a British government publication. The proportion of unemployed to the total population in some of the chief countries on January 1 was as follows:

Germany	15.0%
Belgium	9.6%
Norway	8.8%
Denmark	2.3%
United States	2.2%
Netherlands	1.5%
Switzerland	1.1%
Sweden	0.6%
Czechoslovakia	0.4%
Italy	0.3%

While the figures for France and England are not con-

tained in the digest, so that a percentage could be figured, the following statement is made: "In France there is serious unemployment in the textile and metal trades; at Paris 100,000 persons were said to be totally unemployed in November and at Marseilles 30,000 in January. Unemployment has also affected the British Dominions and Japan to an extent which is at least greater than is usual in normal years."

The situation in England itself is known to be very serious at the present time.

In reading the above percentages it should be remembered that the percentage of unemployed to the total population is given and that only one in five can be counted as a constant wage earner. Had the percentages been figured on this basis they would have been much greater, of course.

## Metal Coatings as Rust Preventives

EXTENSIVE experiments with zinc coatings are reported on by Dr. W. Lange in the *Zeitschrift für Metallkunde* for April. Four processes are dealt with, namely, electro-plating, dipping, sherardizing and spraying (Schoop process), which were investigated during the war at the instance of the army research department. Tests were made on small plates of wrought iron measuring 1.2 x 1.8 x 0.16 in. These plates, protected by the different processes, were subjected to the influences of distilled water, hydrant water, and a one-half per cent salt solution, as well as to the influence of the weather, partly in a humid atmosphere containing much carbonic acid gas.

After commenting interestingly on the different processes, the author reaches the conclusion that rust protection is approximately the same for all processes, if they are properly applied. Unsatisfactory results can practically always be traced to too thin a coating of zinc. One pound of zinc should cover from 200 to 380 sq. ft. When well applied, a coating of zinc gives protection against atmospheric influences and hydrant water for a considerable

period. But the protection against a one-half per cent salt solution lasts for only a short time. It follows that protection against sea water is also quite ineffective. The method of zincing best suited to any particular object depends on the form, cross section and the surface formation. For hardened and hard drawn objects, such as springs, steel wires, etc., plating, spraying and possibly sherardizing at low temperature may be used; for strongly profiled objects, objects with deep hollows, and steel pipes, dipping and sherardizing are recommended; for objects made to measure whose limits must be retained, plating and possibly sherardizing; for material on which further work must be done, like sheet metal, plating and dipping; for parts with seams and rivets which are to be made tight at the same time, dipping and spraying; for cast iron objects, spraying.

The life of the different coatings can be greatly increased if the zinc is covered with a coating of resinous lacquer or water glass as a protection against atmospheric influences.



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## Tractor a Lusty Youngster

NINETY firms manufactured 203,207 tractors, worth \$193,563,000, in 1920. Of these tractors, 162,988 were sold in this country, at a value of \$161,896,000, and 29,143, valued at \$30,850,000, were exported. This is quite a remarkable showing for an industry which really dates its activity from 1914. Prior to that year the development of tractors was almost entirely along the line of large machines, which reached their peak of production in 1912, when 11,444 tractors were manufactured. The next year the number was fewer. The tractor had a small sale because it was available only for large farms. In 1913 the Bull tractor, the small farm pioneer, was brought out and this tractor sold in considerable numbers in 1914. Since then the development has been rapid.

It is worth mentioning that the value of the tractors manufactured is a considerable part of the farm equipment business, as the total for this industry, as given by the Department of Agriculture, is \$536,945,000. During 1920 only fifteen firms are reported as manufacturing steam traction engines and these

firms turned out only 1766 engines, worth only \$4,661,000.

Reliable figures of production and sale since 1916 are available through the United States Department of Agriculture, as follows:

	1916	1917	1918	1919	1920
Manufactured .....	26,670	62,472	132,697	164,590	203,207
Sold in U. S. ....	27,819	49,504	96,470	136,162	162,988
Sold for export.....		14,854	36,361	19,893	29,143
On hand Dec. 31.....		15,525	15,401	27,740	16,076

## The Vacation Problem

A NEW name for a somewhat old practice is seen in the announcements of factory shutdowns this year. In former years factories have been closed for certain periods "for repairs" and for "inventory" and for other reasons. This year some factories are closing for a week or more "on account of efficiency vacation."

The factories that are doing this are plants which give to their employees a vacation under pay. Previously it has been the custom to permit the employees to arrange vacation schedules that permit the more or less efficient operation of the plant. But this year several firms are announcing that the entire plant, including office, will be closed for one week, with the exception of a small force to answer emergency mail and to make emergency shipments. After the plant has been closed for the vacation period, everybody will come back refreshed and get to work again. One Brooklyn plant, which pays employees for two weeks' vacation period, has caused half of this vacation to be taken by closing the factory on Saturday mornings and the other half is taken through a full week shutdown.

## Profiting by Unsuccessful Experiments

HOW many engineers, even those with long experience and records of exceptional achievement, have had so-called "bright ideas" which when put to practical test have failed to materialize because of some unforeseen or seemingly insurmountable obstacle? Every engineer can recite experiences of this kind, many of them accompanied by long periods of what may seem to be fruitless research or development work. The experience gained by learning what is not desirable or attainable is, nevertheless, instructive and correspondingly valuable. Furthermore, it frequently happens that the information gained is or would be, if made available, of great value to other investigators, either in serving as a foundation upon which to build further or in showing what is not possible or commercially feasible. Again, two heads are often better than one. What may seem an insurmountable obstacle to one engineer may be circumvented or eliminated as a result of the experience of another.

For these and other reasons it would be a fine thing if engineers would regard it as one of their duties to report the results of investigations which they have occasion to make, whether directly profitable or otherwise. This is done in an unsystematic way in some

instances, especially when the investigation has proved a highly profitable one, but the idea might well be carried further. The Society of Automotive Engineers and other engineering organizations have accumulated much useful data in their transactions, but these represent but a small fraction of the useful engineering information that can and should be brought together.

We understand that the S. A. E. Research Department has in mind collecting and indexing all published material bearing upon automotive engineering. It might well go further and solicit from its members and others data of equal or perhaps greater importance accumulated through research efforts the results of which have never been published but which are filed away where they serve no useful purpose.

## Talk to Your Congressmen

**A**PPARENTLY the Republican majority in Congress is subject to pressure from those who placed the legislators in their present positions. This is indicated by some changes that have been made in the Tariff Bill and by the heed the Senate gave to the President's message on the soldier bonus.

This is as it should be, provided the proper persons speak the sentiment which reaches the legislators. So far it seems that much of the influence has been for good, but the legislator is never quite safe on a business program. Already the legislators have put oil on the free list, which is quite pleasing to the automotive industry, but it might be well to encourage them to keep oil where it now is. It might be possible for a change to be made in the aluminum duty if proper representations were made to the legislators.

Most of all, however, the automotive industry is interested in the carrying out of the Republican promises of a business administration, the lessening of taxes and similar movements. It will pay manufacturers to demonstrate that it is better politics to legislate for business than directly for political support.

## Car Resistance Factors

**I**N the S. A. E. paper by Mr. James, read at the summer meeting, the various resistances encountered by a road vehicle were enumerated, and constants were given by which each could be evaluated. In the case of air resistance a number of authorities were quoted, which differed considerably among each other, and it was pointed out that the highest constants were probably somewhat too high and the lowest too low.

It is doubtful whether any experiments have ever been made directly on an automobile to determine the air resistance at different speeds and to calculate therefrom the proper air resistance constant. S. F. Edge once determined with a car having a windshield the maximum speeds of which the car was capable with different windshield areas. However, as the projected area of the car without windshield, the power curve of the engine, the gear reduction and wheel diameter were not given, it was impossible to make use of the results in determining the air resistance constant.

That the constant found for flat surfaces moved straight against the air is not directly applicable to automobiles is obvious, because streamlining has quite an important influence on the air resistance, and the modern automobile body is to quite an extent streamlined. The constant for an average car body should, therefore, be smaller than the constant for a plane surface. On the other hand, there is a power loss in automobiles running at high speeds which is usually not taken into consideration and which undoubtedly varies with the speed in about the same way as the air resistance loss; namely, that due to road shocks and resultant slippage of the wheels on the road. When going at racing speeds, the driving wheels are out of contact with the road a considerable portion of the time, spinning around idly, and when they strike the road again the tires usually slip more or less until the pressure between tire and road has become nearly normal. That this action is the cause of great power loss is obvious from the experience of every driver that it is almost impossible to make any great speed on rough roads.

If this loss of power, which increases with the speed much faster than the tractive resistance loss and probably in about the same proportion as the air resistance loss, be added to the latter, then the highest values which have been given for the air resistance constant would undoubtedly be nearly correct. It is realized, of course, that the loss spoken of does not depend directly upon the exposed area of the car, but upon the total weight and the ratio of unsprung to total weight; but inasmuch as the shape of car bodies tends to become standardized, there is a fairly definite relation between exposed area and total weight.

## Educating Dealers

**I**T is interesting to hear factory sales managers discuss the necessity of educating the dealer and then to follow the way in which this education is carried out. It is easy to write "enthusiasm" material and it is easy for the dealer to react favorably to such material when times are good, but the general reaction during depression times is likely to be extremely unfavorable.

In either good or bad times, greater progress is likely to be made by fact-education. Not that inspiration is not an essential of good salesmanship. But an analysis of automotive selling indicates that there has been an excess of inspiration and a lack of merchandising analysis. Cars and trucks must be sold in the future on a basis of sound marketing studies. Every party concerned must do his part in gathering and correlating data. True dealer education will concern itself with talking to the dealer along these lines. Excellent results can be obtained by creating a "fact atmosphere," by emphasizing the necessity for study and analysis along selling lines. Automotive merchandising has never been short of enthusiasm and inspiration and those desirable qualities will not be lost if emphasis is removed from them temporarily. Several companies which have already started work in merchandising analysis are already profiting by the results of their efforts.

# Sharp Criticism for British Makers

## Increasing Imports Deplored at Meeting

### Combination of Standard Makes for Export Advocated at Heated Conference

By Cable to AUTOMOTIVE INDUSTRIES  
LONDON, July 25.—The conference here of British automobile manufacturers with British motor car dealers throughout the world resulted in sharp criticism of the shortcomings of British makers and their products from the viewpoint of overseas users.

Government spokesman deplored the increasing imports revealed in the striking trade returns, and advocated a combination of the standard British cars to go after business in overseas markets.

A spokesman for the manufacturers contended that while wages remain at the present levels, British makers cannot hope to compete successfully for foreign trade.

Dealers from all parts of the world told some homely truths which resulted in a proposal to hold a meeting under the auspices of the Board of Trade to discuss requirements for cars for export, probably on American lines.

Overseas critics averred that American cars are better than British, and asserted that claims of superior quality for the price in British makes were not well founded.

A spokesman for India resisted heatedly the claim that British vehicles give a greater mileage per gallon of gasoline than American cars.

The general impression is that the conference failed of its purpose, chiefly because of lack of adequate publicity. Editor Goddard of *Motor Export*, a monthly publication, who recently toured the British overseas market, asked the traders present for information concerning the needs in these markets and declared that British makers are slack in their publicity methods.

### STATE TO FIGHT OIL PRICES

BUFFALO, July 25.—The district attorney of Erie county has declared he proposes to take retaliatory action against the Standard Oil Co. which he accuses of "maintaining a high price for gasoline in the face of declining prices for crude oil."

## NATION'S PRODUCTION 87% OF 1920 IN 2ND QUARTER

NEW YORK, July 25.—Production of passenger cars by the automobile manufacturers which are members of the National Automobile Chamber of Commerce for the second quarter of 1921 was 57 per cent of the production by the same companies for the second quarter of 1920.

Ford production for the second quarter this year was 137 per cent of the same quarter last year.

Production for the industry as a whole in the second quarter of 1921 was 87 per cent of 1920.

Production by the N. A. C. C. companies for April, May and June was 107 per cent greater than for January, February and March.

Production by truck companies which are members of the N. A. C. C. for the second quarter this year was 39 per cent of the second quarter of 1920. It was 34 per cent greater than for the first quarter this year.

## Tire Exports Greater, Akron Makers Report

AKRON, July 26.—Akron tire manufacturers report heavier export business so far this year than at any time in the history of the tire industry. The volume of export business has practically doubled since the first of the present year. As indicative of the steady return to stable economic conditions in Europe, tire manufacturers report European export business increasing rapidly.

Mexico and South America continue to lag in export of tires, largely due to the fact that merchants in these countries have refused to write off their losses and are holding for war time prices, according to export managers of the "Big Four" of Akron, the Goodyear, Goodrich, Firestone and Miller Companies.

Goodrich recently has organized a separate or subsidiary export corporation and has established offices in Akron. Firestone this week has transferred its export departments from New York to Akron so that export managers can keep better in touch with the home office and can handle export orders directly out of Akron. This transfer brings G. T. Currier, F. C. Allen, W. H. Snyder and G. L. Livingston to Akron from the Firestone export office in New York, with L. A. Latour remaining in charge of the Firestone warehouses in New York City.

## Tire Exports Nearly Doubled in England

### Otherwise Shrinking Market Brighter by Cutting Down of Rubber Import Value.

LONDON, July 15 (By Mail)—The best that can be said of Britain's automotive trade returns—export and import for June—is that the end of the month marked the near cessation of the protracted period of British labor troubles. The cloud seems completely to have lifted with the decisive vote of the engineering unions—comprising some 30 and more affiliated bodies—in favor of accepting the wage reduction proposed and discussed between the masters and men some weeks before.

As to imports, during the month 602 cars and trucks and 391 chassis were imported, the combined value (at pre-war exchange rates) being \$1,344,360. The value of parts imported was \$626,620 and of tires imported \$1,144,005.

British vehicles exported numbered 166 and chassis 43, the combined values being \$938,740 and the value of exported parts was \$484,645 and of tires \$555,315.

The six months' totals were: Imports, vehicles and chassis, 6,619 as compared with 25,521 in the corresponding period of 1920; parts (value) 9,020,390, and tires (value) \$7,783,585 as compared with \$18,410,645 and \$12,582,440 in the like period of 1920.

British exports for the six months—Vehicles and chassis, 2,340 compared with 2,533 in the like period of 1920; parts (value) \$3,888,830 against \$4,244,615 in the like period of 1920, and tires \$16,088,030 against \$5,990,170 in 1920.

It will be noticed that while there has been a notable shrinkage of imports and exports generally during the six months, the export value of British tires has nearly doubled and the import value of tires has been nearly cut in half.

The interesting point here is that imported tires are duty free, yet the British tire trade is constantly urging that they should be taxed on the plea that British interests suffer and British workers would benefit by increased production following (it is hoped) the fall off in imported tires.

### ELGIN MAKES RECORD

ARGO, ILL., July 25.—The Elgin Motor Car Corp. has informed its dealers that the number of cars shipped for the month of June was 102 per cent larger than for any other one month in the past seven. Orders June 1 were 259 per cent greater in the same period.



# Rickenbacker Turns Manufacturer

## American Flying Ace Plans \$5,000,000 Firm

Backed by Walter Flanders and  
B. F. Everit—Files Charter  
Application

DETROIT, July 26—Capt. E. V. Rickenbacker, America's ace of aces, is about to enter the ranks of American motor car manufacturers, backed by Walter Flanders and B. F. Everit. Application was filed at Lansing yesterday for a charter for the Rickenbacker Motor Co., a \$5,000,000 concern backed by a group of automobile men which is of unusual strength and resource.

This is not the first time that Flanders and Everit have been associated as they were two members of the old E.M.F. group which later became the Studebaker Corp. The other name was that of William E. Metzger, who was the "M" in the combination. This organization looms large in the history of automobile manufacturing activity as one of the first to manufacture a low priced car in large quantities.

Since the sale of the E.M.F. concern to Wall Street interests, Everit has confined his attention entirely to his original business of automobile body building and he is to-day the second largest body builder in the world.

The name of Flanders is familiar to everyone in the automotive industry. He took over the defunct United Motors Co. from which he created the Maxwell Motor Co., of which he was head from 1911 to 1920. During that time this organization earned \$18,000,000 in profits, having started from what was known as a pile of scrap. Flanders has continued to insist up to this time that he was going to remain in retirement and in fact made this announcement in Detroit not more than ten days ago. Those well informed in the industry always have believed, however, that Flanders would come back.

Rickenbacker stated to-day that the design of his car was started over two years ago when he returned from Europe determined to enter the automobile manufacturing business. He states that the design incorporates many points learned through his own long experience in the automobile field and that of his associates.

As it now stands the organization includes Everit as president and general manager, Rickenbacker as vice-president and sales director, Harry L. Cunningham as secretary and treasurer. The other directors are Flanders, Carl Tuchenor, Roy Hood and E. R. Evans.

Cunningham is one of the closest men  
(Continued on page 193)

## COMPETITION SO GREAT TRAINS GIVE WAY TO MOTOR CAR

NEW YORK, July 26—An effect of automobile travel on railroad operation is shown in the decision of the Interstate Commerce Commission authorizing the abandonment of two branch lines of the Boston & Maine Railroad in New Hampshire. One, extending from Cherry Mountain to Jefferson in Cross County, a distance of three and one-half miles, was built in 1892 for the accommodation of summer resort travel. The increase in motor car travel has caused a steady diminution in the passenger traffic, and in 1919 and 1920 the company reported that the average number of passengers per train was three with total freight revenues in 1920 amounting to \$88 and total passenger revenues \$319.

The other branch line extending from Bethlehem Junction to Profile House, in Grafton County, a distance of nine miles, also had to give way to the competition of automobiles, as the report shows that the average number of passengers per train during 1920 was two, with revenues amounting to \$1,713 and operating expenses \$12,940.

## Hope for Reciprocal Duties on Implements

CHICAGO, July 25—Although the tariff bill passed by the House has placed imports of Canadian farm implements on the free list, hope is entertained that the Senate will place manufacturers of farm operating equipment in the United States on an equal footing with their competitors in the Dominion, which has an almost prohibitive tariff on farm machinery.

Some manufacturers believe that the tariff bill empowers the President to impose reciprocal duties. Because of the uncertainty which prevails, manufacturers connected with the National Implement and Vehicle Association have authorized their national legislation committee to give full consideration to the tariff question, with power to file a protest if American farm machinery manufacturers are not fully protected.

The section of the bill which relates to agricultural implements does not specifically mention tractors, and inquiry will be made to ascertain whether it is the intention to include them in list of farm machinery to be admitted free.

## Sherman Will Direct A.E.A. Sales Campaign

Executive Editor of Class Journal  
Co. Resigns to Conduct \$40,000  
Promotion Plan

NEW YORK, July 26—Ray W. Sherman, executive editor of the Class Journal Co., has resigned to become merchandising director of the Automotive Equipment Association.

Mr. Sherman will take up his new work Aug. 1, organizing and directing the sales promotion movement authorized at the recent Mackinac Island convention of the A. E. A. His headquarters will be in Chicago, where he will work with the sales promotion committee headed by Robert A. Stranahan, president of the association.

Before becoming executive editor of the Class Journal papers, Mr. Sherman was editor of *Motor World*, which he joined more than nine years ago. Previously he had spent several years in daily newspaper work and for a time was in the advertising department of the Franklin Automobile Co. He was graduated from Syracuse University in 1907.

The work which Mr. Sherman will undertake, with a staff of assistants, is virtually an educational campaign intended to carry a practical message of better merchandising to all branches of the automotive equipment trade. It will call for the co-operation of manufacturers, jobbers and dealers in plans yet to be worked out in detail.

## Manufacturers Study Enclosed Car Market

DETROIT, July 25—Automobile manufacturers are beginning to scan the horizon in a study of prospects for enclosed car business in the fall. It is too early to determine definitely the size of the probable demand in September, October and November, and dealers are not inclined to commit themselves.

It is felt among some well posted men in the industry that due to the reluctance of closed body manufacturers to make large commitments for materials there is a possibility of something resembling an enclosed car shortage during the fall. It is felt that when the vacation season is over a larger proportion of the cars sold will be of the enclosed type. It is certain that none of the body manufacturers are over-producing at this time on closed jobs. Manufacturers of cars say they will not be able to formulate plans for production of enclosed models until after Aug. 1, when they will have had a chance to sound out dealers.

## Atlanta Territory Sees Trade Revival

July Sales, However, Not Expected to Reach Those of June

ATLANTA, Ga., July 26—In spite of the price reductions effective July 1 and the resultant increase in sales that has been experienced by these various companies during the present month, as a whole July will not be as good a month for the automotive industry in the Atlanta district as June. The outlook for the future, however, is brighter than it has been for a number of months and indications are that automotive sales in this district will have picked up to an appreciable degree by the early part of fall.

A prominent Atlanta banker declares that a thorough investigation conducted recently by his bank leads him to believe that the situation is now on the road to rapid improvement.

"For some time economic authorities have been watching for the trend of affairs that will indicate a revival in business conditions," this banker declared, "and they are now beginning to see its advent."

One of the primary difficulties in the South is the continued and unexpected low price of cotton, which leaves the farmer without ample finances for the purchase of automobiles and almost closes this market entirely as a profitable one for the dealers.

Conditions as a whole, however, appear to be on the upward trend, and virtually all lines of business in this section appear to be noting favorable effects as a result.

## Headlight Law in Ohio Takes Effect August 16

COLUMBUS, July 26—The law enacted at the last session of the Ohio General Assembly regulating the glare of headlights becomes effective Aug. 16, which is the time of the expiration of the referendum period. The new law provides that no headlights can be used on the highways and streets of the state unless covered by a lens approved by the Ohio Highway Commissioner. No certificate of approval of lens can be issued until actual tests have been made by that official.

The provisions are that a light shall be used to disclose any persons, vehicle or object for a distance of 200 ft. ahead of the car, and no dazzling rays shall be used more than 3 1/4 ft. above the surface and not more than 75 ft. ahead of the car. No lamp shall be more than 32 candlepower. No spot light can be used except when projecting its rays directly on the ground at a distance of 50 ft. in front of the vehicle and to the right of the center of the roadway. Heavy fines are provided for violation of the provisions of this law.

## DIXIE DEALERS OPPOSE PROPOSED GEORGIA GAS TAX

ATLANTA, GA., July 26—The plan to raise upwards of \$3,500,000 per year in the State of Georgia by a special tax on gasoline and soft drinks, and which is now being considered by the State Legislature, will be bitterly opposed by the dealers according to present indications.

The tax on gasoline proposed is 1 per cent per gallon, and this would net the State additional revenue of \$800,000. The tax would, of course, be passed on to the ultimate consumer, but with the country still paying war taxes on most of its luxuries, various dealer organizations are planning to oppose the passage of the measure as an unnecessary hardship.

## Savannah Sales Good; Outlook Is Favorable

SAVANNAH, July 26—Savannah retail automobile dealers have experienced a decided improvement in business during the last two months as compared with the first three or four months of the year. June sales and general automobile business showed material increases, as compared with the preceding months, as a result of the reduction in prices, and a slight improvement in general business conditions, in this territory.

However, says Percy S. Bacon, president of the local dealers' association, the June sales are hardly better than the average monthly sales of last year. The first four months of this year were exceedingly bad for the dealers of this territory, but the recent improvement has given the dealers new hopes, and they are putting forth every effort to push sales forward.

Bacon explained that for the past two years the automobile business in Savannah has been greatly handicapped by the construction of concrete roads being in progress, which made long, boggy detours necessary. Since the completion of road and bridge work through this section, forming a direct route from the East, through Savannah and Brunswick into the State of Florida, the local dealers are expecting considerable improvement in business.

Depression in the cotton, naval stores and lumber markets, upon which Savannah and vicinity chiefly depend, has caused tight money and other factors which still prevail to considerable extent. Until these markets recover considerably, normal conditions can hardly be hoped for in this territory. However, reductions in prices by retailers in general have stimulated buying by local consumers considerably, and there is a tendency toward improvement in exports within the next six or twelve months.

The outlook for the automobile business in this territory is very favorable.

## July Sales in Texas Show 20% Increase

Dallas, Ft. Worth, Sherman and Waco Report Substantial Gains Over June

DALLAS, TEX., July 26—Conditions in the automotive industry in Texas continue to show improvements from month to month. As the June sales on the part of the retailers showed an increase over those of May so are the July sales showing an increase over those of June. A canvass of a score of retail automobile establishments in Dallas and a dozen in Fort Worth, Sherman, Greenville, Waco and other towns developed the fact that the sales for the first half of July show an increase of from fifteen to twenty per cent over the sales of the same period for the preceding month. Dallas wholesale dealers who are supplying retailers in north Texas, parts of New Mexico, Oklahoma and Louisiana report that sales are increasing over the territory.

The increase in sales of automobiles, according to the local dealers, is due to three things.

First—The marketing of the grain crops in this section of Texas is putting some \$30,000,000 in the pockets of the farmers. This money is getting into circulation and cars are being bought. The fruit and vegetable crop is being marketed and this is bringing some \$20,000,000 more to the farmers of this section. Money is freer, hence cars are being bought.

Second—The reduction in the prices of automobiles. Dealers who have made price reductions, and practically all of them have, say there has been a noticeable increase in sales since the reductions.

Third—It is the touring season and the roads are alive with motorists. More people are using automobiles for vacationing this year than ever before.

## Dealers Not Big Losers in Closed Chicago Bank

CHICAGO, July 26—The best information available shows that Chicago automobile dealers who were depositors in the closed Michigan Avenue Trust Co. will not be heavy losers, as their accounts in most cases were small and represented balances carried to meet payrolls. As a consequence motor row is not much concerned.

The Chicago Clearing House committee has issued a statement advising the public that the closing of the bank has no bearing upon general banking conditions, which are sound. Auditors now at work expect to have a statement ready in a few days. The troubles of the bank date back to a deal with the Graff Mfg. Co., which obtained a loan of \$250,000 on the strength of a contract with the Packard Motor Car Co. of New York which later was canceled.

## Indianapolis Hopes to Beat July Figures

### Cole Orders Show 45 Per Cent Gain Over Period of Pre-Reduction

INDIANAPOLIS, July 26—As July nears an end, it is evident here that the volume in business will exceed that done in June by a larger per cent than was expected. The greatest increase can be noticed by those automobile companies who have just recently made cuts in prices. The increase at the Cole plant has been noticeable. Since the reduction in prices, orders received at the plant show an increase over the pre-reduction period of approximately 45 per cent. Other plants are able to show increases of from 20 to 30 per cent. Those companies which made reductions earlier in the year are having a steady business, tending, officials say, toward a slight increase. These companies obtained increases immediately after prices were cut and contrary to all predictions here their sales did not slump after the first increase.

Dealers in automobile accessories here appear to be more optimistic concerning business for July and for the remainder of the year than the strictly motor car dealers. In accessories for smaller cars, such as the Dodge and Ford, the shock absorbers head the list. Dealers say that the demand for bumpers, special wheels, spot lights and locks has been good, better in fact than was expected.

Latest bank reports show business in the banks to have increased materially during the past six months of 1921 and savings accounts to have shown more than their proportionate share of increased business. In spite of this fact, Indianapolis bankers are more cautious than usual in lending money.

Automobile finance organizations, which finance the purchaser in a payment plan, appear to have plenty of money at the present time and report that since June 15 much better credit conditions have prevailed. Many accounts which have been past due for weeks have been paid up and payments now are being made regularly. The percentage of non-payment is less than it was this time a year ago.

### Turn in Kelly Tire Stock

HARTFORD, CONN., July 25—At a meeting of persons interested in the fate of the Kelly Tire & Rubber Co., Benedict M. Holden explained the status of the company. It was pointed out that the stockholders would be lucky if they got 50 cents on the dollar.

Nathan E. Prince, vice-president of the Hartford-Connecticut Trust Co., has consented to serve on the stockholders' protective committee. This is composed of bankers in New Haven, Waterbury and Hartford. Plans are now being considered as to the best means of protecting the interests of the investors.

## DETROIT PLANTS PUT 22,976 MEN TO WORK SINCE MARCH

DETROIT, July 26—Virtually the entire increase in employment in Detroit since March has been in the vehicle and transport group of manufactures. In this industry, which includes the automobile factories, employment increased from 53,205 in February and 81,093 in March to 104,069 in June.

## Restrictions of Banks Affect Sydney Sales

SYDNEY, AUSTRALIA, June 14 (By Mail)—The vast majority of would-be purchasers of motor cars in New South Wales are prevented from buying owing to the restrictions banks are now exercising with their clients who owe them money. The banks are pessimistic, but recently a few optimistic notes have been sounded by some bank managers in their annual reports to shareholders. The automobile trade has just finished up its summer business, which under such conditions has established the worst record since 1912, and as a result most of the motor car dealers are stocked with cars. There are a few fortunate ones who have cleaned up their stocks, but there are others who have heavy stocks and it will be twelve months before decent orders are placed for more cars by some of them. The purchasers are still waiting for prices to fall.

During the first two weeks in June the motor trade has been busy discussing the tariff with the Federal parliament of Australia, and it is predicted in some quarters that the import duty on the chassis will be reduced, but that the present duty on the complete car will be continued. An energetic campaign is being waged to get a lower duty on farm tractors and motor trucks. The duty on farm tractors has been considerably higher in proportion to that on automobiles than it should.

Wool, which is one of the staples of Australia, has for over a year come through a very bad period. As this is the biggest revenue producer in the country, this situation is naturally reflected in the buying power of the people.

For months it was impossible to sell a single pound of wool. There were no buyers and no offers. Lately the position has become slightly changed and indications point to a gradual improvement. If such develops it will bring about a decided improvement in business conditions throughout the Commonwealth of Australia.

In New South Wales motor truck business has shown improvement of late, whereas in the remainder of Australia it is practically dormant. Truck improvement in New South Wales is due to the heavy hilly nature of the populated areas.

## Car Demand Improves in Columbus Field

### Closed Plants Gradually Resum- ing—Records Show More Workers Are Employed

COLUMBUS, July 26—There is a continued improvement in the demand for passenger cars in Columbus and central Ohio territory. This is the report from dealers and distributors of cars in almost every line. With a number of price reductions announced during July, business in certain makes was still further stimulated. On the whole trade is much better than was expected.

There is a slight improvement in the unemployment situation which is shown by the reports of employment agencies and also from reports received from large employers of labor. Some of the plants that were closed down early in the year are gradually resuming and are employing more men from time to time. Other concerns are still holding their own, and as a result there are fewer men out of work now than was the case a month or six weeks ago. This is being reflected on the automobile trade, especially passenger cars. People are now inclined to take a chance, for it is the belief that the worst of the slump is over and that conditions are on the mend.

But dealers and distributors are not too optimistic and they are proceeding cautiously. The larger majority believe that the improvement will be gradual and they do not expect a boom during the present year. They are working on the principle that a certain number of cars will be sold with things brightening up, and it is up to the dealer to hustle for the business. Consequently, salesmen are being trained to pick up prospects and to handle the prospects after they are secured. It is a long, hard grind ahead of the sales force, and special efforts are being made to keep up as much as possible.

### May Modify Ford Offer

WASHINGTON, July 26—Secretary of War Weeks says that Henry Ford's offer for the Government nitrate plant at Muscle Shoals, Ala., is unsatisfactory in its present form. He said that in several respects the Ford proposal was not in the exact form expected, though he thought it likely that modification could be made in the offer when he discussed the proposal with Mr. Ford, which might make it acceptable. The date has been set for a conference between the two.

### A. M. E. A. Convenes Oct. 5

NEW YORK, July 26—The annual convention of the American Manufacturers Export Association, which numbers several automotive manufacturers among its membership, will be held at New York on Oct. 5 and 6, and various matters of importance will be discussed.

## Automobile Market Depressed in Japan

**Imports Close as Yokohama  
Sheds Fill Up with Cars  
and Trucks**

SEATTLE, WASH., July 26—Continuation of the depressed state of the automobile market in Japan has led to stoppage of automobile imports and to the accumulation of large numbers of cars and trucks in the customs sheds at Yokohama, according to the latest reports from the Orient. A partial recovery in retail sales was felt in the first four months of the year, but since then conditions have slumped somewhat and it is now felt that no marked improvement will come until autumn.

Retail dealers in Japan complain that would-be purchasers of automobiles feel that the prices asked for standard makes of cars are too high. The average American or English car sells for an amount in Japanese currency equal to twice the retail price in the country of manufacture. And yet conditions are such that even at this price the automobile dealer in Japan, it is said, can make but a small profit. Transportation and boxing costs add greatly to the cost of the foreign automobile, and the high import duty in Japan is charged not on the original cost of the automobile but on the original cost plus boxing and transportation charges. Transportation, boxing and insurance costs amount to from 15 to 20 per cent of the first cost of the automobile. To this cost must be added the landing charges, an item which has greatly increased in the last few years. Charges for interest on money tied up must also be added.

### Consider Own Production

In face of the present high cost of imported cars, home production of automobiles is again being talked of. Several attempts to manufacture Japanese automobiles have been made, and are being made at this time, but so far they have been generally unsuccessful. In one or two instances a small, light car of satisfactory performance has been produced, but the manufacturers have been unable to interest local capital in sufficient quantities, and as a result the production costs have been high, and the selling price has not been appreciably lower than asked for of foreign vehicles of similar size.

Japanese labor is not yet sufficiently skilled or sufficiently experienced to be suitable for use in automobile manufacturing. It is considered that Japan will not be able to produce her own cars and trucks for 15 or 20 years.

The recent passage of the new motor taxes in Tokyo have added to the motorist's burden. One Tokyo writer says that not only is Tokyo content with having the worst roads of any large city in the world, but that it has the double distinction of imposing the highest automobile taxes.

## COLE CAR BOUGHT BY KING CONSTANTINE OF GREECE

INDIANAPOLIS, July 26—The Cole Motor Car Co. obtained an order to-day from King Constantine of Greece for a Cole car, all decorated in a coat of arms, nickel-plated fixtures and everything. Before Greece got the king bug the last time, its ruler had a Cole car and while officials of the company do not know whether Constantine requisitioned the car after he resumed the throne, yet he has fallen in love with a Cole car to the extent of ordering one.

## Installing Budget System in Goodyear Tire Firm

AKRON, OHIO, July 26—President E. G. Wilmer, of the Goodyear Tire & Rubber Co., who recently succeeded F. A. Seiberling, has put into operation a complete budget system for the entire Goodyear factory and the main offices and all branch offices. The budget plan was adopted following a conference of Mr. Wilmer and other Akron officials, with New York banking interests now virtually in control of the Goodyear company through the \$80,000,000 refinancing program recently negotiated.

Under the system each factory or office department and every branch office has been assigned a specific budget, with the order issued to each departmental manager to hold his expenses within his respective budget for the ensuing year. Heretofore Goodyear has operated without a budget and without a financial board of strategy to pass upon expenditures, new expansions and addition of high salaried men.

## Preston Motors Starts Shipments to Europe

BIRMINGHAM, ALA., July 26—Shipments to foreign countries by the Preston Motors Corporation have recently begun according to an announcement by James T. Driver, vice-president and general manager of the corporation.

The first car sailed from New York on the steamer Woodrow Wilson for the distributor of the Premocar in Yugoslavia last Saturday. While only one car was shipped the agency has ordered three carloads more, and they will sail as soon as possible.

Applications for a distributor's franchise have been received from Africa, Australia, England, Germany and many other foreign nations. Just as soon as the production warrants this territory will be closed. The Creel Motor Company, local distributors, have dotted the state with Premocars. A departure from the general rule is shown in the fact that the Premocar is just as popular at home as it is elsewhere.

## Cleveland Dealers Predict Good Gains

**July Will Be from 25 to 30%  
Better Than Average, They  
Assert**

CLEVELAND, July 26—Basing their estimates on the volume of business done the first two weeks of July, representative Cleveland dealers assert the present month will be from 25 to 30 per cent better than the average July in the past.

Reductions in prices brought an influx of new business that has continued through the middle of the present month in this city. Many owners and others wanting to own a car this year kept holding off for lower prices, until now dealers say the demand indicates that the average man and woman is of the opinion that the last price reductions on 1921 cars have been made.

The Chandler car is now selling at the pre-war price, and the local dealers say that June sales went up surprisingly, and that the first two weeks in July are far ahead, from the standpoint of new cars delivered, of the corresponding period in 1920. This statement is borne out by Samuel Regar, treasurer of the Chandler Motor Car Co. He said that retail sales of Chandler cars throughout the country for June were the largest of any month since October 1920.

The Jordan dealer, who says that his June sales were the best for any similar month in the history of his firm, asserts that July this year is likely to establish a new record.

Reports at the Dodge, Chevrolet, Willys-Knight, Overland, Studebaker, Auburn, Franklin, Hudson and Essex, Stutz and Buick agencies are that July this year is better than the average.

The automobile industry here seems to accurately reflect general business conditions, as portrayed by the Cleveland Trust Co. That bank says:

"Business cycles pass through four separate phases—prosperity, forced production, liquidation and readjustment back to better times. We are now in the third and fourth phases, and while liquidation is not entirely completed, readjustment is under way. When prices are falling the tendency is to get rid of stocks on hand. During this transition industry stagnates, unemployment is general and business is bad, because everybody wants to sell and few want to buy. Such a situation always corrects itself because consumption is greater than production and stocks become exhausted and have to be replenished. Evidence is accumulating that the rapid fall of wholesale prices has stopped.

### Stockholders Ask Receiver

EVANSVILLE, IND., July 25—A group of stockholders in the Stronghold Tire & Rubber Co. has filed a petition in the county court asking for a receiver. It is alleged the company is on the verge of bankruptcy.

## \$90,000,000 in Truck Contracts Hang Fire

**Russian Soviet Officials Who Made Them Under Arrest in Chicago**

CINCINNATI, July 26—A few days ago the United States Motor Truck Co. of Covington, Ky., had contracts for \$90,000,000 worth of automobile trucks for the Soviet government in Russia. To-day the company is wondering whether the contracts are good or not.

F. J. Alvin, an official of the company, also is wondering whether his appointment as Director of Standardized Motor Truck Equipment for the Russian government in the United States, also is valid.

The Trailmobile Co., the Highland Body Co., and other Cincinnati concerns interested in automobile building, also are wondering as a result of recent developments in Chicago.

Max Schallman, a representative of the Soviet government, made the contracts and promised Alvin the appointment several months ago. No money was passed at the time and the companies with which contracts were placed, including several not directly engaged in the automobile business, were waiting for the passage of the coin before undertaking the contracts. But the contracts, nevertheless, were all signed and ready, once the money was shown.

Schallman since has been arrested in Chicago on several charges by Federal authorities, in connection with his activities in this country. His attorney says he will carry the contracts as soon as delays, beyond his control, are overcome. These are due to affairs across the sea, it was said.

The firms concerned are up in the air and awaiting definite word on their contracts. Alvin's appointment was to supervise standardized truck manufacture in some 15 or 16 truck plants throughout the country, at which contracts were to be made by Schallman.

It is charged that the contracts were made to get business men interested in recognition of the Soviet government, because of the pressure they would bring to bear on congressmen and senators due to their contracts.

## New South Wales Plans \$243,000,000 Road Loan

NEW YORK, July 26—A loan of \$243,000,000 will be raised in New South Wales to carry out the reconstruction of the main roads throughout the State. This report to the Bureau of Foreign and Domestic Commerce states that the loan, which will carry 5½ per cent interest, is being arranged by the State treasurer. The scope of the main roads bill has been enlarged by extending its area throughout the county of Cumberland. Every penny of the huge loan, says the report, will be devoted to the building of good roads.

## CIVILIAN AVIATORS FLY 3,250,000 MILES IN SIX MONTHS

NEW YORK, July 26—The Manufacturers Aircraft Association, on completing an aviation survey of the United States, announced today that in the last six months the 1200 commercial planes in operation had flown approximately 3,250,000 miles.

"The record," says the survey, "shows that civilian flying, although embarrassed by the lack of an American air policy, has established itself as a remarkably safe and dependable means of transportation. In three and a quarter million miles of travel by air, only 15 persons were killed and 43 injured in a total of 27 serious accidents. Most of these accidents occurred among that class of civilian aviators known as gypsy flyers.

"Of the 1200 commercial aircraft, probably 1000 are under the indirect supervision of responsible plane manufacturers or transportation companies—and this is absolutely the only regulation over flying, as local ordinances or state laws cannot be enforced. Lacking a Federal organization controlling civilian aviation, these 200 or more gypsy flyers have been permitted to fly at will and many have met disaster."

## Stockholders Will Buy Immel Company Assets

COLUMBUS, July 26—The sale of the Immel Co. plant together with all materials and equipment at the other two plants of the company to Arthur G. Gilmour, chairman of the committee of stockholders, has been approved by the court. Steps are now being taken to organize an entirely new corporation to take over the property and operate it for the manufacture of closed automobile bodies, to which purpose the plant has been placed.

A meeting of the former stockholders who have participated in the sale will be called soon, when it is hoped to select a name and to iron out details for the incorporation of the company. All financial matters will also be considered at this meeting. It will probably be weeks before a definite announcement.

## Cut Kalamazoo Trucks

KALAMAZOO, MICH., July 26—A general price reduction ranging from \$300 on the lighter models to \$425 on the heavier trucks has been announced by the Kalamazoo Motors Corp., which manufactures the Kalamazoo truck. New prices f.o.b. Kalamazoo range from \$2,495 for the 3000-lb. truck to \$4,800 for the road builders' special 5-ton truck.

## British Labor Back; Industry Sees Hope

**Automotive Trade One of First to Benefit Big Return of Workers**

LONDON, July 10 (By Mail)—The tenseness of the British labor and general industrial situation has subsided more rapidly than it took to develop. The miners have resumed work, the engineers have come to terms and will continue at work pending further discussion, and the cotton operatives have resumed work. Thus the three chief British industries have again reverted to a reasonable course and the fact finds expression in the slogan, "Full speed ahead."

The factor underlying these disputes has been the problem of wage rate and the acceptance of economic necessity of a reduction of cost of production. On all hands the Government is blamed for lack of provision in handling the affair. It "controlled" industry just long enough to suit its purpose, and just as quickly decided to cut the control, with the result that labor and employers were thrown at each other's throats.

The automobile industry will be one of the first to benefit by the resumption of labor, and in a few days the stock of the automobile companies should begin to reflect a hopeful issue.

At present the demand is exclusively for light cars and motorcycles. Big stuff has slumped, so much so, that it is probable one of the big factories would suffice for all the salable output in that category.

## Companies to Increase Daily Tire Production

AKRON, OHIO, July 25—The Goodyear Tire & Rubber Co. is preparing to increase production to 25,000 tires and 30,000 tubes a day. Considerable difficulty is being experienced in obtaining skilled tire builders.

The Firestone Tire & Rubber Co. announces that its production will be raised 23,000 tires and 25,000 tubes a day. Substantial increases are reported in orders both from manufacturers and dealers.

NEW YORK, July 25—The Kelly-Springfield Tire Co. is producing in excess of 2300 tires a day at its Akron and Wooster, Ohio, plants, and 700 a day at the new Cumberland, Md., factory. Output at Cumberland is being increased as rapidly as possible. More than 900 men are employed there now, and the number is being increased each week. The production at this plant alone is expected to reach 5000 a day by the end of the year.

BOSTON, July 25—The Fisk Rubber Co. is increasing its production. The output now is running 8500 casings and 10,000 tubes daily.



## Cost Cuts Chief Help to Ford Meeting Loan

Sharp Manufacturing Reductions  
Aided Him to "Put It Over"  
on Bankers

DETROIT, July 25—Details of the manner in which Henry Ford overcame the financial difficulties which confronted him early in the year and escaped from the bankers who were waiting eagerly to get a share in his business by means of a loan, have been printed at length recently in the daily newspapers. The salient facts were recounted in *AUTOMOTIVE INDUSTRIES* some two months ago.

The most striking feature of the story is the sharp reduction made in manufacturing costs. All non-essential jobs were abolished. Late in 1920 the average cost of labor and commercial overhead per car, exclusive of material, was \$146. Now it has been cut to \$93. Formerly 15 men were required per day per car. Now it requires only nine.

Early in January Ford needed \$58,000,000 to pay \$33,000,000 in bank loans which he made to buy the holdings of the Dodge Brothers; \$18,000,000 for Federal taxes and \$7,000,000 for employees' bonus.

He had on hand \$20,000,000 in cash and raised \$24,700,000 by the sale of cars manufactured from parts on hand in the main factory and the assembling plants. He collected \$3,000,000 due on foreign accounts and realized \$7,900,000 by the sale of liberty bonds. Another \$3,700,000 came from the sale of coke and by-products. This left a margin of \$1,300,000 for operating expenses.

The additional funds needed were obtained by making use of the Detroit, Toledo & Ironton Railroad. Before he got control of the road it took an average of 22 days to haul raw materials to the factories, work it up, and get it to dealers. The money tied up in this way stood constantly at about \$88,000,000. This time was cut to 14 days and the amount tied up reduced to \$60,000,000. This left \$28,000,000 for operating capital.

## English Firm Acquires Willard Patent Rights

CLEVELAND, July 26—C. A. Vanderwell & Co., Ltd., of London has acquired the patent rights covering the manufacture of the Willard threaded rubber insulated battery for the United Kingdom and British dominions, excepting Canada, according to an announcement made today at the office of the Willard Storage Battery Co. The threaded rubber takes the place of the wooden fiber separators in the battery and makes the battery much more lasting.

The device is the invention of Willard and it has been used in this country for more than a year with such good results that the Vanderwell company sought the right to use it.

## SEIBERLING RETURNS TO THE RUBBER INDUSTRY

NEW CASTLE, PA., July 25—Frank A. Seiberling, former president of the Goodyear Tire & Rubber Co., has "come back" to the rubber industry, as his friends predicted he would, after relinquishing control of the huge corporation he built up from the humblest of beginnings.

Under a court decree he will take possession of the New Castle Rubber Co. which he purchased for \$103,000 at a bankruptcy sale some time ago. This price was considered very low, as the factory is well equipped and cost several times that amount.

While awaiting confirmation of the sale by the court, Seiberling told New Castle bankers that he expected to take personal charge and begin operation as soon as possible.

## Dealers Fight Georgia Accessory Tax Measure

ATLANTA, GA., July 26—Volney Williams, president of the Georgia Automotive Dealers Association, appearing before the House committee on appropriations and ways and means of the Georgia State Legislature, now in session, told members of the committee that the tax increases proposed by the present assembly on automobile and accessory classifications are too high, and that if the present taxes are increased to any appreciable degree it will have the effect of putting a large number of dealers in Georgia out of business within the next year.

A bill revising the general tax act in the State so as to produce an estimated increase of \$500,000 a year to the State revenue beginning Jan. 1, 1922, has already been introduced before the General Assembly. Wholesale and retail dealers in automobile tires and accessories are placed in separate classes in this bill, wholesalers being taxed \$250 a year and retailers \$25 a year. There are other proposed forms of taxation in the bill that will have a serious effect on the automobile industry in this State if it is passed. The bill providing for a tax of one cent per gallon on gasoline appears to be a certainty regardless of the efforts that have been made to defeat it.

John B. White a Bidder

SPOKANE, WASH., July 26—John B. White, president of the Washington Tire & Rubber Co., bid in the assets of the corporation when they were sold by the sheriff to satisfy a judgment given the Lincoln Trust Co. on a \$65,000 bond issue. He is understood to have been acting for himself and other stockholders.

## Trade Officials to Confer with Hoover

Conference to Discuss Compila-  
tion of Census of 1921 Pro-  
duction Figures

WASHINGTON, July 26—Representatives of the National Automobile Chamber of Commerce, Rubber Association of America, and other organizations in the automotive trade will attend a conference of trade associations with Secretary of Commerce Hoover and the officials of the Bureau of Census, next Friday. The conference will discuss the best methods by which the organization may co-operate in the compilation of the biennial census covering statistics of products of manufacturing industries taken for the year 1921.

John E. Edgerton of the National Association of Manufacturers has issued a notice to members of the association and to trade bodies which are co-operating in this activity.

The Director of the Census desires this conference with representatives of the associations in order that he may consult with them concerning the number, nature and form of the various inquiries and the general scope and work of the Census Bureau, as well as the methods of co-operation with the officials of the bureau and department to facilitate the work and accomplish the best and most useful results to American industry.

Among organizations asked to send representatives to the conference are the American Iron and Steel Institute; American Supply and Machinery Manufacturers' Association; National Association of Engine and Bolt Manufacturers; National Association of Brass Manufacturers; National Pipe and Supplies Association; Heating and Piping Contractor's National Association; and Railway Car Manufacturers' Association.

## Chicago Holding Own, Hopeful for Future

CHICAGO, July 25—With small losses in sales volume during the past ten days, as compared to the high spot for the month, business with the Chicago dealers is holding much better than was hoped. Sales during July have reached a high mark for the dull season and many dealers are of the opinion that August will produce business that will carry that month beyond its average volume. J. V. Lawrence, vice-president of the Henry Paulman Co., Pierce-Arrow distributors in Chicago territory, summing up the automobile situation said:

"Good business is going to continue up to about Sept. 15. About that time I look for an increase in sales to last for two months. I believe that we will sell more automobiles from Sept. 15 to Nov. 15 than we have ever sold before during the same period of the year. My judgment is that December will be dull."

# American Car Wins French Classic

## Duesenberg, Driven by Murphy, Shows Way to Europeans

De Palma Second in Thrilling Road Race—Flying Stones Force Two Out

### How They Finished in French Grand Prix

Driver	Car	Place	Time
Murphy	Duesenberg	1	4:07:11
DePalma	Ballot	2	4:22:10
Goux	Ballot	3	4:28:38
Dubonnet	Duesenberg	4	4:30:09
Boillot	Talbot-Darracq	5	4:35:47
Guyot	Duesenberg	6	4:43:13
Wagner	Ballot	7	4:48:01
Guinness	Talbot	8	5:06:43
Segrave	Talbot-Darracq	9	5:08:06

By cable to AUTOMOTIVE INDUSTRIES

PARIS, July 25.—Jimmy Murphy, an American driver, piloting an American-made Duesenberg car, carried the Stars and Stripes to victory to-day in the post-war renewal of the classic French Grand Prix for cars with a piston displacement of 183 cu. in. (3 litres). It was the first big European race in which an American team had taken part. The distance was 321.78 miles.

Ralph De Palma, veteran American pilot, finished second, fifteen minutes later, in a Ballot. He has flashed past the stands in the lead, lap after lap, on the Indianapolis speedway in the American classic, in the same French car, but not to victory.

The race was largely a duel between Duesenbergs and Ballots. Six of the nine cars which finished carried the hopes of these two makers. There were two Talbot-Darracqs and one Talbot. The Ballots took second, third and seventh places, and the Duesenbergs first, fourth and sixth. Boillot in a Talbot-Darracq finished fifth, and the Talbot-Darracq was ninth and a Talbot eighth.

The race, on the outskirts of Le Mans, 30 times around a fast triangular course measuring 10.7 miles, was hotly contested from the first lap to the last. In the early circuits Joe Boyer, in a Duesenberg, and Jean Chassagne, in a Ballot, furnished many of the thrills. Mechanical trouble put them out near the end.



JIMMY MURPHY

Jimmy Murphy, who won the French Grand Prix for America in a Duesenberg, is one of the latest American drivers to spring into fame. He is a product of the Pacific Coast and began his racing career as mechanic for Eddie O'Donnell and later with Eddie Rickenbacker. He drove a Duesenberg in the Indianapolis races this year and finished fourth.

Boyer and De Palma ran a dead heat for first place in the initial lap, with Chassagne and Murphy neck and neck in second place. The other leaders, in order, were Wagner, Guinness, Boillot, Guyot and Dubonnet. In the first lap Wagner had clutch and carburetor trouble.

Murphy and Boyer were in the lead in the second lap, followed by Chassagne and De Palma. On the third lap the two leaders were unchanged, but Chassagne went into third place ahead of De Palma.

The cars stood in this order until the end of the sixth lap, when Boyer stopped to look at his wheels and Chassagne went into second.

At the end of the seventh Murphy stopped to change tires and take on gas as a precaution, giving Chassagne the lead. The order up to that time was, Murphy, Chassagne, Boyer, Guyot and De Palma.

While Murphy was at the pits for gas and tires, Boyer raced into second place, but Murphy soon overtook him and pressed hard after Chassagne but the Ballot held the lead until the seventeenth lap. Then Chassagne went to the pits with his gas tank leaking badly from a puncture made by a flying stone. This accident forced him to leave the track and Murphy went into first place again

(Continued on page 197)

## N. A. C. C. in Split with Underwriters' Body

Severs Relations with Chicago Laboratories Over Question of Car Grouping

NEW YORK, July 27.—The National Automobile Chamber of Commerce has definitely severed relations with the Underwriters Laboratories at Chicago, an adjunct of the Underwriters Association. The last straw was the determination of the Laboratories to group cars according to mechanical construction.

The activities of the Underwriters Laboratories are regarded as too detailed. The inspections interfere with the routine of factory production and result in classifications which are illogical. Parts makers who do not submit to the laboratory tests do not get ratings and as a consequence a car may be unfairly listed because not all of its parts have been supervised, although they may be just as good or better than those inspected by the laboratories.

Few accidents to-day are due to faulty construction and automobile makers feel that nothing is gained by the tests in the Underwriters Laboratories. The high insurance rates are the result of over-valuation and failure to take into consideration the moral hazard. This virtually puts a premium on the destruction of motor vehicles.

## Rickenbacker Enters Manufacturers' Field

(Continued from page 187)

in the automobile industry and has been associated with Everit and Flanders practically since the beginning of the business. Cunningham helped Alexander Winton build his first car and was chief assistant to Henry Ford when he built the old "999." He had been Ford branch manager in Detroit and continued as consulting engineer until the E.M.F. organization was started when he joined this group. His last position was that of sales engineer in charge of production in the Maxwell-Chalmers Co. Since Flanders left Maxwell-Chalmers Cunningham has been devoting his entire attention to perfecting the Rickenbacker car.

Hood has had a similar history. He has been noted as a purchasing agent in the automobile field and started as assistant purchasing agent of the E.M.F. group. He later held the same position with the Studebaker Corp. and then became purchasing agent of the Maxwell-Chalmers. His position in the new concern will be that of purchasing agent.

## Willys Passes Peak of Output, Is Belief

**Orders for 5-Day Working Schedule Posted—August Production 6500**

TOLEDO, July 26—Willys-Overland has passed the peak of sales for the present season, it is believed by officials at the plant here, as orders were posted on Monday calling for five-day working schedule and lowering of production for next month.

The mark set for July was 12,000 cars. This has been cut to 10,500 cars, and August mark set at only 6500. The September schedule is 2750. These are only tentative, and if the trade continues as brisk as it has been during the last few weeks they will have to be revised upward.

The sales for the present week will probably temper the schedule for next month. Rarely has Overland operated extensively during the summer months.

Last week hundreds of men were laid off and during the next ten days the force will probably be cut by 2500 men. It is planned to keep a normal force of about 5000 men at work during the fall months.

President John N. Willys declared last week that the operations of the company had been so successful the last few weeks that financially it was now "out of the woods" and that it would go forward in fine shape.

He said that bank loans would be reduced on August 1 by a substantial payment in cash. The company's statement shows a cash balance on hand of approximately \$10,000,000, which will go far towards retiring the \$21,000,000 of loans. The loans were due in May but were extended until November.

It is thought by that time the plans of the creditors' committee will be ready and that a bond issue will be floated as a part of the clean-up for the loans and strengthening of the financial structure of the company.

## BOSTON 'SAFETY WEEK' WILL FOLLOW BIG CONVENTION

BOSTON, July 26—Motor accidents and how to prevent them will take a prominent part in the discussions of the annual convention of the National Safety Council, which this year will have its meeting at Boston. Governor Channing H. Cox has given the officials the use of the State House and there will be some 20 meetings every day in the committee rooms at the capitol, and also on Boston Common will be staged some interesting features relative to accidents. There will be meetings also in some of the other cities in the State. Plans will be worked out for a Safety Week in Boston in which everyone will be asked to take part.

## Automobile Men Buy Fletcher Bank Stock

INDIANAPOLIS, July 25—Five men prominent in automobile industrial circles of Indiana are in the group of stockholders which has acquired the interests of Stoughton A. Fletcher in the Fletcher American National Bank, leading financial institution of this State, according to announcement by the bank, made public to-day. They are Carl G. Fisher, president Indianapolis Motor Speedway and the Fisher Automobile Co.; James A. Allison, president Allison Engineering Co.; Walter Marmon, president Nordyke & Marmon Co.; Edward G. Sourbier, president Stutz Fire Engine Co.; Lucius M. Wainwright, president Diamond Chain & Mfg. Co.

"It is common knowledge that I have invested a large part of my personal worth in the Midwest Engine Co., which like many other large manufacturing concerns has had its share of troubles due to the present industrial depression," said Fletcher, in connection with the announcement of disposal of his holdings.

## Automobile Excise Tax to Be Retained

**Little Chance of Abolition—Federal License Fee May Also Be Added**

WASHINGTON, July 26—Outlook for elimination of excise taxes on automobiles is not particularly encouraging at this time when the House Committee on Ways and Means is framing a new revenue bill. The Treasury will recommend the abolition of the excess profits tax, reduction of transportation tax, reduction in surtaxes, elimination of so-called "nuisance" taxes and other minor changes. The President has been advised that the House will enact the tax bill by August 6, but House leaders say it will be fortunate if the bill is reported out of committee by August 15. Indications are that a Federal automobile license tax will be approved by the Ways and Means Committee.

The United States Chamber of Commerce advised the Ways and Means Committee that a canvass of business throughout the country showed that the second largest vote on taxation matters was for the repeal of the war excise taxes ranging from automobiles and their accessories to wearing apparel.

The sales tax which the National Automobile Chamber of Commerce had endorsed, has been definitely shelved by the House Committee on Ways and Means. As there will be no need for extra funds to meet a soldiers' bonus, the sales tax will not be necessary, though Congress must devise methods to raise \$4,000,000,000.

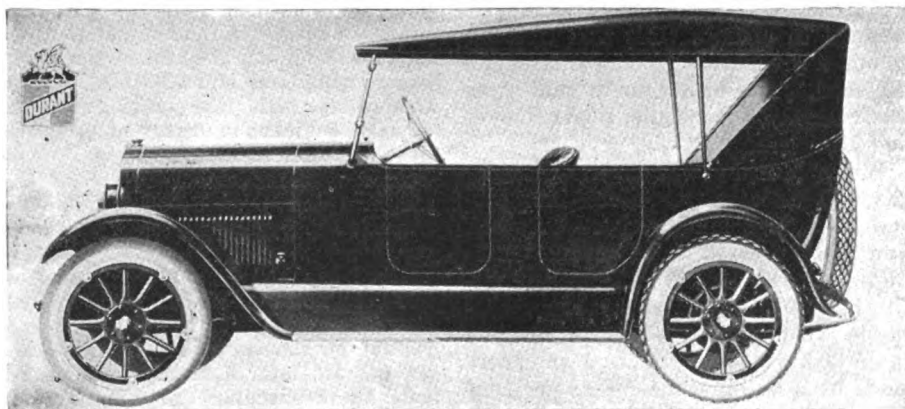
It is known that the Ways and Means Committee is likely to accept the program of tax revision, as submitted by the Treasury, because it affords the easiest way out of a difficult situation. The House Committee will undoubtedly amend the Treasury plans, but the belief exists that the recommendations of the Administration will be given as the views of the committee. The Senate Finance Committee conducted extended hearings on the sales tax last spring.

The Treasury believes it possible to enforce a Federal automobile license tax which would be paid directly by the consumer or the user.

## Rush Work on Verlinden Plant of Durant Motors

LANSING, MICH., July 25—Rapid progress on the Verlinden plant of the Durant Motors Corp. is being made. The Christman Construction Co., which has erected four cement towers for work, is now completing the second floor of the main plant and its various units. Steel for structural work on the warehouse and the enameling plant is on the ground and work on this is starting to-day. The Christman company is beyond schedule on the plant and from present outlook will turn over the plant on Nov. 1.

## New Durant Car and Nameplate



Durant Four, which will sell for \$890 and will be on market about Aug. 1, now on display in Long Island City

## 203,000 Gas Tractors Output for Last Year

### Department of Agriculture Makes Statistical Report on Farm Implements

WASHINGTON, July 26—Production statistics of farm implements as compiled by the Bureau of Public Roads, United States Department of Agriculture, show that there were 203,000 gas tractors manufactured during the year 1920, with a value of \$193,000,000. These figures represent the output of 90 firms and 162,988 tractors with a domestic sales value of \$161,896,000, while 29,143 were foreign sales valued at \$30,850,000.

The statistics regarding farm implements were compiled from reports of 583 manufacturers of tractors, farm vehicles and other operating equipment. It is believed that at least 99 per cent of the manufacturers answered the questionnaire sent out by the Department of Agriculture. The reports of a considerable number of firms covered the fiscal year ending in the latter part of 1920 or the early part of 1921.

The reports of such firms do not represent exactly their activities for the calendar year of 1920, but in every case the report covered an entire year, and it is believed that for all practical purposes the totals may be considered representative of the industry for the calendar year. The total value of implements manufactured was \$537,000,000. The export of tractors represents a large proportion of the total of foreign trade in farm implements, though there were 85 firms manufacturing horse-drawn vehicles. The total value of 449,095 vehicles was estimated at \$42,423,000, of which \$40,929,000 were domestic sales.

### New Buick "Four" Will Be Marketed for \$975

FLINT, MICH., July 27—The Buick Motor Co. announces the following prices on the various models of its new four-cylinder car: Touring, \$975; roadster, \$935; coupe, \$1,475; sedan, \$1,650. The engine is of the valve-in-head type, has a three bearing crankshaft and cylinder dimensions of 3 3/4 x 4 1/4 in. The oiling system is a combination of pressure and splash and the cooling water is circulated by a pump. The Marvel carbureter is standard equipment and it is provided with a new automatic heating system which is interconnected with the throttle so that the amount of heat supplied is dependent on the speed of the engine.

The clutch is of the multiple dry disk type. The front universal is incorporated with the gearset and lubricated from it. Hotchkiss type drive is used and the springs are semi-elliptic all around. The wheelbase is 109 inches. The body is finished in black with a white stripe on the touring model. The shipping weight is 2380 lbs.

### GAS PRICES SOARING, COMPANY INSTALLS OWN PLANT

NEW YORK, July 27—The Doehler Die Casting Co. of Brooklyn is installing a gas manufacturing plant of its own because of the high price it has to pay for its supply from gas companies. The Doehler company figures that it can make its own gas at a cost of 40 cents a thousand cubic feet. Its bill for gas last year was \$117,000.

The Doehler company was one of a number of manufacturing concerns which some time ago petitioned the Public Service Commission for a sliding scale of rates for industrial consumers of gas, the charge per cubic foot to be reduced as the volume of gas consumed was increased. No action has yet been taken, but the Doehler company doesn't intend to take any chances.

## Buyers' Strike Asked to Cut Tractor Price

### Georgia Commission Tells Farmers Manufacturers Must Reduce Farm Implement Charges

ATLANTA, GA., July 26—In a statement that has been widely published in Alabama newspapers, M. C. Allgood, Commissioner of Agriculture for that State, calls upon the farmers to declare a buyers' strike against tractors and other power farming machinery until the manufacturers reduce prices. Allgood, in his statement, declares that he is taking this matter up with other agricultural departments in the various southern states with the end in view of effecting an organization and bringing the subject to the attention of Congress for an investigation.

The statement declares that while agricultural products are bringing only a small fraction of the prices paid during the war, farm implements are now selling at 100 per cent more than the prices existing before the war began.

### General Motors, in Educational Booklet, Tells Stockholders Company's Magnitude

NEW YORK, July 25—The General Motors Corp. is mailing to stockholders with the Aug. 1 dividend checks, an educational booklet telling them something of the magnitude of the corporation. Few persons, even among the stock-

holders, have any definite idea of the wide ramifications of the great enterprise. The following table shows sales of passenger cars and commercial vehicles by divisions for the past four calendar years:

Years Ended Dec. 31	1920	1919	1918	1917
<b>Passenger cars:</b>				
Buick .....	111,215	115,405	74,856	117,300
Cadillac .....	19,826	19,801	12,279	19,692
Chevrolet .....	126,397	127,362	81,435	109,111
Oakland .....	36,155	51,901	24,110	33,951
Oldsmobile .....	25,713	33,345	18,822	22,045
Scripps-Booth .....	8,779	8,128	4,008	2,545
<b>Commercial cars:</b>				
Chevrolet trucks ...	13,651	6,098	384	2,664
GMC trucks .....	5,137	7,729	8,997	5,861
Oldsmobile trucks ..	8,239	7,782	30	15
<b>Totals:</b>				
Passenger cars ....	328,085	355,942	215,510	306,644
Commercial cars ...	27,027	21,609	9,411	8,540
Miscellaneous* .....	36,421	28,607	21,913	11,319
<b>Grand total:</b>				
Cars, trucks, tractors	391,533	406,158	246,834	324,503

\*Consists of tractors; McLaughlin, Chevrolet and Olds cars produced and sold in Canada, and therefore not included in reports to National Automobile Chamber of Commerce; and also Buick and Cadillac commercial cars.

The corporation has 78 divisions, subsidiaries and affiliated companies in 35 cities of the United States and Canada. These plants embrace more than 2000 acres of land upon which there are over 1500 buildings with a floor space of more than 32,000,000 sq. ft. The Buick plant at Flint, which covers 200 acres, is 1 1/2 miles long and 1/4 mile wide. The new Cadillac plant at Detroit covers 46 acres. The central office building in Detroit is the largest office building of its

kind in the world and contains 1,400,000 sq. ft. of floor space.

In addition to the manufacturing plants, the various divisions have large investments in factory branches, service stations and retail stores in all the principal cities of the United States and Canada. Chevrolet alone has 38 retail stores. Every city of importance in the world is covered by the General Motors Export Corp. and other foreign organizations of the corporation.

## Fail on Agreement on Motor Gas Range

Conferees Leave Matter to Results  
of Experimental Work Now  
in Progress

WASHINGTON, July 23—Inability of the conferees attending the meeting of the Technical Committee on Standardization of Petroleum Specifications to agree, left the determination of the new distillation range of motor gasoline to the results of experimental work now in progress. The suggestion that the present ninety degree point should be raised slightly was objected to on the ground that the specification should be retained unchanged until such time as an entirely new grade of gasoline can be used. The committee plans to study the specifications for aviation gasolines and for all grades of greases during the coming year and, therefore, did not set any specifications for these items.

The committee agreed that the acid heat test for gasoline and the cold test for steam cylinder and black oils were unnecessary, but the fire tests for lubricants should be continued in specifications as a check on sampling. It was decided that the new American Society for Testing Materials Methods should be adopted, though due consideration should be given the fact that these methods are still in a tentative stage. More definite color standards at a corrosion test for gasoline were also discussed.

Of interest to automobile manufacturers and owners was the belief expressed by the conferees that further definiteness would be desirable in the test for emulsifying properties of lubricants. It was shown that the words "light," "medium," etc., as applied to these oils have different meanings when these oils are used for different purposes, and a system of numbering was advocated to replace the present names for the grades. A slight broadening of the viscosity limits was suggested in order to allow several commercial grades of oil to qualify under the specifications, and a relaxing of the color and pour test standards was advocated for the same reasons.

The committee will study the suggestions submitted at the conference and recommend action by the technical committee and the interdepartmental committee.

## Chemical Fuel Is Cited by Federal Commission

WASHINGTON, July 25—The Federal Trade Commission has cited Chemical Fuel Company of America, Inc., Louisville, Ky., in complaint of unfair competition in the sale of a motor fuel in interstate commerce. Thirty days are given the company in which to file answer.

According to the complaint, this company sells a motor fuel known as tri-

oxalene, which, it is stated, is advertised as having been thoroughly tested by the United States Government Bureau of Mines, and has fulfilled every claim made for it as a fuel for all classes of aircraft, seaplanes, etc., and is the most perfect automobile fuel.

The complaint alleges that these representations are false and misleading in that no official test of tri-oxalene has been made by the Bureau of Mines, and that chemical engineers in that bureau who made unofficial tests of this product did not regard it as having any commercial merit or being of scientific interest.

This citation is made after a preliminary inquiry, and initiates a proceeding to try out the case on its merits, the hearings to commence on Aug. 31.

## Slow Production May Cancel Many Orders

PHILADELPHIA, July 26—A canvass of eight suburban boroughs and towns shows that while new automobiles are, in most instances, selling well, there is now danger of some of the sales being cancelled because of slowness in factory production. In not a few instances customers who have ordered cars and found they could not be delivered for many weeks, if not exceeding two months, have stated their intention, in case of non-delivery within a specified time, to cancel the order and obtain a car of another make whose factory is producing.

While the sale of accessories, with the exception of such articles as greases, windshield cleaners, and the like, is absolutely flat in most of the dealers' places as well as garages, tires are beginning to show more movement, except in far-outlying points. Trucks are slow and nothing much is being done in the line of trailers.

## Blame Gas Tanks for Coast 'Plane Crash

Should Not Have Been Carried  
at Base of Wings, Say  
Aviators

BERKELEY, CAL., July 26—Placing of the gasoline tanks at the junction of the wings with the fuselage is held by aviators of this part of the country to be responsible for the total destruction of the Jacuzzi monoplane, built in Berkeley, at Modesto, Cal., July 14, with the accompanying deaths of the four men who were riding in the plane.

Harold L. Coffee, of Oakland, former overseas aviator, was piloting the Jacuzzi monoplane when it fell. With Coffee were Giocondo Jacuzzi, brother of the inventor of the monoplane and chief financial backer of the Jacuzzi Monoplane Co. of Berkeley; A. Duncan McLeish, former army aviator and attorney for the monoplane manufacturing company, and John A. Kauke, service supervisor of the Cleveland Tractor Co., also of Berkeley. All were dead when spectators reached the fallen plane.

### Eyewitnesses Tell Story

The gasoline tanks were carried at the bases of the wings, and eye-witnesses of the accident say that the first sign of trouble was the explosion of one of these tanks, when the wing supporting it literally leaped from the side of the plane. A second later the other wing was seen to fall as the other gasoline tank exploded. The Jacuzzi company had been warned by local fliers prior to this flight that if either one or both of these tanks exploded both wings would be blown from the machine and the plane would be helpless in the air.

### Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for June and Twelve Previous Months

	Month of June				Twelve Months Ending June			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes .....	4	\$28,700	3	\$19,500	63	\$459,394	66	\$465,955
Airplane parts....	..	9,443	..	7,837	..	643,270	..	194,440
Commercial cars..	2,697	4,216,502	418	531,234	24,356	41,577,684	17,598	29,511,955
Motorcycles .....	2,557	689,485	348	99,353	35,041	9,550,022	24,505	7,731,298
Passenger cars...	12,733	14,486,362	1,964	2,057,490	115,519	125,384,025	84,430	103,786,970
Parts, not including engines and tires .....	..	7,429,188	..	2,211,528	..	66,292,652	..	67,409,570

### Engines

	Month of June				Twelve Months Ending June			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas..	4,108	\$673,619	542	\$125,992	39,413	\$6,062,901	14,173	\$2,662,803
Marine, gas.....	1,084	303,488	435	166,465	10,231	3,457,524	7,023	2,636,768
Stationary, gas..	2,832	437,115	965	295,542	28,584	4,385,447	23,629	4,669,795
Tractor, gas.....	1,664	1,573,236	32	111,902	20,186	19,304,891	13,398	13,557,202
Total.....	9,688	\$2,987,458	1,974	\$699,901	98,414	\$33,210,763	58,223	\$23,526,568



## Johnson Will Direct G. M. in Great Britain

Appointed Managing Director—  
Succeeds J. H. Willson—  
Raskob and Sloan Return

(By Cable to AUTOMOTIVE INDUSTRIES)

LONDON, July 23—Walter H. Johnson, managing director of Delco-Remy, Ltd., has been appointed managing director of General Motors, Ltd. and will have charge of the distribution of the entire General Motors line in England.

### Appointment Not a Surprise Here

NEW YORK, July 26—Appointment of Walter H. Johnson as managing director of the British subsidiary of the General Motors Corp. did not come as a complete surprise. He will succeed Joseph H. Willson, who retired from the service recently and who is now in the United States.

Johnson handled the Delco and Remy products in England before the organization of Delco-Remy, Ltd., something over a year ago and when that company was formed was placed at the head of it.

When the bottom dropped out of the market for automobiles in England, General Motors was heavily overstocked in all its lines as the possibilities of the market had been greatly overrated. Liquidation is now progressing rapidly, however, and the outlook is gratifying.

Johnson came to the United States on the Aquitania with J. J. Raskob, vice-president in charge of finances, and Alfred P. Sloan, Jr., vice-president in charge of operations, who had been abroad on business for about a month. They were accompanied by Christian Lie, manager of the Paris branch of the General Motors Export Corp.

Sloan and Raskob spent all their time in London and Paris where they made a careful analysis of industrial and business conditions. They were gratified at the recent turn of events in both England and France.

Lie, who gained fame in the Ford organization, is making his first visit to the United States in two years. He will remain here about two months. Johnson will stay in this country only a fortnight, studying the General Motors organization. Willson, who is succeeded by Johnson, was manager of the Chevrolet branches in Brooklyn and New York before he joined the General Motors Export Corp. as assistant sales manager.

## Murphy in Duesenberg Wins Grand Prix Race

(Continued from page 193)

in the twenty-second circuit. He held it until the finish but it was no easy victory.

In the 26th lap Guyot was running second and seemed likely to hold that position until the finish, but a stone, hurtling up from the road, intervened.

The missile hit his mechanic on the head and so nearly stunned him that when clutch trouble developed he could not crank the car.

This brought one of the dramatic incidents of the race. Arthur Duray, watching the contest as a spectator in the grandstand, realized what had happened, vaulted the fence and took his place beside Guyot as a mechanic.

The mishap dropped Guyot from second to sixth place, however, and gave DePalma, running with a leaky gas tank, the opportunity for which he had been hoping. The American veteran went into second place and never was headed.

Boyer went out on the 18th lap with a broken connecting rod, while trailing Murphy. The only other eliminations were Small in a Mathis and Thomas in a Talbot-Darracq, who was forced out two miles from home when a stone pierced his oil tank. Nearly all the drivers were cut by loose stones from the roadway.

The entire Sunbeam, Talbot and Talbot-Darracq teams were withdrawn a week before the race but 24 hours before the start two Talbots and two Darracqs were re-entered.

The Duesenbergs had a slight amount of tire trouble but the Ballots with the new Pirelli straight side cord had none. The Dunlop straight side cords used by the Talbot Darracq proved a failure and had to be changed during the race for Oldfields and Michelins.

The course was the shortest ever used in France for the Grand Prix and did not stand up to the speeds which can be made by modern cars. There were no accidents, however. Although the race was run under the auspices of the Automobile Club of France, the LeMans club played a prominent part in the arrangements and hopes to get permission from the Government to transform the road into a permanent speedway. It is not intended to close it to ordinary traffic but to provide permanent stands, pit, barricades and bridges. Half the course was a national highway, very wide and almost straight with a maximum grade of 3 per cent.

All the cars were equipped with 8-cylinder ahead engines except Goux's Ballot which had 4 cylinders of 2 litres piston displacement, and the Mathis which had a 4-cylinder motor of 1½ litres displacement. The smaller Ballot was entered, however, only because of the wrecking of the 8-cylinder used by Renard, who was killed in practice. It finished third and its success promises well for the 2-litre Indianapolis race in 1923.

The Ballots were on the same general lines as those entered at Indianapolis. DePalma drove the same machine he used in the American race except for a new engine.

The Talbot and Talbot-Darracqs were built along the same general lines after the design of Louis Coatalen.

The Duesenbergs differed in several respects from the European cars. They had no Hotchkiss drive, they had hydraulic brakes on all wheels, the total weight was lower and they had a left hand drive for a race run clock-wise.

## METAL MARKETS

UNNOTICED at first, because overshadowed by the financial highlights which featured the now famous Henry Ford interview, one of the Detroit passenger car builder's remarks is now coming in for considerable discussion by steel producers and buyers, because of its vital bearing on the market. Mr. Ford stressed the fact that the Ford Motor Co. was no longer buying its supplies months ahead, but from month to month. Producers argue that, if this method of steel buying were to become a permanent and general custom it would necessarily bring about enhanced costs. In the last few months steel mills have had to take orders of the hand-to-mouth buying sort, and were glad at that to get them. But buying of this sort amid the abnormal conditions of the last few months is one thing and a permanent doing away with contracts for a reasonable time ahead quite another. The entire structure of the steel industry is reared on a sufficient backlog of orders to enable mills to anticipate their own wants in the way of ore, coke, limestone and other raw materials. Mr. Ford himself placed an order the other day for 135,000 tons of iron ore for his River Rouge furnace; if he did not provide himself with the ore necessary to keep his furnace in blast in winter time, while lake navigation is open, he would have to pay rail transportation, thus adding considerably to the cost of every ton of iron. Non-integrated steel mills are no less compelled to anticipate their wants on the basis of contracts in sight, if they are to produce economically. Only a few days ago such sheet mills had opportunity to buy sheet bars at a considerable saving, but without any backlog of sheet orders on their books they naturally felt timid. Automotive purchasing agents, no less than steel producers, appear to be of the opinion that, once the steel market has settled down to a more dependable course than that which has been in vogue of late, there will be a return to the system of placing orders for reasonable tonnages a sufficient time ahead to warrant mills in operating on a dependably economic basis which will redound to the consumers' benefit. For the time being the market remains in a plastic condition, with much talk of further downward revision in "official" prices, but a steady increase in the volume of demand. While further announcements of price reductions are by no means precluded and may come over night, the market generally may first permit competition to reveal more clearly whether such cuts are necessary and what their extent should be.

Pig Iron.—Blast furnace interests are beginning to assume a more firm attitude and bids below the market have less chance of acceptance than heretofore.

Steel.—The Trumbull Steel Co., Warren, Ohio, is rolling a substantial order of strip steel for Ford Motor Co.'s account. The latter interest as well as other automotive manufacturers figure in extensive bolt and nut transactions in the Cleveland market. As a result, the market for nuts and bolts has turned firmer. In the sheet market, where there are numerous reports of price concessions, the situation seems to be that mills which can make immediate shipment usually obtain full or close to full prices, while on deferred shipments concessions of \$2 a ton and upward are more or less frequent. Demand for full finished automobile sheet is slightly lower.

Tin.—Cheapness of this metal has failed to bring about better demand.

**BANK CREDITS**

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

The outstanding feature in the credit world last week was the reduction of rediscount rates by four of the Federal Reserve banks and similar action by the Bank of England. The announcement was made on Wednesday by the New York, Boston, Philadelphia and San Francisco banks that the new rate for all rediscounts and advances had been fixed at  $5\frac{1}{2}$  per cent to take effect on Thursday, July 21. This is the third reduction announced in the current year by the New York Federal Reserve Bank. This action reflects the improved credit situation and is evidence of the belief by the authorities in control of the Reserve Board's policy that money rates are not likely in the near future to show any sustained and decided firmness. On Thursday the Bank of England also announced a reduction of its rediscount rate to  $5\frac{1}{2}$  per cent, reflecting the improved credit situation in England.

The lower discount rates were made possible by the continued improvement in the reserve position of the Federal Reserve System. During the week gold reserves of the system increased \$15,554,000, and total discounts declined \$17,831,000 and Federal Reserve notes in circulation \$39,220,000. Federal Reserve notes in circulation, \$2,564,613,000, were at the lowest point since Aug., 1919. Total earning assets of the system declined \$35,392,000, while deposits declined less than \$1,000,000. As a result of these changes, the ratio of total reserves to deposit and Federal Reserve note liabilities combined increased from 61.6 per cent to 62.5 per cent, and the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, increased from 78.9 per cent to 80.6 per cent. The improvement was even more marked in the case of the New York Federal Reserve Bank, where the reserve ratio increased from 68.7 per cent to 70 per cent and the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, increased from 102.8 per cent to 105.9 per cent. Gold reserves of the New York Bank increased \$13,059,000, while Federal Reserve notes in circulation declined \$8,947,000 to the lowest point since July, 1918.

In spite of the advancing crop moving demands, there are distinct signs of easier money. This became really apparent in the local market following the announcement by the New York Federal Reserve Bank of the lowering of its rediscount rate. Call money ranged from 5 to 6 per cent as against a range of  $5\frac{1}{2}$  to  $6\frac{1}{2}$  the previous week. For the first three days of the past week a uniform rate of 6 per cent was quoted, but on Thursday, following the announcement of the rediscount cut,  $5\frac{1}{2}$  per cent became the renewal rate for the re-

mainder of the week. On the "outside" market,  $5\frac{1}{2}$  per cent money was said to be available at all times, and near the close of the week call funds could be obtained for  $4\frac{1}{2}$  per cent. Time money continued unchanged at 6 per cent to  $6\frac{1}{2}$  per cent for all maturities from sixty days to six months, until Thursday, when loans secured by mixed collateral declined to 6 per cent and "all-industrial" loans declined to  $6\frac{1}{2}$  per cent. Trades were few, however, and unimportant. Commercial rates were also affected by the easier trend in the money market. Sixty to ninety days' indorsed bills and prime six months' paper were quoted at 6 per cent to  $6\frac{1}{4}$  per cent, as against  $6\frac{1}{4}$  per cent to  $6\frac{1}{2}$  per cent the previous week. While there was a good demand, the supply of high-grade paper was light and was absorbed in the main, it was said, by out-of-town banks.

**Ford August Output to Set New Record**

DETROIT, July 26—Production schedules for August, breaking all previous monthly records, were announced by the Ford Motor Co. to-day.

During August 109,700 cars and trucks are to be made in the United States. The best previous figure is July production, expected to be 109,000. Previous to July, the figures are June, 108,962, and May, 101,464.

The figures given are for the United States alone. The Manchester (England) and Canadian Ford plants expect to increase from 225 cars daily to 300 cars daily during August. No definite schedules have been prepared for these plants as yet, however. This would bring the total world's production of Ford cars and trucks for August to 117,800, surpassing all previous marks.

In addition to the car and truck schedules, it is announced at the River Rouge tractor plant that 200 tractors daily are scheduled for August, or a month's production of 5400 tractors.

Repair parts which would make approximately 150 cars daily are to be produced. The motor production schedule calls for 4200 motors daily.

**GASOLINE STOCKS GROW**

WASHINGTON, July 26—Production of gasoline continues to increase as refinery statistics issued by the Bureau of Mines show that the daily average production for May was 14,469,931 gallons, which is 262,758 gallons larger than the production for the preceding month, and an increase of 1,129,640 gallons over the daily average production for the year 1920. Stocks on hand at the refineries were increased by 55,272,887 gallons over stocks of April 30. The May exports of gasoline amounted to 39,858,771 gallons, while domestic consumption amounted to 354,263,486 gallons. The daily average consumption for the month of May shows a decrease of 318,120 gallons from that for the month of April, also a decrease of 1,703,413 gallons from daily average of May, 1920.

**FINANCIAL NOTES**

General Motors Corp. bank loans now approximate \$66,000,000, a reduction of about \$16,000,000 from notes payable of \$82,000,000 as of December 31 last. Cash on hand is in excess of \$50,000,000, compared with \$47,608,000 seven months ago. Inventories are below \$153,000,000, or \$11,000,000 less than at the beginning of the year. While earnings this year are likely to show a considerable falling off from 1920 net profits of \$37,750,375, or \$1.58 a share on the common after all charges and preferred dividends, indications are that the company's financial position will be a great deal stronger at the end of 1921 than at the close of 1920.

Pierce-Arrow Motor Car Co. shows an operating loss of \$828,866 for the three months ended June 30, after allowing for maintenance and depreciation. This compares with a profit of \$1,432,706 in the corresponding quarter of 1920. Allowances for Federal taxes and other items called for \$571,684 in the second quarter of this year, making a total deficit of \$1,400,550, compared with a surplus of \$705,779 in the three months ended June 30, 1920.

Mason Tire & Rubber Co., in a comparative balance sheet as of May 31, shows cash of \$13,947, against the figures of April 30, 1920, which were \$803,919. Accounts and bills receivable are \$707,722, against \$1,033,149 in April, 1920. Inventories are \$2,628,959, against \$2,245,654 the previous year. Bills and accounts payable amount to \$842,309, in comparison with \$405,228. The surplus is \$126,219, against \$651,538.

Willys-Overland, Inc., of Toledo, has applied for a temporary receiver for the Overland-Houston Co., local distributors of Overland cars. An injunction has been issued restraining the officers of the company from interfering with the assets. Willys-Overland, Inc., the parent company, asserts that it holds a lien on the capital stock of the other concern, the assets of which are estimated at \$130,000.

Sims Magneto Co., in a comparative balance sheet as of December 31, shows cash of \$154,836, as against \$101,858 for 1919. Notes and accounts receivable \$629,394, against \$192,963. Inventories are \$912,842, against \$683,451. Notes and accounts payable \$1,221,908, against \$332,979. The surplus figures are \$590,054, against \$588,393.

Nash Motors Co. has declared a dividend of \$6 a share on the common and a regular quarterly dividend of \$1.75 a share on preferred, both payable August 1.

Wholesale Tire Co., New York, has filed schedules in bankruptcy, listing liabilities of \$55,778 and assets of \$20,323.

Stewart-Warner Speedometer Corp. has declared the regular quarterly dividend of fifty cents on the common stock, payable August 13 to stock of record July 30.

International Harvester Co. has declared a regular quarterly dividend of \$1.75 on the preferred stock, payable September 1 to stock of record August 10.

**RECEIVER FOR OHIO TIRE**

TOLEDO, July 27—William J. Slater, Akron, has been appointed receiver for the Ohio State Rubber Tire Co., Sandusky, by Federal Judge Killits here. Bankruptcy proceedings were started here against the company by Edward Maurer, Inc., of New York, when they filed a bill of complaint.

## MEN OF THE INDUSTRY

L. M. Bradley, of New York, has been appointed sales manager of the New Era Spring & Specialty Co., Grand Rapids, Mich. Mr. Bradley has been in the automotive industry for twenty-two years, his activities dating back to the steam car days. He has been connected with the Willys-Overland, Studebaker, U. S. Motors, R. & V. Knight and for four years was assistant general manager of the old American Motor Car Manufacturers Association of New York, which was formed by Henry Ford to combat the famous Selden patent suit. He has been advertising manager of the "American Motorist" and for three years general manager of the Motor and Accessory Manufacturers Association at New York. He is a former newspaper man.

Major Irving C. Moeller, who has been manager of the Cleveland branch of the Mack International Motor Truck Corp., has been transferred to the general offices of the company in New York. He was guest at a farewell dinner given in Hotel Winton by the Cleveland Automotive Trade Association, of which he was vice-president. M. F. Parsons, manager of the Syracuse branch, Major Moeller's successor, was elected a trustee of the association.

Frank H. Golding, formerly general manager of the Holmes Automobile Co., Canton, Ohio, has been appointed general manager and treasurer of the Fox Motor Car Co. H. O. Swanson, formerly in the service and engineering departments of the H. H. Franklin Co., makers of Franklin air-cooled cars, has been appointed chief engineer. The new plant with 100,000 square feet of floor space is capable of producing 2500 air-cooled cars a year.

Earle S. Barber, who resigned as Director and Sales Advertising Manager of Alfred Decker & Cohn, Chicago, has engaged in business as Earle S. Barber & Co., "Commercial Councillors." They will cover the various branches of business and will maintain a sales organization for obtaining distribution and maintaining efficient representation in five states—Illinois, Indiana, Iowa, Michigan and Wisconsin.

W. R. Hyde, for several years special Western representative of Hilo Varnish Corp., with headquarters in Chicago, will take over the New York and Pennsylvania territory, formerly covered by J. Frank Brown. The new territory, which is not new to Hyde, as he looked after it in former years, will offer a splendid opportunity for the development of business in the industrial field.

George R. Wright, who for the past eight years has been manager of the Philadelphia branch of the Chevrolet Motor Co., has been appointed distributor for the new Durant line in Philadelphia and the surrounding territory. The present home of the Oakland car at 918 North Broad Street has been leased by Wright for a term of years for the Durant.

George T. Briggs is again connected with Wheeler-Schebler Carburetor Co., Indianapolis, as general sales manager. Briggs was associated with the Sinclair Refining Co. as manager of the Automotive Division, and more recently as general manager of the Motorcycle and Allied Trades Association.

Arthur H. Lacey, formerly assistant director of engineering with the Hall-Scott Motor Car Co., and who is now a consulting engineer in Oakland, California, has taken larger offices where with increased facilities,

he states that engineering problems will be taken care of most efficiently.

Vance McCarty, one of the most prominent men in the leather belting industry, has been elected vice-president of the Chicago Belting Co. He leaves the Edward R. Ladew Co., Inc., of which he was vice-president.

K. H. MacQueen has been appointed assistant to the general manager of the Bearings Service Co., at Detroit. MacQueen was associated with the Bearings Service Co. at the time it was formed.

## INDUSTRIAL NOTES

Frank B. Anstead, president of the United States Automotive Corp., has announced the formation of the Fayette Painting and Trimming Co., a new subsidiary of the automotive corporation, with a capital stock of \$500,000 in common shares. The new company will engage in the painting and trimming of the bodies for the Lexington Motor Co., which is the principal subsidiary of the United States Automotive Corporation.

Bantam Ball Bearing Co. announces that widespread distribution has resulted in a demand for replacement bearings and the company has just added a replacement department to its organization. J. H. Kraus, in charge of this department, is now arranging with dealers throughout the country to carry a stock of various bearing applications for replacement service.

Positive Lock-Bolt Co. has purchased the entire assets of The Safety Nut & Bolt Co. The new organization is a \$250,000 Ohio corporation, with the following personnel: C. C. Murphy, president; J. N. Leatherman, vice-president; M. D. Neff, secretary; Edna B. Craft, treasurer; W. H. Burke, general manager; H. L. Jollay and Wm. F. Koehn, directors.

American Malleable Co., Owosso, Mich., has opened one furnace giving employment to 150 men. This makes the number of men now employed by the factory 300. The recent increases in business have come from the Buick plant which is increasing materially its production. The local plant furnishes several parts for the Buick car.

Collapsible Rim Corp., New York City, has announced full production of Standard collapsible rims in all the popular sizes. The rim is indorsed as being thoroughly practical and scientifically right. It operates in an entirely new manner and is said to relieve the motorist of all the annoyance that follows tire trouble.

American Motor Body Co. has filed plans for an addition and other improvements for the works of the Hale & Kilburn Corp. at Philadelphia.

Webster & Perks Tool Co. has sold its grinding and polishing stand and accessory department to the Hill-Curtis Co., Kalamazoo, Mich.

## CREDIT CONDITIONS BETTER

INDIANAPOLIS, IND., July 20—Credit conditions are improving materially, according to executives of the various automobile financing organizations of this city. Collections in every one of the companies now are approaching the 100 per cent mark.

## Interest Is Centered on U. S. Air Policies

### President Understood to Favor a Central Bureau of Aviation for Country

WASHINGTON, July 19.—Considerable interest is being manifested as to the air policy the Government may adopt in connection with the work of reorganizing the different departments, which is now well under way. There can be no question that difference of view obtain, but it is understood that the President is in favor of creating a central bureau of aviation, which might be established in some Government department rather than as an individual unit.

It is known to be the opinion of the Administration that a distinct aviation bureau would develop more creative genius as well as economy than is possible now under the present system of having different aviation services under various bureaus, such as the War, State and Post Office departments. There can be no doubt that study of the aviation problems has convinced the Government of the desirability of establishing a commercial aircraft industry on a paying basis, not only because of its importance to trade and business in peace times but because of its availability in times of emergency. Among the problems that have presented themselves, however, is that of maintaining production sufficient to encourage different concerns to engage in the industry. This, of course, would require the distributing of awards for aircraft, and it is stated that it has not definitely been determined how the Government may aid in this direction.

Plans for reorganization of the Government departments, while progressing, have not as yet reached a point where specific recommendations have been determined upon in regard to the establishing of a fixed air policy, but it is believed that the organization of a central bureau will result.

President Harding has nominated Capt. W. A. Moffett as Chief of the Navy Department's Bureau of Aeronautics with the rank of rear admiral. Capt. Moffett has been interested in aviation for several years and is at present in charge of the naval aviation here.

## JORDAN GOING CAPACITY

CLEVELAND, OHIO, July 26—Distributors here at a meeting at the factory of the Jordan Motor Car Co. were told that factory capacity for the next four months has been sold and that production will be maintained at the organization's highest average. The Jordan Co. during the quarter just ended shipped ten per cent more cars than in the same period last year, which was the peak of the automobile sales boom. Distributors reported fewer cars on their floors July 15 than at any previous time in the company's history. This is attributed to the sales increase which followed the price reduction in May.

# Calendar

## SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair, conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 23-Oct. 8—New York, Electrical Exposition, 71st Regt. Armory. Electric Equipment, Machinery and Vehicles.

Nov. 27-Dec. 2—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment. La Paellon de las Rosas. Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery. Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 5, 1921—Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

Sept. 14-15-16—Portland, Ore., Credit Convention Motor and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## RACES

July 25—Grand Prix, Le Mans.

Labor Day—Uniontown, Pa., Autumn Classic.

## No More Price Cutting, Says President Willys

TOLEDO, OHIO, July 26—In discussing the price question upon his arrival for a few days' consultation with factory officials, John N. Willys said:

"I have been asked several times lately about the future price situation. So far as we are concerned it is very simply answered; there have been one or two so-called second cuts on certain automobiles which in reality were just a slight trimming down of prices. When we decided to reduce our price we went all the way. The present extra price of \$695 on Overland is a reduction of approximately 33 per cent. We made this reduction because we wanted to get the benefit of big volume business and we are getting it.

"I am confident that the financial interests of the country will continue to do their best to support legitimate, hard working dealers in maintaining the proper stock of automobiles and I know the dealers who have automobiles on hand can sell them and are selling them.

"I believe, however, that a complete evolution in the method of selling automobiles is in progress. Dealers and distributors are conducting their business on sounder lines. They are systematically going after business and watching their costs in a way they never did before."

## 7 Goodyear Directors Elected in Dominion

TORONTO, ONT., July 26—The special general meeting of Goodyear Tire & Rubber Co. of Canada, for the purpose of electing seven directors under the new plan, four by common and three by preferred and prior preferred shareholders, resulted in the election of, for the common, A. H. Carlisle, E. G. Wilmer, G. M. Stadelman and P. W. Litchfield, and for the preferred, B. A. Thompson, of Nesbitt & Thompson, Montreal; J. A. McAllister, nominee of Dominion Securities, Toronto, and J. G. Lane, present secretary of the company.

In answer to questions raised by a few preferred shareholders, General Manager A. M. Carlisle stated that the issue of 6 per cent prior preferred stock had all gone to the parent Akron company at par in liquidation of indebtedness. The sum issued was \$2,826,000, as against an authorization of \$4,500,000, which had been legalized, but which had not all been required, and the balance of which was not for sale. Mr. Carlisle also stated definitely that not one share of common had been bonus stock. Every dollar's worth had been issued for value received or interest due. This common stock was cut from \$100 to \$10 par in the course of the reorganization.

## Buys Rubber Company, Pays \$22,422.93 Taxes

COLUMBUS, July 20—By a decision in the Federal Court in Columbus, the Allen Motor Co. will be compelled to pay \$22,422.93 in Federal income taxes which was assessed against the Scioto Rubber Co. Although the decision is local, the effects are far reaching and will affect many similar cases.

The Allen Motor Co. took over the plant and property of the Scioto Rubber Co. April 29, 1919. In the article of agreement the Allen company assumed all of the legal debts of the rubber company. After the purchase Federal agents found that the income tax unpaid for 1917 was \$3,304.76 and for 1918, \$19,117.17. The Scioto Rubber Co. was no more as its assets had been merged with the Allen Motor Co.

## Stratton-Bliss Gets Dodge

NEW YORK, July 20—The Stratton-Bliss Co., holding the Dodge Brothers franchise in New York City, has discontinued its contract with the Elsey Motor Co., which had the Dodge in the Bronx. Both sales and service will be handled at the Stratton-Bliss branch, Grand Concourse. Charles J. Quinn, who has been with the headquarters sales department of Stratton-Bliss on Broadway, has been made manager of the branch.

## Standardized Traffic Adopted in Bay State

BOSTON, July 26—Motorists traveling throughout Massachusetts in the near future will not be mixed up on traffic signals, for plans have been outlined whereby the different police departments will adopt standardized regulations to govern traffic. This was brought about as a result of a conference yesterday at the Massachusetts Automobile Club attended by more than 100 chiefs of police and representatives of the Safe Roads Federation.

Following an all day session it was voted to appoint a committee to take up the matter. This committee comprises Chief Michael Feeney of Fall River, chairman; Deputy Chief Thomas McMurray of Worcester, Chief Edward P. Doherty of New Bedford, Chief James H. McKenna, Waltham, Capt. Bernard J. Hoppe, Boston Traffic Squad, and Capt. George A. Parker of the State Motor Patrol.

The conference voted also that it was the sense of the meeting that in the opinion of those present:

Motorists who drive under the influence of liquor should be sent to jail instead of being fined.

Pedestrians should be made to cross the street at protected crossings in the interest of safety.

## See Reduced F.O.B. Rates in Proposed Schedule

ATLANTA, GA., July 26—Material reduction in the f.o.b. rates from the Central Freight Association, or automobile, territory to Atlanta may be effected if the new schedule of freight rates for the Southeast is adopted, it was indicated at a conference of shippers and carriers held recently in the Chamber of Commerce, Atlanta.

The new rate scale was introduced in the proceedings by B. M. Goodwyn, chairman of the fourth section committee of the Interstate Commerce Commission.

# AUTOMOTIVE INDUSTRIES

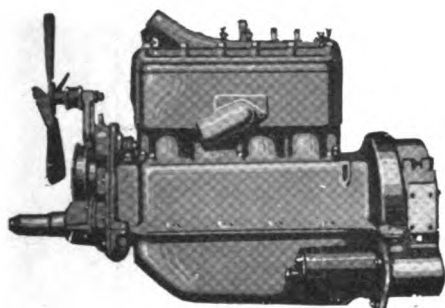
*The* AUTOMOBILE

Vol. XLV  
Number 5

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, AUGUST 4, 1921

Thirty-five cents a copy  
Three dollars a year

## Nine Out of Ten People Are Buying "Fours" \*



**T**HE multi-cylinder cars have a distinct place in the automobile market, from which they cannot be displaced.

Yet their market is not only small, but is essentially different from the big, broad market where the initial investment is more of a determining factor of choice.

In this big market competitive models have been less numerous among the "Fours," a fact of importance to the car manufacturer.

Only 35% of all makes are "Fours," but 90% of all cars sold are "Fours."

This increasing preference for "Fours" by the buying public is undoubtedly due to the fact that, with the right four-cylinder motor, the car manufacturer can offer all of the essential things any motor can do and at the same time build appealing quality and value into the rest of the car to a degree impossible with more cylinders at the same price range.

In an unusual way, the Lycoming Motor qualifies for leadership among the four-cylinder engines.

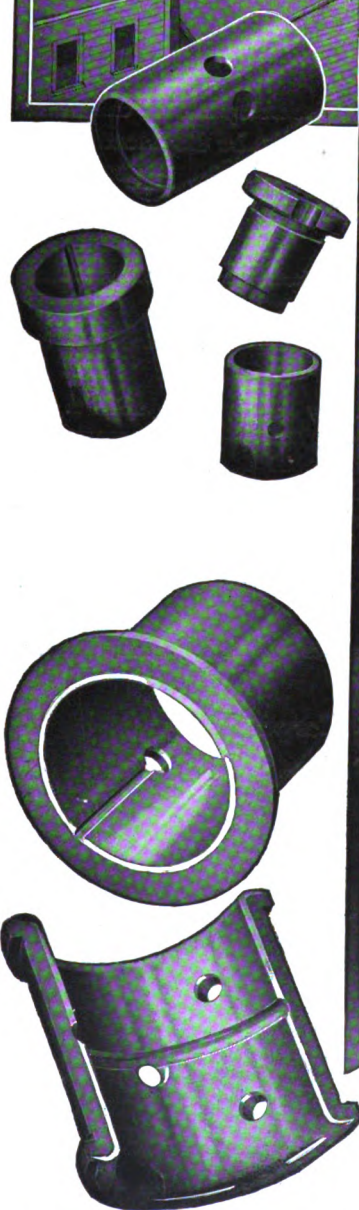
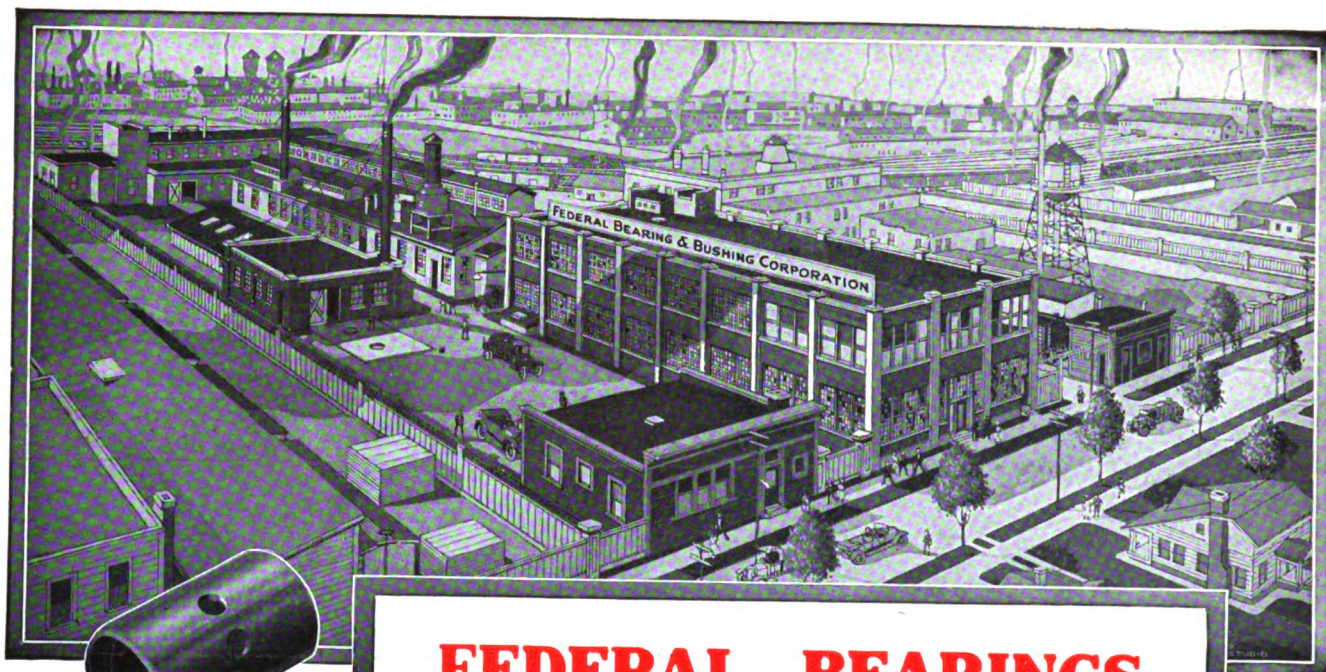
Find out about this four-cylinder engine—Model K, Lycoming Motor.

**Lycoming Motors Corporation**  
Williamsport, Pa.

\*Exclusive of Fords.







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### UNIFORMITY

The Babbitt lining in every Federal Bearing shows the same tough, fine-grained, homogeneous structure because every Bearing is chilled immediately after it is lined.

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Every Federal Bearing is guaranteed absolutely free from porosity, because the process of manufacturing makes it impossible for the Babbitt to contain air while cooling.

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**DETROIT - MICHIGAN**

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, AUGUST 4, 1921

No. 5

## Trends in the Petroleum Industry for First Half of 1921

Production and imports of crude, and consumption of gasoline exceed figures for first half of 1920. Imports from Mexico which are now falling off, have prevented possible shortage in total supply here.

By Joseph E. Pogue<sup>1</sup>

**T**HE petroleum industry was among the last to be affected by the industrial depression.<sup>2</sup> Although showing signs of succumbing in late 1920, the industry had gathered so much momentum that it ran over into 1921 before the reaction fully came. In February, however, a sharp break in prices occurred and from then on the process of general liquidation was drastic.

But in spite of all depressing influences, the actual production of crude petroleum, under the impetus gained in 1920, has gone on increasing; and even petroleum refining, closely linked with crude production, has displayed only a moderate curtailment, as compared with the recession in manufacturing activities in general. Thus large stocks of both crude and refined products have accumulated.

A unique factor in the petroleum situation is an increase in the demand for one of the products, gasoline, accompanying greatly lessened requirements for kerosene, fuel oil, and lubricating oils

—an unbalanced market condition which has created perplexing problems.

Coincident with full production at home and a set of demands badly out of balance, the oil fields of Mexico have been exploited with redoubled intensity, under the spur of a keen competition and the menace of salt water encroachments. In consequence, a flood of imported oil has come upon the domestic market to add to the demoralization.

The feature of greatest interest to the automotive industry is the now well demonstrated fact that petroleum, because of peculiarities incident to its exploitation, does not conform closely to the economic cycle, but displays a lag of some six to twelve months.

That is to say, at any given moment the production of crude petroleum (and refinery activity to a modified extent) is responding to the stimulating or depressing influences of conditions months in the past. Thus during the first half of 1921, a period when production in general was running at half capacity, the output of crude petroleum broke all previous records.

Conversely, at the next turn ahead, when demands revive, the output of crude petroleum may be expected to display the deferred effects of the present time of depression.

<sup>1</sup> Consulting Engineer, New York.

<sup>2</sup> The statistics presented in this review were derived from the following sources: Data on crude petroleum from U. S. Geological Survey and American Petroleum Institute; refined products from U. S. Bureau of Mines; well data from Oil and Gas Journal; export figures from U. S. Bureau of Foreign and Domestic Commerce; prices calculated by the writer from quotations given in The National Petroleum News, and The Oil, Paint, and Drug Reporter.



The production of crude petroleum in the United States increased from 211 million barrels during the first half of 1920, to 237 million barrels in the first six months of 1921—an advance of 12 per cent. At the same time the corresponding imports of crude petroleum grew from 39 million barrels to 66 million barrels. These imports came practically entirely from Mexico. The consumption of crude petroleum during the two half-year periods under view increased 5 per cent, but this change is scarcely a measure of demand since part of the petroleum consumed by refineries went merely into the building up of stocks of refined products. A review of the crude petroleum situation is presented in Table I.

Of greater significance than the half-year record is the trend of the significant items, and the course of production and imports of crude petroleum in the United States by months for the period 1918-1921 is shown in Fig. 1. The chart is drawn on a ratio scale in which the slopes of the curves are proportional to the percentage changes.

The failure of the curve of production to accommodate itself to the depressed demand of the current year is at once to be noticed, as well as the prominent part played of late by imported oil, that is, Mexican petroleum. Imports reached their peak in late 1920, but the decline in 1921 has not been great relative to the lessened requirements.

#### Oil Field Development

The production of crude petroleum is composed of the declining output of thousands of old wells plus the flush production of hundreds of new wells. The country's outflow of petroleum would gradually decline, were it not for the complement of new wells brought in each month. A study of drilling activity, therefore, gives a clew to future production, since the rate of decline of old wells is known.

During the first six months of 1921, there were 2675 fewer productive wells completed in the fields east of California than during the same period of the previous year. The total number for 1921 (6 months) was 8568, as compared with 11,243 in 1920 (6 months). The number of rigs up and wells drilling—an index of the work under way—has fallen from 11,087 in June, 1920, to 6418 in June, 1921. The main effect of this recession in preparation for production is yet to be felt.

The trend of new work and successful completions in the entire country exclusive of California is shown by months for 1920 and 1921 (6 months) in Fig. 2. The ratio scale permits the slopes of the two curves to be directly compared.

It is at once apparent that drilling activity has fallen away nearly 50 per cent since its period of greatest intensity in 1920. The significant feature, however, is that the present decline is over the summer months (when drilling efforts are normally at their height) and during the coming winter the seasonal decline will still further cut down operations. Thus a gap is created in the productive effort that can be made up with difficulty when an increasing production comes to be required.

During the past few months there has been a change in the type of territory subjected to drilling. Ordinarily, a large share of drilling efforts are directed to pioneer acreage.

Of late, under the low prices prevailing, the drill has been directed almost wholly to proven acreage where the chances of striking oil are good. The net effect has been an intensive development of blocked-out reserves. Such a policy, if long continued, will seriously retard the gaining of an increased production later on.

During the year two new oil pools were opened up—the El Dorado in southern Arkansas and the Haynesville in northern Louisiana. During the week ending July 9, the estimated daily output of these two pools was 52,000 and 10,450 barrels respectively, together 4.76 per cent of the country's total production. The development of these two pools has contributed substantially to the increase in domestic production that has characterized the first part of 1921. The bringing in of new territory at a time when the oil was not needed reflects the tendency of petroleum production to proceed independently of outside conditions.

#### Mexico

The production of crude petroleum in the United States for a number of years has fallen short of domestic requirements, not through any failure on the part of production, which has gone on increasing, but because demand has been growing at a rate which could not be paralleled by output. The degree to which this country has grown into petroleum dependence upon outside sources of supply is indicated by the fact that at the beginning of 1921 one-fourth of our crude petroleum was coming from Mexico. This proportion fell to about one-fifth during early 1921, but without imported oil even the depressed demands of middle 1921 could scarcely have been satisfied.

In view of the important bearing of Mexican petroleum upon industrial and automotive activities in the United States, the reports as to the rapid exhaustion of the producing pools in Mexico have proven disquieting. It is not generally realized that the proven oil pools of Mexico are confined to a small area in the Tampico-Tuxpam region, which was responsible for a quarter of the world's output of petroleum in 1920. Outside of this single area, there are promises of oil in several localities, but as yet no important commercially developed deposits; relatively little development work, in fact, has been done outside the proven area, which will have a retarding effect on future production.

Widespread attention was attracted by an address on the oil situation made by Ralph Arnold, a prominent petroleum engineer, before the American Institute of Mining and Metallurgical Engineers on February 16, 1921, in which the following statement was made regarding the proven oil pools of Mexico:

"Now let us turn to some concrete figures regarding the immediate future in Mexico: There have been twelve proven important pools: Ebano, Panuco, Topila, Dos Bocas, Tepatate, Casiano, Chinampa, Los

TABLE 1—COMPARISON OF THE CRUDE PETROLEUM SITUATION FOR THE FIRST 6 MONTHS OF 1920 AND 1921  
(In millions of barrels)

	First 6 months, 1920	First 6 months, 1921	Per cent change
Production .....	211	237	+12%
Imports .....	39	66	+69%
Exports .....	4	4	0
Stocks, Jan. 1.....	129	134	+4%
Stocks, June 30.....	127	179	+41%
Domestic consumption.	247	260	+5%
Crude to stills.....	196	*219	+12%

\*Approximate; June estimated.

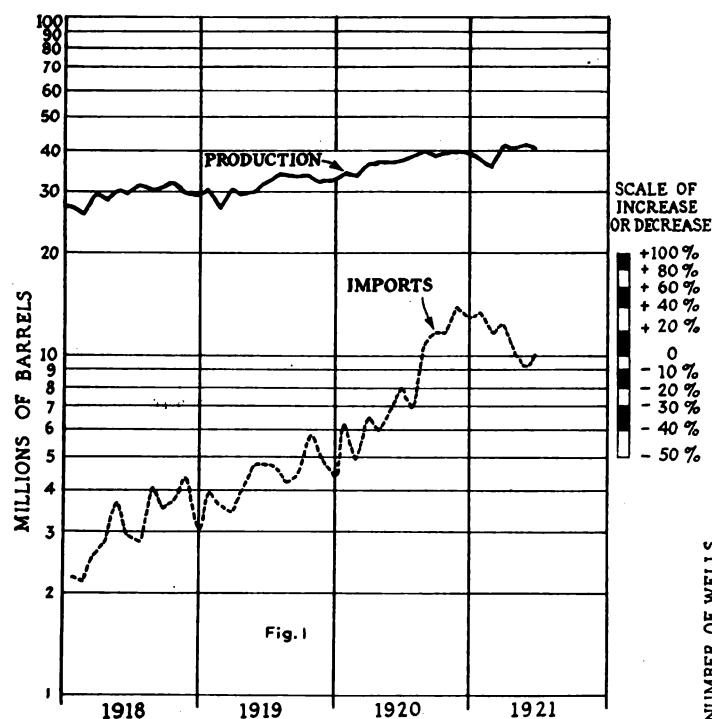


Fig. 1

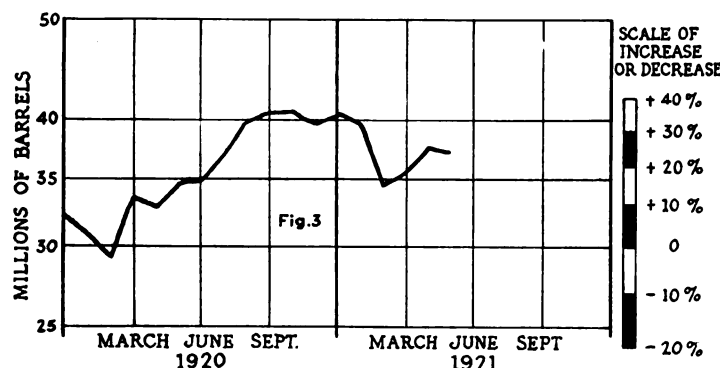


Fig. 3

Fig. 1—Trend of production and imports of crude petroleum by months, 1918-1921

Fig. 2—Trend of oil-field activity east of California by months, 1920-1921

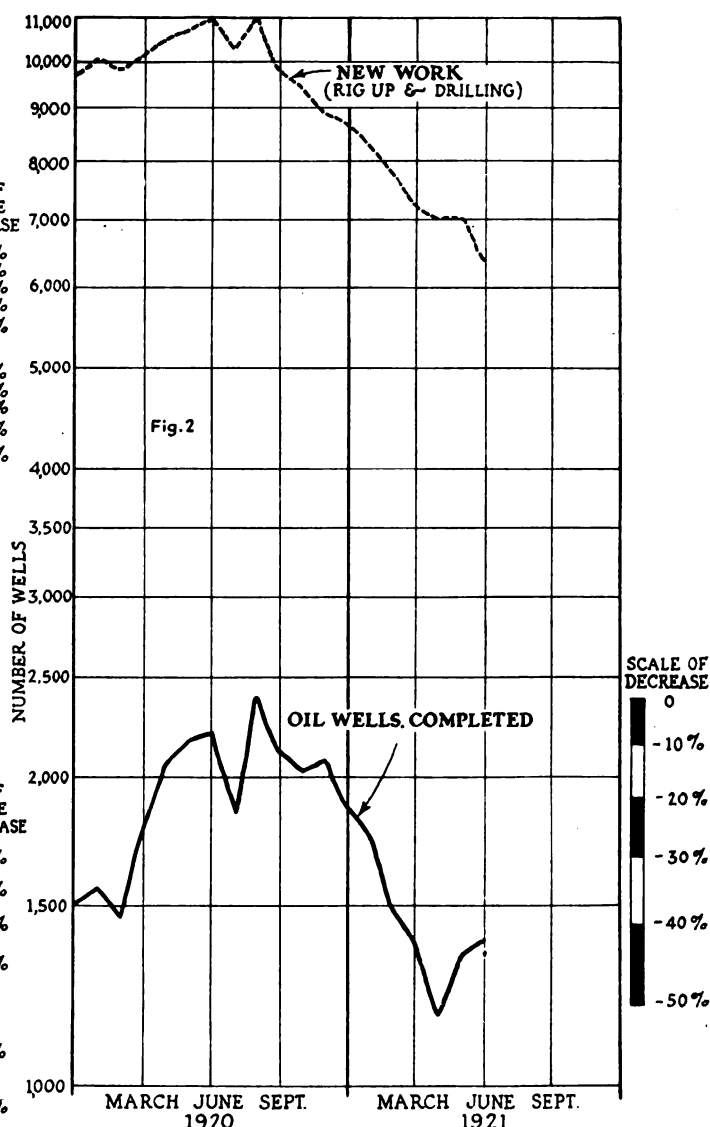


Fig. 2

Fig. 3—Trend of refinery activity—the quantity of crude petroleum run to stills by months, 1920-1921

Naranjos, Zacamixtle, Cerro Azul, Potrero del Llano and Alamo. Of these Dos Bocas, Tepatate, Casiano, Chinampa and Potrero del Llano are extinct; Los Naranjos, Panuco and Alamo are rapidly going to salt water, and, with the exception of Panuco, as far as important production is concerned, are, or soon will be, unimportant. Panuco and Ebano, apparently will continue for many years producing enough oil and a valuable mixture of oil and water to have an important bearing on the productivity of Mexico. This leaves Zacamixtle, a practically virgin pool, and Cerro Azul, a partly exhausted pool, the latter controlled by a single company, to furnish, with Panuco, the bulk of the proven future supply. Of the exhausted pools, the greatest only produces a little over 120,000,000 barrels. Los Naranjos will probably produce a total of over 150,000,000 barrels. These oil pools compared favorably in area with the present producing pools, so that these latter may be assumed to yield no large excess over the maximum so far attained. Estimates of future production are: Zacamixtle, over 125,000,000 bbl.; Cerro Azul, 75,000,000 bbl. remaining; Alamo, 25,000,000 bbl. remaining; Los Naranjos and Panuco, each 50,000,000 bbl. remaining; total, 325,000,000 bbl. Last year Mexico produced 185,000,000 bbl., or an average of about 500,000 bbl. per day. Mexico is now producing at the rate of about 600,000 bbl. per day; approximately two-thirds of this is com-

ing from Los Naranjos, a pool which will probably be extinct by early summer on account of the encroachment of salt water. If the present rate is maintained throughout the year, 1921 will see about 220,000,000 bbl. of oil brought to the surface in Mexico, or about one-half the probable production of the United States for the year. But Mexico's proven reserve is less than twice this amount, hence, at the present rate of production, the latter part of 1922 will see the end of the proven big fields in Mexico. There is little wildcatting going on in Mexico now, probably not over 25 strictly wildcat wells now being actively drilled outside the main producing district. Whether it is 1½ years or 2 years, or even a little longer or a little less before the break comes, it is certain to come."

The reader should hold clearly in mind that the statement quoted above refers to the proven oil pools of Mexico. Other deposits will certainly be developed in Mexico, but the pools now contributing so bountifully are not limitless and are showing signs of approaching exhaustion.

Arnold's analysis has aroused considerable discussion and difference of opinion. While some of the proven pools referred to may be extended by further drilling and the limits of the Zacamixtle pool have apparently

<sup>1</sup> The Oil Situation, Mining and Metallurgy, Mar., 1921, pp. 20-21.

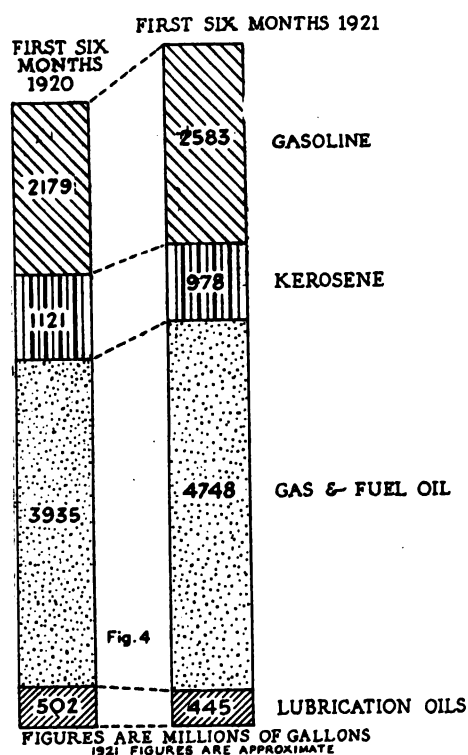


Fig. 4—Production of petroleum products in the United States during the first six months of 1920-1921

already been enlarged during the first six months of 1921, the statement by Arnold is deserving of close consideration.

Should the curve of Mexican production turn sharply downward in 1922 or 1923, the effect upon the petroleum situation in the United States will be significant.

#### Refinery Activity

The best index of refinery activity is the quantity of crude petroleum run to stills and the trend of this factor by months is reflected in Fig. 3. Reference to this chart will disclose the rapid increase in refining activity throughout the second and third quarters of 1920; the maintenance of a high level of productivity the fourth quarter; and a slight recession during the first half of 1921. The moderation of the curtailment in crude run to stills in early 1921 is striking, in view of the drastic recessions both in productive activities in general and in demands for most of the petroleum products. The relatively vigorous status of petroleum refining was due partly to the attempt of refineries to accommodate producers and in part to the increased demand for gasoline

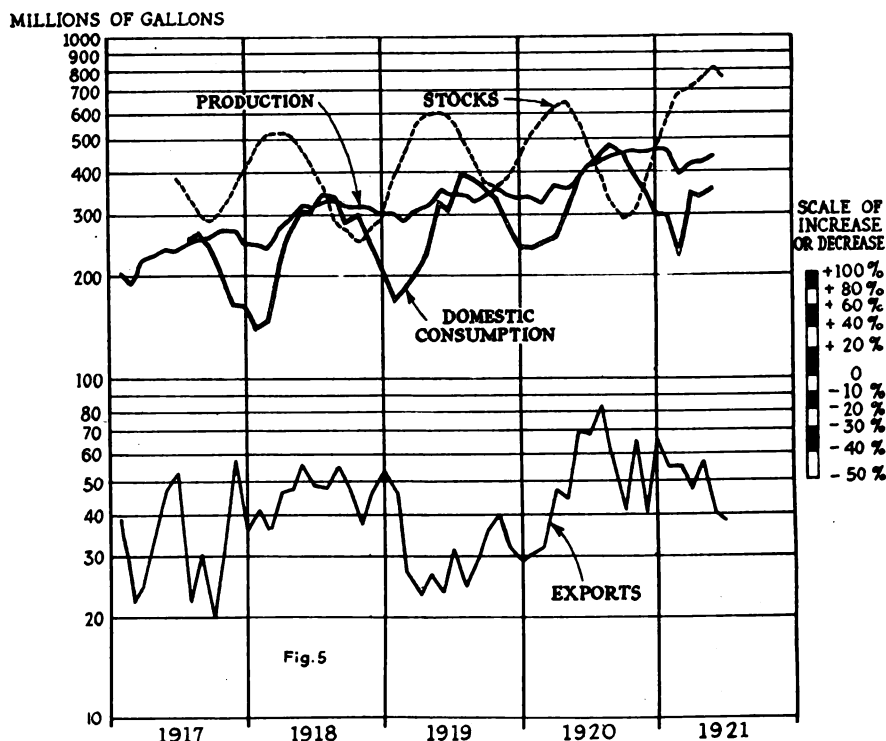


Fig. 5—Trend of the gasoline situation by months, 1917-1921

which could not have been met if refinery output had been trimmed to the measure of the market for kerosene, fuel oil, and lubricants.

On January 1, 1921, there were 415 refineries in the United States with a daily capacity of 1,888,800 barrels, as compared with 373 refineries with a daily capacity of 1,530,565 barrels a year previous. During 1920, therefore, refinery capacity in the United States increased 23 per cent.

On January 1, 1921, the proportion of the installed capacity being utilized was 68 per cent. As refining was virtually at its highest point at this time, the figures quoted indicate the extent to which the refining industry was overbuilt relative to normal requirements.

The output of the leading petroleum products—gasoline, kerosene, fuel oil, and lubricating oils—for the first six months of 1921 as compared with the corresponding period of 1920, is given in tabular form in Table 2 and shown graphically in Fig. 4. It will be observed that gasoline and fuel oil have increased in output 19 per cent and 21 per cent respectively; while kerosene and lubricating oils have declined. This differ-

TABLE 2—U. S. PRODUCTION OF PETROLEUM PRODUCTS DURING FIRST 6 MONTHS OF 1920 AND 1921  
(Unit: 1,000,000)

	First 6 months, 1920	*First 6 months, 1921	Per cent change
Crude run (bbls.)....	196	220	+12%
Oils purchased and re-run (bbls.).....	19.3	17.8	— 8%
Gasoline (gals.).....	2,179	2,583	+19%
Kerosene (gals.).....	1,121	978	—13%
Gas and fuel oil (gals.)..	3,935	4,748	+21%
Lubricating oils (gals.) .....	502	445	—11%

\*Approximate; includes estimated figures for June.

TABLE 3—ENDPOINT OF MOTOR-GASOLINE IN SELECTED CITIES IN 1920 AND 1921

(Data from U. S. Bureau of Mines)

	Endpoint in Degrees Fahrenheit			
	April, 1919	Jan., 1920	July, 1920	Jan., 1921
New York.....	411	418	432	417
Washington.....	426	439	449	439
Pittsburgh.....	425	425	454	430
Chicago.....	423	445	455	439
New Orleans.....	435	424	445	428
Salt Lake City...	441	440	456	439
San Francisco....	374	406	428	417
Average.....	417	427	446	429



ence reflects the lack of balance obtaining between the several demands for petroleum products.

### Gasoline

The trend of the gasoline situation by months from 1917 to the present is shown in Fig. 5. The chart is drawn on a ratio scale so that the percentage changes as well as the quantity changes may be directly observed and compared.

The trend of the output of gasoline over the period shown indicates an annual increase of approximately 18 per cent; this rate also measures the increase in demand. The gasoline requirements of the current year show some recession from the past trend, though they are still 10 per cent in advance of the requirements of a year ago. An increase of this magnitude in the domestic demand for gasoline during a period of industrial depression is a striking commentary on the essential character of automotive transportation.

The marked seasonal character of the curve representing gasoline stocks is noteworthy. In spite of the current increase in gasoline requirements, production this year has been amply maintained. Gasoline stocks usually start to decline in April, but this May saw a sharp increase instead of the usual recession. The flexure in the curve reflecting this feature is an indication of the extent to which the petroleum industry has maintained production in the face of a general industrial decline.

The United States Bureau of Mines conducted its usual semi-annual chemical survey of motor-gasoline in January and the summarized results are shown comparably in Table 3. It will be noted that the average

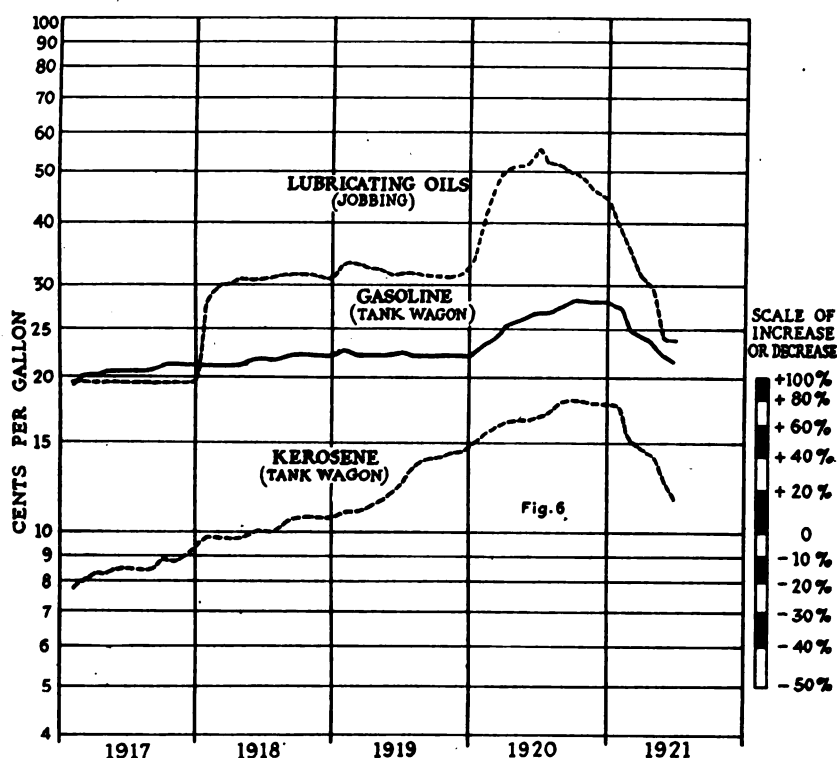


Fig. 6—Trend of the average prices of gasoline, kerosene, and lubricating oils by months, 1917-1921

indeed, has proved an embarrassing problem to many refiners, and in some quarters the product has been lumped with fuel oil in the absence of an adequate market for its separate disposition.

Fuel oil has also been piling up on the refiners' hands because of the curtailment in industrial and shipping activities. Much of the imported crude is turned into this product and it is also produced perforce in the manufacture of gasoline. The close relationship between gasoline and fuel oil as joint-products always causes trouble when the demands for the two get out of step.

The demand for lubricating oils suffered serious curtailment during 1921, following closely upon the marked stimulation in output that characterized 1920. Between September 30 last and April 30 the stocks of lubricating oils on hand in the United States have doubled.

### Exports

In common with other productive activities, the petroleum industry has suffered from a sharp decline in its export trade. This condition has proved particularly troublesome in respect to kerosene and lubricating oils, the two products that normally go abroad in greatest proportion.

Exports of the four major products of petroleum for the first half of 1920 and 1921 are compared in Table 4, where the degree of the recession in the foreign demand is at once apparent.

The vigorous entry of foreign countries into oil field development may be expected to bring growing competition into the overseas markets for oil products and thus restrict this outlet for American oils.

### Prices

As may readily be gathered from the foregoing discussion, the price situation in the petroleum industry has undergone a radical revision during the first six months of 1921. This situation is depicted in perspective in Fig. 6, where the trend of the average prices of gasoline, kerosene, and lubricating oils is shown by months from 1917 to the present. The sharp advances gained in

TABLE 4—EXPORTS OF PETROLEUM PRODUCTS DURING THE FIRST 6 MONTHS OF 1920 AND 1921  
(In millions of gallons)

	First 6 months, 1920	First 6 months, 1921	Per cent change
Gasoline and naphtha.	292	292	0
Kerosene .....	424	386	- 9%
Gas and fuel oil.....	411	436	+ 6%
Lubricating oils .....	209	137	-34%

endpoint was approximately the same in January, 1921, as in January, 1920, and notably less than in July, 1920. The average endpoint of gasoline is always less in winter than in summer by virtue of the lessened demand in cold weather; but the normal increase in endpoint that has characterized the past five years is slowing up this year in keeping with an "easy" supply. The endpoint of gasoline is a function of the degree of stress between supply and demand, modified by the season. If its past behavior is any criterion of the future, the endpoint will reassume its upward trend as soon as demand begins again to take the lead over supply.

### Other Products

The production of kerosene has fallen rather sharply throughout the first six months of 1921, in keeping with a much reduced demand. The disposition of kerosene,

TABLE 5—TREND OF PRICES IN THE PETROLEUM INDUSTRY BY QUARTERS, IN PERCENTAGES OF THE AVERAGE PRICES IN 1913  
(Average prices for 1913 = 100)

	1913	1919	1920				1921	
			1st Q.	2nd Q.	3rd Q.	4th Q.	1st Q.	2nd Q.
Crude petroleum (at wells).....	100	197	270	311	314	311	218	154
Gasoline (tankwagon) .....	100	142	154	169	176	179	164	143
Kerosene (tankwagon) .....	100	162	202	213	226	226	199	161
Fuel oil (at refinery).....	100	147	233	288	286	226	149	116
Lubricating oils (jobbing).....	100	209	293	344	336	302	224	167
*All commodities.....	100	212	250	269	251	207	169	151

\*From U. S. Bureau of Labor Statistics.

early 1920 have been eliminated and petroleum prices have gone far toward their pre-war level. Thus in June of this year, the prices of mineral oils stood as follows, in percentages of the average prices prevailing in 1913: Crude petroleum, 127; gasoline, 137; kerosene, 146; fuel oil, 102; lubricating oils, 154.

Fig. 6 indicates that the average price of gasoline in June, 1921, was approximately equal to the average price over the three year period, 1917-1919. The price of lubricating oils, it may be observed, started downward the middle of 1920, shortly after commodity prices in general started to decline, and between June, 1920, and June, 1921, fell 58 per cent. The steady upward trend of the price of kerosene from the beginning of 1917 to late 1920 should not escape attention, as this move toward the level of gasoline was caused by the entrance of kerosene into use as a motor fuel.

The price of mineral oils compared with all commodities is shown by quarters in Table 5, in percentages of the prices prevailing in 1913. These composite figures are calculated from thousands of individual quotations and reflect with considerable verity the country wide levels attained during the period shown. The drastic liquidation in petroleum prices *per se* and relative to prices in general is definitely measured.

The actual prices of gasoline in a number of selected cities is given in Table 6 by months for 1921, compared with the average prices in 1913, 1919, and 1920. While gasoline has a smaller percentage decline than its joint products, it had previously attained a less high level from which to recede. The marked difference in level in various parts of the country is noticeable, the product being cheaper in the central states, where the bulk of the gasoline is produced.

Petroleum prices for a time were resistant to the downward price swing that accompanied the industrial

depression, but they finally succumbed and soon made up for lost time in their downward course.

### Conclusions

The features of the half-year of special interest from the automotive viewpoint may be summarized as follows:

- (1) The domestic production of crude petroleum continued to increase despite a sharp decline in prices and demands.
- (2) Prices of crude petroleum and its products displayed a sudden and spectacular recession.
- (3) Oil field development suffered a notable curtailment, with an effect still to be felt.
- (4) The stocks of both crude petroleum and its products accumulated in considerable volume.
- (5) Refinery activity slowed down very slightly, considering the decline in the market.
- (6) Mexico attracted widespread attention in respect to the encroachment of salt water in many of her wells.
- (7) Export activity fell away to a consequential degree.
- (8) Two new domestic pools were vigorously developed at an inopportune time.
- (9) Petroleum came to the forefront as an international problem.

### Fuel Developments Abroad

ONE of the last acts of the French Chamber of Deputies before adjournment was to authorize the Minister of Commerce to proceed with the production of the "native motor fuel" which is to be a substitute for gasoline and render France independent of Great Britain and the United States in this respect. This fuel is said to be the result of extended research work carried on at Government laboratories. René Faber, an engineer, is said to have succeeded in producing alcohol anhydrate, that is, alcohol combined with gasoline, which is then treated with acid and redistilled.

From Germany comes news of a new motor fuel named Tetraline. It is a by-product of the process of making coke from bituminous coal. One molecule of naphthalene, the coal tar product formerly used for making dyes, is combined with four atoms of hydrogen. The resulting product is technically known as tetra-hydronaphthalene, but for commercial purposes the name has been shortened to tetraline. It is a liquid as clear as water, with a specific gravity of 0.975. The boiling and ignition temperatures are both very high, and the freezing temperature is very low. These properties are said to make the new fuel particularly suitable for use in small bore, high speed engines. Owing to the high ignition temperature the fuel cannot well be used in low compression engines, but when mixed with somewhat more volatile fuels it can be used in the average gasoline engine, according to the inventors.

TABLE 6—WHOLESALE (TANKWAGON) PRICE OF GASOLINE IN SELECTED CITIES DURING 1921 COMPARED WITH PREVIOUS YEARS  
(In cents per gallon)

	New York	Baltimore	Chicago	Kansas City	San Francisco	Average
1913						
Year ...	16.8	15.8	14.8	15.2	15.4	15.6
1919						
Year ...	24.5	22.5	21.1	21.8	21.1	22.2
1920						
Year ...	29.4	27.8	25.4	25.4	24.5	26.5
1921						
Jan. ....	31.0	28.3	26.6	24.9	27.0	27.6
Feb. ....	28.5	25.8	23.0	21.0	27.0	25.1
March ...	26.5	24.5	23.0	21.0	25.0	24.0
April ...	26.0	24.5	22.3	20.4	25.0	23.6
May ....	26.0	23.7	20.0	18.7	23.8	22.0
June ....	24.6	22.0	19.5	18.2	23.0	21.5

# Highway Transport the Greatest National Economic Problem

Thirty educators and industrial leaders discuss importance of proper educational training for men who are to adjust this growing industry to the public needs. Highways and their use considered as one problem.

**T**HE proper construction and use of the highways is the greatest single economic question before the people to-day, was a statement frequently made at a recent gathering of economists at the University of Maryland. The meeting had been called by the Committee on Highway and Highway Transport Education with a view to getting expressions of opinion from engineers engaged in educational work, manufacturers and users of highway transport with the ultimate purpose of outlining an engineering educational course that can be recommended to universities interested in this line of work.

It was said repeatedly that the financing of highway projects had been a sort of haphazard affair which had borne good results on a wave of popular opinion in favor of good roads, but that, as many of the States and other civil divisions are nearing their legal limit of indebtedness for this purpose, more orderly methods of finance have to be found. The foundation of motor transport, of course, is based on the actual highway and without proper highways there can be no effective motor transport. Motor transport, in the minds of the men assembled, is of equal importance with that of any other branch of transportation and will, eventually become the vital link, as it is the feeder of railway and all other transportation. It was admitted by all concerned that at present much of the highway transportation is uneconomical because there is not the proper understanding of its importance to the public life and because of the small development of basic knowledge concerning it.

The topics on the program are illustrative of the objectives of the committee:

- Highway Transport
- Highway Finance
- Economic Problems of Construction and Maintenance
- Highway Administration
- Cost Accounting in Highway Transport Operation
- National and State Legislation

C. J. Tilden, Director of the Committee, called the meeting to order and introduced President Charles S. Howe of the Case School of Applied Science who served as chairman of the meeting.

A better understanding of the deliberations of the meeting probably will be gained through including here a list of those present:

- A. F. Woods, President, University of Maryland.
- George H. Pride, President, Heavy Haulage Company.
- E. G. Sutton, Executive Secretary, National Association of Sand and Gravel Producers.
- George A. Ricker, District Engineer, Portland Cement Association.
- J. C. Marquis, Editor, *Country Gentleman*.
- J. N. Mackall, Chairman, Maryland State Roads Commission.
- W. E. McComas, Portland Cement Association.
- W. K. Hatt, Professor of Civil Engineering, Purdue University, and Director, Highway Research, National Research Council.
- J. C. Long, Educational Secretary, N. A. C. C.
- W. C. John, United States Bureau of Education.
- T. W. Allen, General Inspector, Bureau of Public Roads.

- N. W. Dougherty, Professor of Civil Engineering, University of Tennessee.
- H. G. McGee, Bureau of Municipal Research.
- W. A. Bassett, Chief, Engineering Division, National Institute of Public Administration.
- F. W. Fenn, N. A. C. C. Truck Committee.
- George F. Zook, Chief, Division Higher Education, Bureau of Education.
- W. T. Bawden, Assistant to Commissioner, Bureau of Education.
- P. P. Claxton, formerly U. S. Commissioner of Education, Provost-Elect, University of Alabama.
- J. G. McKay, Professor of Economics, University of Wisconsin.
- Charles S. Howe, President, Case School of Applied Science.
- H. G. Collins, The White Company.
- E. J. Adams.
- T. H. MacDonald, Chief, Bureau of Public Roads.
- M. O. Eldridge, Director of Roads, A. A. A.
- Maj. F. S. Besson, Corps of Engineers, U. S. Army.
- Clyde Jennings, Managing Editor, *AUTOMOTIVE INDUSTRIES*.
- J. R. Bibbins, Department of Transportation and Commerce, U. S. Chamber of Commerce.
- A. J. Brosseau, President, International Motors Company.
- A. M. Loomis, National Grange.
- L. M. Estabrook, Associate Chief, Bureau of Markets and Crop Estimates, Department of Agriculture.
- Charles L. Raper, Dean, College of Business Administration, Syracuse University.
- Pyke Johnson, National Automobile Chamber of Commerce.
- R. D. Chapin, President, Hudson Motor Car Company.
- A. N. Johnson, Dean, College of Engineering, University of Maryland.
- R. A. Hauer, International Motors Company.
- J. W. Brooks, Director, American Highway Educational Bureau.
- C. J. Tilden, Director, Highway and Highway Transport Education Committee.
- C. D. Curtiss, Bureau of Public Roads.
- S. S. Steinberg, Professor of Civil Engineering, University of Maryland.

This group of men, of course, did not gather to study the petty questions that are bothering the truck operator of to-day, nor were they interested in the troubles of any one road man. They were gathered to throw all troubles into the melting pot and to consider the proper method of solving the general highway transport problem of the future.

The suggestion that highway financing plans are in a bad way was made by MacDonald. He told of States and communities that are nearing their debt limit and of projects which are being held up because the bonds cannot be sold at the rate of interest authorized. This fact was referred to many times during the day. McKay, the Wisconsin University economist who is doing consulting work for the Bureau of Roads, read a paper in which he presented a new plan for the allotment of costs, according to benefits accruing. He advocated some radical departures from the present method of assessment and advocated a heavier burden on the present users of highways. His plan was not presented as a finished one but a tentative plan subject to further development. As a final thought, Adams suggested that it might be possible to put the present authorized highway bonds in a fund for which Fed-

eral currency might be issued, under the authority of the War Finance Board. His thought was based on the recently announced plan to assist the railroads. He held that highway transportation is as vital to the country as is railroad transportation—a conclusion in which all present agreed.

#### Old Roads as Foundation for New

Mackall gave a new turn to the thought on financing when he said that too many roads which would serve perfectly well as foundations are being torn up to build entirely new roads. He told of work done in Maryland where roads that had been broken up under the heavy war time traffic between Washington and Philadelphia had been resurfaced at much less cost than a new road and are perhaps better than entirely new roads. His point was that engineers are sometimes overlooking assets in the present wornout highways.

Brosseau, speaking on financing, asked for closer inquiry into the needs of the community and the building of roads equal to the traffic that could be expected. There is an inclination to build for a greater need than exists, he thought, in this way wasting money and turning the taxpayers against the project.

Eldridge of the A. A. A. spoke of the need of a uniform traffic census system, as it is impossible to compare present census. Dougherty thought that the very basis of a highway course should be studied as to cost of maintenance, construction and the traffic census and the relation of the cost and expectancy to the property.

Dr. Claxton was impressed with the additional factor of value in the social advantages of a good highway system and asked that this be considered. He spoke of the satisfaction he felt in that the subject of transportation had been injected into the educational system during his term of office. He urged that the continuance of this work be supported as much good could be accomplished by the proper education of children both in an appreciation of the necessity of transportation and in safety. The actual nationalization of education on this subject in common with others must, he thought, come through the State universities.

#### National Viewpoint Important

The need of a nationalization of thought and action on highway and highway transport was suggested by Chapin and this fact, too, was brought out by others many times during the day. Chapin said that the time has come when roads must return the cost dollar for dollar. In the past the money for construction had come too easily but that 21 billion of dollars had been invested in highway transport and it is time the subject was taken more seriously. The present maintenance, he said, was equal to that of railroad transportation, about 10 billion of dollars a year. The need now is for a national view of this question. Railroad and highway transportation should be considered together as transportation necessary to the prosperity and welfare of the nation. He said that in the study of highway transport, attention had been given to the truck alone but that it is necessary to include the passenger car which has become a vital factor in every-day life and which, through better manufacture and lower price of the next few years, will become even more closely entwined into daily life. The number of passenger cars traveling daily, he said, has become a problem that can not be ignored and because of the number of these cars, it can not be assumed that any road that will carry the heavy traffic is sufficient for the passenger car. This thought, too, was carried through the day, especially in the questions of traffic control, maintenance of highways and the necessity for a close study of maintenance. Chapin's point that too much

is being spent on the maintenance of the vehicle because not enough is spent on the maintenance of the highways was accepted by the highway men.

The only prepared paper of the day, read by Hatt, set forth a tentative plan for the Highway Research Committee, Division of Engineering of the National Research Council. This paper consisted chiefly of questions which the Committee has set out to answer and was illustrated by a chart. It will be printed in an early issue of AUTOMOTIVE INDUSTRIES.

Pride and Estabrook were responsible for injecting some surprising figures into the discussion. Estabrook said that recently the Bureau of Markets and Crop Estimates had determined that 134,400,000 tons of farm produce had moved to market over railways. All of this had, of course, first been transported over the highway. To this must be added produce that is consumed at the end of its highway journey without being handled by the railroad. He had no figures as to manufactured articles that entered into highway transport.

#### Effect of Highway on Truck Maintenance

Pride said that the 990,000 commercial vehicles in service to-day are valued at \$500,000,000 and that the maintenance and depreciation cost of \$3,300,000 annually is entirely too high, due to the fact that the highways are causing much damage. Motor trucking to-day is inefficient and there is much room for improvement. In his later remarks Pride carried this a bit further and said that an enormous cost is being paid by the public because there are so many failures in automotive transport work, due to a lack of proper education of the men who embark in the business. These men, he said, do not know the costs of their work or of maintaining equipment and their consequent failure puts a burden on the trucking industry and adds resistance to the sale of trucks. He strongly favored including a course in cost accounting in any study of motor transport. This view met with general approval. He said that at present there is an annual turnover of something like three billion dollars in this industry and that a study of cost accounting is imperative because of the amount involved. The inefficiency of present trucking, he said, is levying a tax on all commodities. Even the great industrial companies do not know to-day what a factor highway transportation is in the cost of their commodities. It is, he said, an entirely neglected subject.

The subject of administration of highways and highway transport was briefly discussed. Raper favored a State administration, which should be controlled by a national administration to bring about a more uniform plan of maintenance and a better understanding of the factors involved. He spoke of the developments in the work at Syracuse University as showing chiefly the lack of administration understanding.

The problem of personal safety on the highways was discussed by Long and Jennings. The former spoke of the steps now being taken to promote safety through school-room work and through essays. Jennings spoke of the need of a study of individual accidents to determine the cause and the evident failure that awaits the present popular idea that safety can be brought about by the licensing of drivers.

Legislation was only briefly referred to, as this organization has no lobby plans. It merely seeks a basis for the drafting of proper laws. Johnson advocated a course of study of the laws themselves so that the highway transport engineers of the future will be able to advise as to uniformity of laws with understanding. Several of the representatives of other related organizations presented the views of their respective associations on the subject and their offer of aid in legislative matters.

# Bosch Producing a Battery Ignition System

Details of new electrical unit are given in the following description. Timer-distributor is made in two types arranged for automatic or manual advance. Interrupter is designed for high speed operation.

**I**N the past the name Bosch has been associated chiefly with magnetos, but the American Bosch Magneto Corporation has decided to extend its line of products until it meets every electro-mechanical requirement of the motor car industry, and in accordance with this policy a battery ignition system has been brought out. The system comprises two units, the timer-distributor and the coil. The timer-distributor is available in two types, Type T and Type TM. Type T is used with what is known as the compensating battery ignition system, including a governor which through the intermediary of a cam advances the spark in accordance with the engine speed and the particular characteristics of the engine to which the system is fitted. Type TM is without the governor and is hand controlled, but otherwise is identical with Type T. Both systems are provided for 4, 6 and 8 cylinder engines.

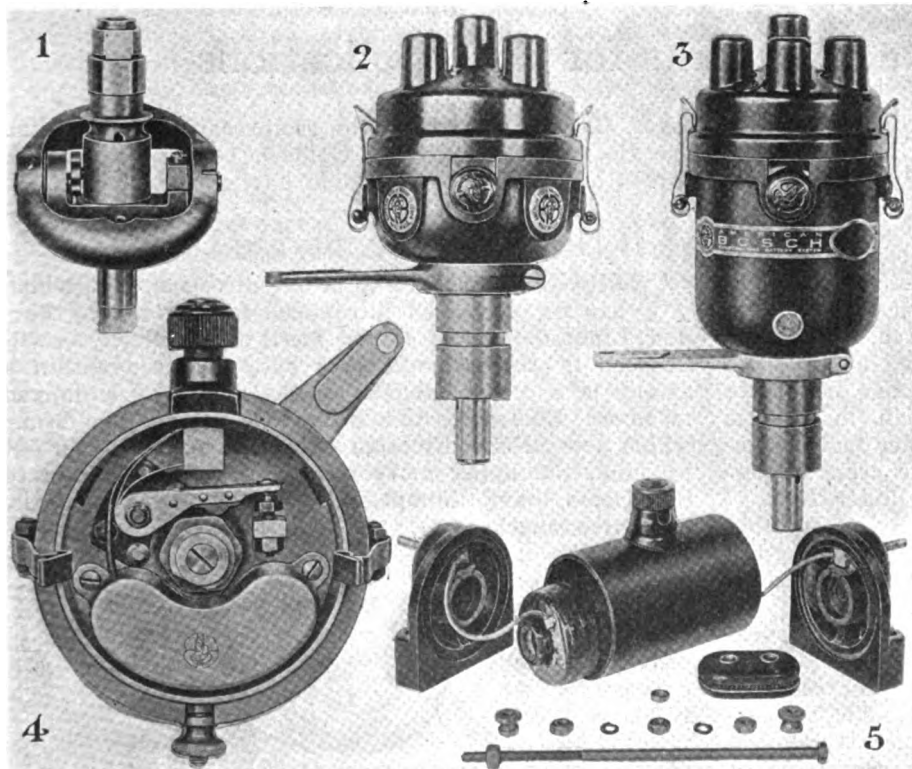
The main housing of the timer-distributor, the lower end of which also constitutes the bearing for the timer shaft, is a gray iron casting, machined to receive the interrupter cup which rests in the upper section. In

Type T the shell has sufficient depth to accommodate the governor mechanism. Spring clips hold the distributor cap in place, and permit ready inspection of the interrupter, condenser and distributor. When electric sparks occur for a considerable length of time in an enclosed space, nitric acid is formed, and ventilation is therefore necessary. In this particular instrument the ventilation is accomplished by using tubular rivets for the spring clips.

The timing arm is a drop forging and is mounted on a shoulder at the base of the main housing. It can be clamped in any angular position desired. By moving the main housing, the angular position of the interrupter cup and the distributor cap mounted thereon is changed in relation to the timer shaft and cam around which it moves, thereby advancing or retarding the spark without changing the angular relation of the distributor parts. Manual control may be used in connection with the compensating feature, this being convenient when the engine has to be started by hand cranking, for instance. In the compensating system lubrication of the bearing and governor parts is effected by a simple splash system, the governor ring dipping into oil in a sump in the shell and spraying it all over the interior parts.

The interrupter is assembled in a cup which also contains the condenser, and the whole unit can be easily removed without disturbing its component parts or electrical connections. One of the advantages of the separate cup design for carrying the complete interrupter mechanism within an accurately ground recess in the main housing, is that the device is always assured of a proper position in relation to the supporting walls of the housing, thereby locating it correctly around the cam on the driving shaft. A thumb nut secures the cup in position and, together with the low tension terminal, provides handles for lifting the cup out for inspection purposes.

The interrupter lever is a one-piece steel stamping, copper and nickel plated. It is light but strong and rigid, and only light spring tension is required for its operation. Tests are said to have shown that the interrupter action is perfect even at speeds in excess of 5000 r.p.m. The lever is provided with a bronze bushing which turns on a hardened steel post, insu-



Parts of Bosch battery ignition system. 1—Ring-type governor for controlling automatic advance. 2—Timer-distributor unit arranged for manual advance. 3—Timer-distributor containing automatic advance mechanism. 4—Interrupter mechanism. 5—Coil parts.



lated by means of a micarta plate. The interrupter is provided with a tinned copper shunt which, because of its lower electrical resistance, carries practically all the current, thereby obviating detrimental effects on the interrupter lever spring.

The condenser is of the dry-wound type, fully enclosed and sealed in a moisture-proof metal housing. It is located in the interrupter cup, and connected directly across the contact points.

The governor is of the "tilting ring" type, and, together with the interrupter cam and rotor, is carried on the timer shaft. The range of ignition advance is determined by an advance control stud integral with the governor mechanism.

As the timer shaft rotates, the tilting movement of the governor ring, due to centrifugal force, advances the interrupter cam, which is assembled to the timer shaft in the form of a sleeve, by direct engagement of a stud projecting into a slot provided in this sleeve. The total throw of the governor ring is adjusted by means of stop pins. Tilting of the ring is opposed by an adjustable spirally wound spring located in a recess in the bearing hub of the ring.

For the same general shape of characteristic curve, that is, the same percentage of movement at definite speeds, a total advance of from 0 to 60 deg. can be secured, measured on the engine flywheel. The advance may have a straight line characteristic or its characteristic may curve considerably. Changes in the characteristic of the advance may be brought about by means of stops for varying the range of travel of the ring, by varying the stiffness of the spring, by varying the initial setting of the spring and by changing the radius of the crankpin movement.

The distributor rotor, which is mounted on a projection of the cam and rotates with it, is provided with a skirt to protect the breaker mechanism. The rotor electrode is fastened by a screw into a recess on top,

and is therefore removable. By reason of this method of attachment to the cam shaft, the rotor cannot be replaced incorrectly if removed for inspection. The distributor cap is mounted on top of the main housing, and is brought into alignment with the cam shaft by a slight projection of the interrupter cup over which it fits. A molded-in tongue fits into a slight recess in the housing, which prevents incorrect assembly.

The ignition coil is of the dry-assembly type, as distinguished from coils which are sealed with insulating compounds. Its construction insures accessibility of all parts. It is mounted separately, preferably on the engine side of the instrument board. The core is laminated and permits the insertion of the center bolt holding the different units together. The soft iron band, together with the soft iron end plates, forms a shield for the magnetic circuit against the weakening effect of neighboring bodies of iron or steel, which is said to materially increase the spark energy. The high tension cable terminal is mounted in the center of the tubular casing surrounding the coil, and can be adjusted to any angular position by loosening the center bolt and swinging this casing to the position desired. This was made possible by connecting one end of the secondary to the magnetic shield surrounding the coil, and by providing a spring contact on the cable terminal inside the coil case.

The same coil is used in connection with 4, 6 and 8 cylinder timer-distributors and operates on 6 to 12 volt systems—the only change necessary being to select the proper ballast coil, there being one for six volts and one for twelve volts. The ballast coil (or resistance unit) is electrically connected in series with the primary winding. It protects the coil from burning out in case the engine is left with the battery switch in the "on" position with the interrupter contacts closed, and it also tends to produce a more uniform spark at different engine speeds.

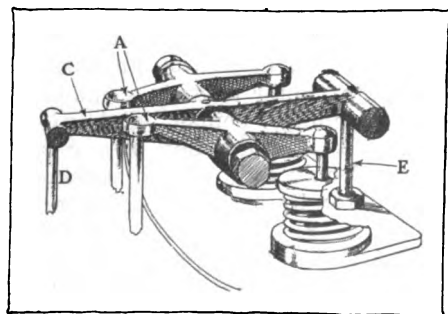
## Two British Developments for Car Applications

### Constant Tappet Clearance

**T**O overcome the tendency of valve clearances to be varied by the unequal expansion which occurs in overhead valve engines, particularly in those having air-cooled or aluminum cylinders, the compensating gear illustrated herewith has been introduced in England. The action of the device provides a canceling motion, which keeps the tappet clearance unaltered. The valve rockers, A, instead of having their pivots mounted on a column directly attached to the cylinder head, are pivoted to a compensating lever, C, which, in turn, is pivoted to the column, E, and at the other end is supported by a tie rod, D, connected to the crankcase or cylinder foot.

By suitably proportioning the levers, the extent to which the pivot of the rockers is raised by the increase of cylinder temperature is reduced to the amount necessary to keep the clearance unaltered. The

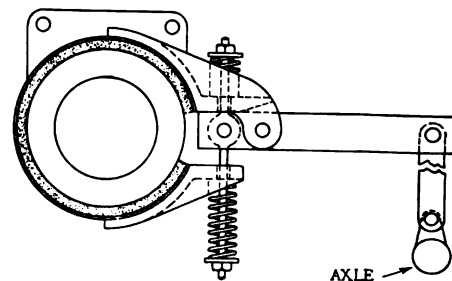
lever, C, does not add to the reciprocating weight, and the tie rod, D, can, it is claimed, be used to provide tappet adjustment or provision having the same effect.



Constant tappet clearance device

### New One-Way Spring Damper

**A** SPRING damper acting in one direction only, which has recently been introduced in England by Barduff, Limited, has at least the merit of simplicity, as will be seen by the accompanying cut. Inclosed within a casing is a drum attached to the frame by a flanged member. Encircling this drum is a fabric-lined brake which acts in one direction only—namely, to damp out rebound, the upper movement of the axle relative to the frame being unimpeded. The extended lever is, of course, shackled to the axle by a pivoted link; adjustment of the damping effect is provided by nuts respectively above and below the two coil springs, which keep the band in contact with the drum.



One-way spring damper

# The Influence of Various Fuels on Engine Performance

## Part V.

The relation between mixture strength and indicated mean pressure for various fuels, compression ratios and spark timing is shown and the influence of jacket water temperature and heating of charge determined. Efficiency at reduced loads and when using alcohol is also investigated.

By H. R. Ricardo\*

**B**EFORE any serious tests were commenced on the variable compression research engine, Messrs. Tizard and Pye had undertaken an exhaustive investigation into the process of combustion, and had arrived at very definite conclusions, both as to the chemical changes which might be expected to take place, and as to the limits of thermal efficiency resulting therefrom. Subsequent tests on the two research engines, more particularly on the variable compression engine, and on various fuels, have served to confirm the conclusions they arrived at. The close agreement obtained during tests carried out comparatively recently with their figures deduced many months previously, and from purely theoretical reasoning, is very striking. The writer gives here only the barest summary of their conclusions.

The thermal efficiency obtainable with any fuel depends in the first place upon the compression ratio at which it can be burnt, and this in turn is governed by the tendency of the fuel to detonate under high compression pressures. At any given compression ratio the thermal efficiency is dependent upon the maximum temperature. Upon flame temperature depends also the direct loss of heat to the cylinder walls, the loss due to dissociation, and that due to increase in the specific heat of the working fluid at high temperatures. The maximum temperature is dependent upon the mixture strength and the available internal energy of the fuel.

The whole question of the extent and influence of dissociation and the change in specific heat at high temperatures was dealt with very thoroughly by Messrs. Tizard and Pye. Broadly speaking, the results of their theoretical investigations have been to indicate:

(1) That when both change in specific heat and dissociation are taken into account the maximum temperature obtained with economical mixture strengths is substantially the same in the case of all available hydrocarbon fuels, though it is perceptibly lower in the case of alcohol.

(2) That the gain in efficiency with increase in compression ratio is very considerably greater than would be predicted from the air cycle formula.

(3) That the theoretical thermal efficiency for the most economical mixture strength may be expressed by the formula  $E = 1 - \left(\frac{1}{r}\right)^{0.78}$ .

This formula takes into account both change of specific heat and the effect of dissociation, and represents

the ideal efficiency obtainable from a working fluid consisting of air and any volatile hydrocarbon fuel, assuming complete combustion (within the limits imposed by dissociation) and no loss of heat to the cylinder walls.

In Fig. 15 are shown three curves: (a) the air cycle efficiency for a range of compression ratio from 4:1 to 7.5:1; (b) Tizard and Pye's ideal thermal efficiency corresponding to the same range of compression, and (c) the observed results on the variable compression engine with most economical mixture strength based on the net calorific value of the fuel and including the latent heat of evaporation. It will be observed that throughout the whole range the relation between the experimental results and the calculated ideal efficiency is constant to within very narrow limits. The difference between the two represents the heat loss to the cylinder walls during combustion and expansion, and the small loss due to the early opening of the exhaust valves. All the tests showed that the gain in efficiency with increase in compression was almost exactly the same in the case of all fuels tested. Naturally, the majority of the fuels would not stand so high a compression ratio as 7.5:1 without detonation or pre-ignition, but up to the highest useful compression for each fuel the curves of efficiency plotted against compression ratio were almost coincident in all cases. Alcohol, for reasons which will be dealt with later, gave a higher thermal efficiency throughout the range of compression, though the curve showed practically the same proportional variation.

The determination of the true absolute thermal efficiency obtainable from different fuels has proved somewhat difficult. Such a determination pre-supposes an accurate knowledge of the effective calorific value of the fuel, and it is in acquiring this that the principal difficulty lies. Much of the published data is clearly unreliable, and must be discarded, while in many cases the very precision with which the calorific value is given to four, or even five, places is sufficient to engender suspicion in view of the great difficulty in the way of making an accurate determination. In regard to the application of the calorific values, as determined, to the calculation of engine thermal efficiency, there is a factor which does not appear to have been taken into consideration in previous investigations on this subject. This factor is the influence of the latent heat of evaporation upon the evaluation of the useful calorific value.

When a sample of liquid fuel is tested either in a Junkers or a bomb calorimeter, some at least of the heat liberated during combustion is devoted to overcoming the latent heat of evaporation of the liquid. In the case

\*From a preliminary report (slightly condensed) on research work conducted by the author and other investigators for the Asiatic Petroleum Co. and published in the Automobile Engineer.

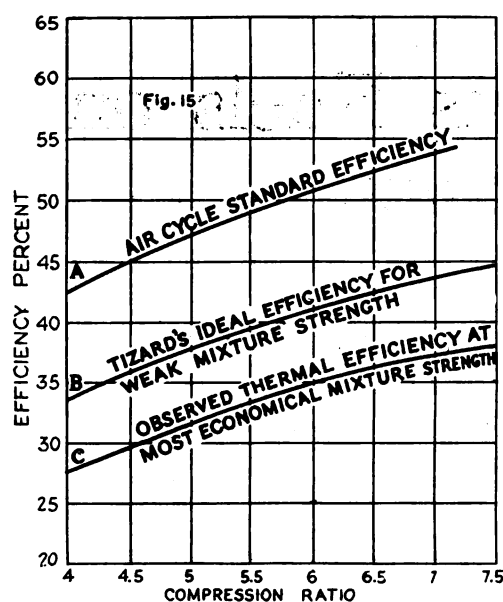
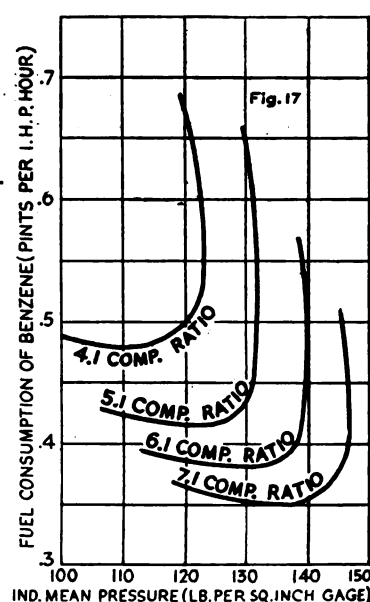
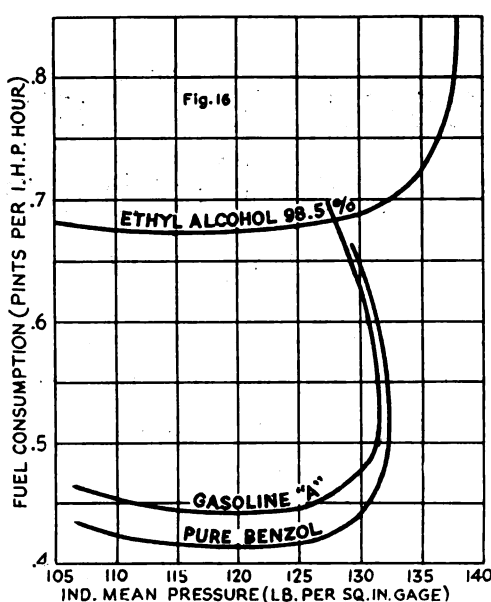


Fig. 15—Relation between thermal efficiency and compression ratio. Fig. 16—Relation between fuel consumption and indicated mean pressure with three different fuels, all used with 5 to 1 compression ratio. Fig. 17—Relation between fuel consumption and indicated mean pressure with benzol at different compression ratios



of the bomb calorimeter, for example, when a sample of liquid fuel is placed in the bomb only a trifling proportion is evaporated before combustion commences. During the process of combustion the remainder of the fuel is evaporated, and the heat required for overcoming the latent heat of evaporation is supplied by combustion. Now when used in an engine the whole, or very nearly the whole, of the fuel is evaporated before the end of the compression stroke, such small proportion as escapes evaporation usually passes through the cylinder unburnt. In practice the proportion of liquid fuel which actually both evaporates and burns during the combustion stroke may be considered as negligible, so that the heat required for evaporation may be regarded as being supplied either outside the cylinder or at least outside the heat cycle. It has been fully accepted by engineers that the latent heat of evaporation of the water formed by the combustion of any hydrocarbon and air should be deducted from the total available heat, because, owing to the high temperature of the cycle, no water is condensed, and consequently this heat cannot be made use of. It is therefore proper and customary to subtract from the total heat the heat equivalent of the evaporation of the water formed. It appears also to be right and proper to add to the total available heat the latent heat of evaporation of the fuel, since this is supplied outside the cycle. To be more strictly accurate there should be added the latent heat at constant volume, which is less than the latent heat at constant pressure by the amount of the work done on the atmosphere if the liquid is vaporized when uninclosed. So far as ordinary gasolines are concerned, the latent heat of evaporation of the fuel bears but a small proportion to its total heat, and does not seriously affect the issue; but in the case of the alcohol group its proportion becomes a very considerable one and should most certainly be taken into account. The most reliable determinations of the calorific value of alcohol, at present available, do not take into account the latent heat of evaporation, and the very high apparent thermal efficiency obtainable with this fuel is therefore largely fictitious.

Theoretical considerations would lead one to suppose that the thermal efficiency, that is to say, the proportion of the total effective heat converted into useful work, should be substantially the same at the same compres-

sion ratio for all fuels, with the possible exception of the members of the alcohol group. This is fully borne out by the experiments made. Provided the fuel is vaporized, or that all liquid is sufficiently finely divided and in suspension, the thermal efficiency at any compression ratio is practically constant.

In Table IX the following values are given for each fuel:

Column B.—The lower calorific value according to the accepted standards and the most careful and reliable determinations.

Column C.—The minimum fuel consumption in lb. per I.H.P. hour actually observed with a compression ratio of 5:1 and standard heat input to the carbureter.

Column F.—The "lower" calorific value (Column B) plus the latent heat of evaporation at constant volume.

For all the data given in these articles, except where specifically mentioned, the thermal efficiency has been calculated from the corrected calorific value of the fuel as given in Column F of Table IX, i.e., the calorific value as determined by bomb calorimeter minus the latent heat of evaporation of the water formed, but plus the latent heat of evaporation of the fuel at constant volume.

In the case of the special research engines, the means provided for measuring both the power output and the fuel consumption were such as to insure an accuracy (based on the mean results) of about  $\pm 0.25$  per cent.

It is very doubtful whether the useful calorific of a composite fuel such as gasoline can be ascertained to within closer limits than  $\pm 0.5$  per cent, more particularly when the fuel used is not a chemically pure substance, so that the observed heat value cannot be checked by analysis.

In all tests for power output and efficiency the following procedure was invariably adopted. The engine was run up to speed; the necessary adjustments were made, and a check test was taken on the standard fuel. So soon as the behavior of the engine was ascertained to be entirely normal the fuel was changed, without stopping the engine, to the sample to be examined. The needle valve in the carbureter was then opened until the power output fell slightly, due to over-richness of the mixture and readings of torque, speed and consumption were commenced. The standard jacket temperature, namely, 60 deg. C. (140 deg. Fahr.), and the standard rate of

heat input to the carbureter, namely, 0.0433 B.t.u. per min. per r.p.m. was maintained throughout the test by means of adjustment for each change of mixture strength. The exact number of revolutions during the consumption of a given quantity of fuel was recorded automatically by means of the magnetically operated counter. After each reading the needle valve in the carbureter was closed very slightly, and, after all temperatures had become re-settled, another reading, both of power output and fuel consumption, was taken. This procedure was repeated continuously until the mixture strength became too weak for steady running. Over-weakness was generally indicated first by a tendency to hunt, followed by popping back into the carbureter if the mixture were still further weakened. Such tests were carried out on every sample of fuel examined, and when the quantity available permitted, similar tests were run at different speeds, different jacket temperatures, or different rates of heat input to the carbureter. The results obtained from three of such tests are shown in Fig. 16, giving fuel consumption plotted against the mean pressure for gasoline "A," pure benzol, and for ethyl alcohol 98.5 per cent at a compression ratio of 5:1. Fig. 17 shows similar curves for benzol at different compression ratios, namely, 4, 5, 6 and 7 to 1. It will be seen that the general form and character of the curves so obtained are substantially the same for all the fuels. The differences that do occur are of a small order except in the case of the alcohol group. In the case of alcohol the power continues to rise with increase of mixture strength to an important extent. This is quite certainly due to the increased volumetric efficiency with rich mixtures resulting from the high latent heat of the fuel and the consequent fall in temperature of the charge. The relation between power output and consumption on the weak side is substantially the same for all fuels, but on this side

the efficiency obtained depends to a greater extent upon the nature and intensity of the ignition spark and upon its timing. Tests on the weak side were run, both with the ignition set to give maximum efficiency at normal mixture and with the ignition adjusted to suit each reduction in mixture strength. Fig. 18 shows the curves obtained (a) with fixed ignition setting, (b) with the setting adjusted for each change in mixture strength. It was observed that the ignition required to give maximum power on any gasoline with a compression ratio just below its detonation point and between the limits 4.5 to 5.5:1 was 31 deg. before top center at 1500 r.p.m. The ignition could be advanced with advantage when working on the weak side to as much as 45 deg. early on the weakest mixtures. The same applies in the case of all fuels tested. It is interesting also to note that at about the mixture strength giving complete combustion the ignition timing required was very nearly the same for all fuels from heptane to toluene or alcohol.

While the behavior of fuels at mixture strengths weaker than that giving complete combustion is very interesting from a scientific point of view, and highly suggestive of possible developments, yet, so far as the multi-cylinder engine is concerned, it is of but little practical value at present, because, owing to irregularities in distribution, such weak mixtures cannot be used. In every instance where any attempt has been made to supply to a four-cylinder engine a mean mixture strength appreciably weaker than that giving complete combustion, the result has been that one or more cylinders of the group are starved, their ignition becomes irregular, and back firing into the carbureter takes place.

In previous articles when dealing with the subject of detonation, it has been stated that the tendency to detonate is at a maximum at or about the mixture strength giving maximum economy. This is practically, scientific-

TABLE IX

Fuel	S.G. at 15° C. (59° Fahr.)	Calorific Value "Lower" (Exclusive of Latent Heat). B.t.u. per Lb.	Minimum Consumption at 5:1 Compn. Lb. per H.p. Hr.	Thermal Efficiency from Cols. (C) and (B). Per Cent	Latent Heat at Const. Press. (Atmospheric). B.t.u. per Lb.	Corrected "Lower" Calorific Value. B.t.u. per Lb.	Corrected Ther- mal Efficiency from Cols. (C) and (F) Per Cent	Minimum Consumption at 5:1 Compression Lb. per H.p. Hr.	Pints per H.p. Hr.	Min. Consumption at Highest Useful Compression Lb. per H.p. Hr.	Pints per H.p. Hr.
<b>Gasolines</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>	<b>K</b>
Aromatic free .....	0.713	19,080	0.415*	32.1	133	19,200	31.9	0.415*	0.462*	0.422	0.471
"A" gasoline .....	0.782	18,450	0.432	31.9	142	18,580	31.7	0.432	0.442	0.393	0.402
"B" gasoline .....	0.723	18,890	0.423	31.9	140	19,020	31.7	0.423	0.468	0.393	0.435
"C" gasoline .....	0.727	19,000	0.421	31.8	135	19,120	31.6	0.421	0.463	0.410	0.451
"D" gasoline .....	0.760	18,770	0.422	32.1	132	18,890	31.9	0.422	0.445	0.407	0.428
"E" gasoline .....	0.719	18,970	0.421*	31.9	133	19,090	31.7	0.421*	0.469*	0.435	0.484
"F" gasoline .....	0.704	19,130	0.414	32.1	134	19,250	31.9	0.414	0.471	0.412	0.469
"H" gasoline .....	0.767	18,790	0.425	31.9	145	18,920	31.7	0.425	0.443	0.389	0.405
Heavy aromatics .....	0.885	17,900	0.510	27.8†	136	18,030	27.6†	0.510	0.461	0.447	0.404
Kerosene .....	0.813	19,000	0.523*	25.6†	108	19,100	25.4†	0.523*	0.515*	0.581	0.571
<b>Paraffin Series</b>											
Hexane (80%) .....	0.685	19,250	0.411	32.2	156	19,390	32.0	0.411	0.480	0.405	0.473
Heptane (pure) .....	0.691	19,300	0.410*	32.1	133	19,420	31.9	0.410*	0.475*	0.491	0.568
<b>Aromatic Series</b>											
Benzol (98%) .....	0.884	17,300	0.458	32.1	172	17,460	31.8	0.458	0.415	0.392	0.355
Toluene (99%) .....	0.870	17,520	0.455	31.9	151	17,660	31.7	0.455	0.418	0.385	0.354
Xylene (91%) .....	0.862	17,800	0.452	31.6	145	17,930	31.4	0.452	0.420	0.381	0.354
<b>Naphthene Series</b>											
Cyclohexane (93%) .....	0.786	18,800	0.420	32.1	156	18,940	31.9	0.420	0.427	0.385	0.392
Hexahydrotoluene (78%) .....	0.780	18,760	0.425	31.9	138	18,890	31.7	0.425	0.436	0.394	0.404
Hexahydroxylene (60%) .....	0.744	18,770	0.424*	32.0	133	18,890	31.8	0.424*	0.466*	0.429	0.461
<b>Olefine Series</b>											
Cracked spirit (53% unsat.) .....	0.757	18,400‡	0.429	32.3	150‡	18,540	32.0	0.429	0.453	0.405	0.428
<b>Alcohol Group</b>											
Ethyl alcohol (98.5%) .....	0.798	11,470	0.663	33.5	406	11,840	32.4	0.663	0.665	0.532	0.533
Ethyl alcohol (95 vol.%) .....	0.815	10,790	0.705	33.5	442	11,130	32.5	0.705	0.692	0.565	0.555
Methyl alcohol (purified wood naphtha) .....	0.829	9,630	0.777	34.0	500‡	10,030	32.7	0.777	0.750	0.725	0.700
Methylated spirits .....	0.821	10,200‡	0.740	33.7	450‡	10,580	32.5	0.740	0.721	0.625	0.609

\*This sign indicates that at a compression ratio of 5:1 the fuel could not be used owing to detonation. These values for fuel consumption are therefore calculated from the readings obtained from tests made with lower compressions. The close agreement between thermal efficiencies calculated from these results clearly shows the uniformity of the relation between compression ratio and thermal efficiency for the different fuels tested.

†The low thermal efficiency observed for those fuels is quite certainly due to non-combustion of a portion of the fuel which probably remains liquid during the working stroke.

‡The calculated heat value for methylated spirits was given in Part I of these articles as 9,850 under a misapprehension as to the water content. The value now given, namely, 10,200 B.t.u. per lb., is probably nearly correct for the ordinary purple variety of this specific gravity.

§Approximate.

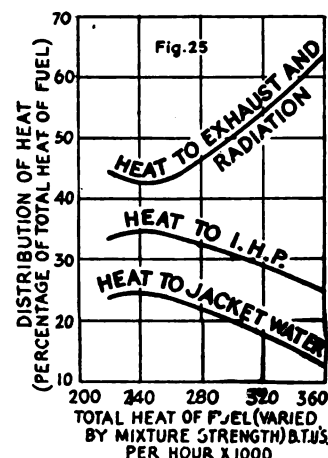
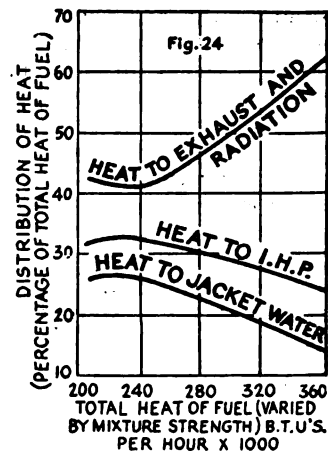
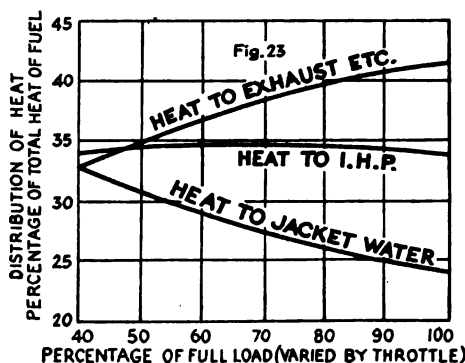
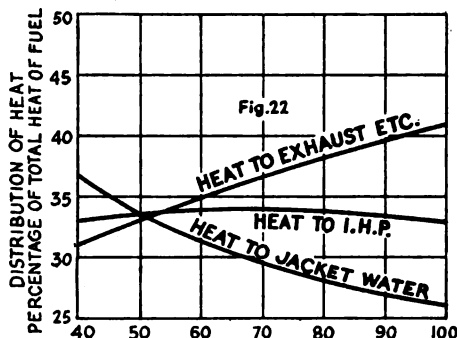
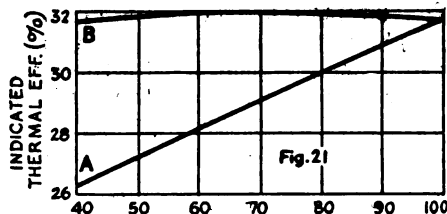
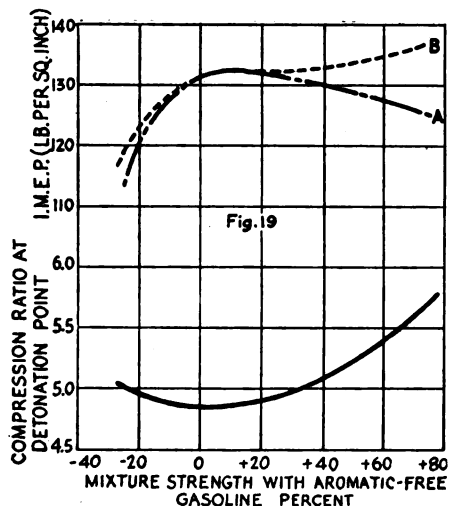
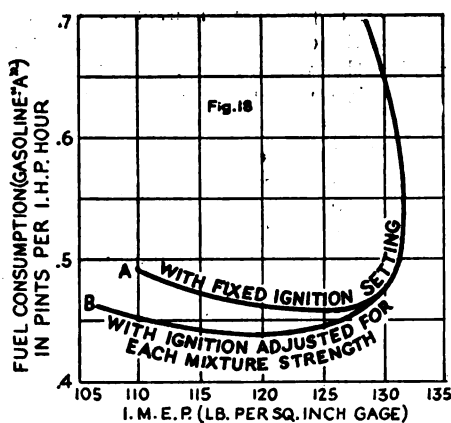


Fig. 18—Effect of spark timing upon relation between fuel consumption and indicated mean pressure. Fig. 19—Effect of mixture strength on indicated mean pressure and allowable compression ratio. Spark adjusted to give maximum power in each case. Fig. 21—Relation between indicated thermal efficiency and load, (a) with fixed ignition, (b) with ignition adjusted for maximum efficiency. Fig. 22—Heat distribution at various loads. Gasoline "A", Compression ratio 5.45 to 1, constant speed and uniform heat input, jacket temperature, etc. Fig. 23—Heat distribution at various loads, using alcohol as fuel, other conditions same as for Fig. 22. Fig. 24—Heat distribution at different mixture strengths on gasoline "A", 5.45 to 1 compression ratio. Fig. 25—Heat distribution at different mixture strengths on 95 percent alcohol, 5.45 to 1 compression ratio.

ally true. Strictly speaking, the tendency to detonate is at a maximum at or about the mixture strength giving complete combustion, and this in practice is almost coincident with that giving maximum economy. With the very weak mixtures a rather higher compression can be used without detonation, but under such a condition an engine is working between exceedingly narrow limits of mixture strength. Satisfactory running would be quite unattainable with an ordinary carburetor even on a single-cylinder engine. In any multi-cylinder engine to work within such limits of mixture strength is certainly far outside practical possibility. With a view to investigating this point more thoroughly a careful series of tests was made on the standard aromatic free gasoline over a range of mixture strengths from 75 per cent rich to 25 per cent weak. After each adjustment of mixture strength the compression ratio was varied so that detonation was just audible. The results of this interesting test are shown in the curves, Fig. 19. It will be seen that with any mixture strength between 10 per cent rich to 10 per cent weak the available compression ratio was 4.85:1. When the mixture was varied in either direction beyond these limits it became possible to raise the compression without causing detonation. The full line curve shows that when the mixture was 20 per cent weak the compression could be raised to 4.95:1, and with a mixture strength 75 per cent rich the compression could be increased to 5.75:1. The ignition setting was adjusted

to give maximum power for each condition. In the same figure is shown (a) the variation in m.e.p. over the same range of mixture strength at a constant compression ratio of 4.85:1, and with ignition timing adjusted to suit each mixture strength; and (b) the same again, but with compression ratio adjusted as permitted by each change of mixture strength. From these curves it will be seen that only a very slight increase in compression ratio can be obtained with weak mixtures, and then only when the mixture is so weak that the running is become unstable.

#### Influence of Jacket Water Temperature

While all standard tests were run with a jacket water temperature of 60 deg. C. (140 deg. Fahr.), some series of tests were also run at temperatures of 35 deg. C. (95 deg. Fahr.) and 85 deg. C. (185 deg. Fahr.). In the case of all fuels boiling below about 180 deg. C. (356 deg. Fahr.) the water temperatures did not influence the efficiency to any appreciable extent, though in some cases, notably with the more volatile fuels, a very slight gain in efficiency was observed when the water temperature was at its lowest, due probably to the general reduction in the temperature of the cycle. The difference was, however, exceedingly small, and for all practical purposes may be regarded as insignificant. It must be understood that these remarks refer to the indicated thermal efficiency. So far as the brake thermal efficiency is concerned, any increase in temperature of the cylinder



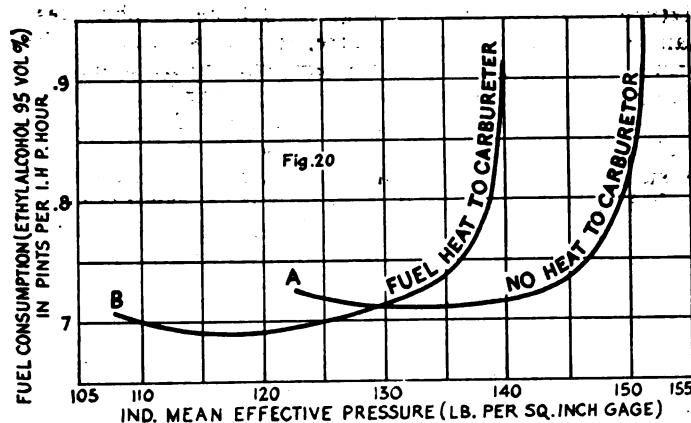


Fig. 20—Effect of heating the charge on the relation between fuel consumption and indicated mean pressure.

walls results in a decrease in piston friction due to the lower viscosity of the lubricating oil. The gain in mechanical efficiency due to reduced friction losses with higher jacket temperatures generally more than outweighs any difference in indicated thermal efficiency. Since piston friction is purely a mechanical factor and varies widely in different engines, it is thought best to deal only with the indicated performance. In both the variable compression and the supercharging engines on which these tests were made the piston friction is so low that the brake thermal efficiency was virtually unaffected by changes in the temperature of the cooling water.

#### Influence of Heat Input to the Carbureter

In all the standard tests a uniform rate of heat input of 0.0433 B.t.u. per minute per r.p.m., or 65 B.t.u. per minute at 1500 r.p.m., was supplied. Other series were also made with no heat input to the carbureter, and also with a heat input of 0.066 B.t.u. per minute r.p.m.

So far as the more volatile fuels are concerned, that is, fuels boiling below 180 deg. C. (356 deg. Fahr.), the heat input, while affecting the power very adversely by reducing the weight of charge entering the cylinder, had no influence upon the thermal efficiency except in so far as a high rate of heat increased the tendency to detonate, and so necessitated the use of a lower compression ratio. The effect of heat input to the carbureter and of water jacket temperature when running with a mixed fuel having an abnormally wide range of boiling, will be dealt with later, but the above remarks must be regarded as applicable to reasonably volatile and homogeneous fuels such as the various gasolines given in the tables, also the lighter aromatics and naphthenes. In the case of 95 volume per cent ethyl alcohol the efficiency rose from 31.6 per cent to 32.5 per cent, when the heat input was raised from nil to 0.066 B.t.u. per minute per r.p.m. In view of the behavior of most of the gasolines which have very much higher final boiling points, this feature is perhaps a little curious; but alcohol, owing to its higher latent heat, its considerable water content, and its low vapor tension, behaves somewhat differently from most of the other fuels tested. Fig. 20 shows the M.E.P. and fuel consumption obtained with 95 volume per cent ethyl alcohol, curve (a) with no heat input, and curve (b) with a heat input of 0.066 B.t.u. per minute per r.p.m. It will be seen from these curves that the minimum fuel consumption is appreciably lower under the heated condition. The maximum power output, of course, is very much lower. From tests on multiple-cylinder engines on gasoline, benzol, etc., where the problem of distribution enters into the account, it was found that a very considerable heat input was required in order to obtain the best thermal efficiency. The heat required varied con-

siderably for different engines; the amount may be taken as an inverse measure of the efficiency or otherwise of the distribution system.

#### Efficiency on Reduced Loads

When the load on an engine is reduced by throttling the supply of working fluid, and the mixture strength is maintained the same as for full load, the temperatures in the heat cycle will be substantially the same, since neither the ratio of compression nor the heat of combustion of the mixture are altered. The only condition which is changed appreciably is the proportion which the residual exhaust products bear to the whole of the working fluid. Apart from the latter consideration the efficiency of the cycle should remain very nearly the same at all throttle openings. Experiments with the time of ignition fixed at that giving maximum efficiency on full throttle have shown that, as the throttle is closed and the power output is reduced at constant speed and constant mixture strength, the efficiency falls; but when the ignition is readjusted to give maximum efficiency at each throttle opening, the indicated thermal efficiency remains substantially constant over a wide range of load, e.g., from 40 per cent to 100 per cent. Fig. 21 shows (a) the indicated thermal efficiency observed on petrol with a constant mixture strength and fixed ignition setting, and (b) the indicated thermal efficiency with the ignition adjusted at each load to give maximum efficiency. It will be observed in the case of curve (b) that the efficiency at about 70 per cent full load is actually appreciably greater than that obtainable on full loads. This characteristic is not peculiar to gasoline, but has been observed also with alcohol. Very great care was taken to ascertain carefully the variation in pumping losses at the different throttle openings, and to correct for such variation when computing the indicated power or efficiency. It would appear that the presence of a greater proportion of exhaust products on reduced loads influences appreciably the rate of burning of the mixture, and therefore necessitates an earlier ignition timing.

Fig. 22 shows the variation in heat distribution for gasoline "A" with different loads at a constant speed of 1500 r.p.m. and under uniform conditions as to heat input, jacket temperature, etc.

Fig. 23 shows a similar set of curves for 95 volume per cent alcohol under identical conditions. In both cases the heat input to the carbureter was proportional to the load and equivalent to 65 B.t.u. per minute at full load.

#### Efficiency on Alcohol

While at any given compression ratio the thermal efficiency was found to be the same on all volatile hydrocarbon fuels, the efficiency obtained with alcohol was consistently higher. For the samples of ethyl alcohol and for a sample of methylic alcohol (purified wood naphtha) accurate calorific values were obtained. These determinations were made by The Asiatic Petroleum Co. at their central testing laboratory at Shell Haven. The determination made of the heat value of 98.5 per cent ethyl alcohol agreed with the value given by Richards to within 0.25 per cent. The values for the alcohol are given in Columns B and F of Table IX. Very careful tests were run with 95 volume per cent ethyl alcohol at compression ratios of 3.8:1, 5:1 and 7:1 under exactly similar conditions as to speed, jacket temperature and rate of heat input to the carbureter. The distribution of heat to the jackets and to the exhaust was very carefully determined also. Similar tests were run also on several gasolines (within the limits of useful compres-

sion ratio) and on benzol. The results obtained are shown in Table X.

TABLE X

A	B	C	D	E
Com- pression Ratio	Ind. Therm. Efficiency, Alcohol 95 Vol. %	Ind. Therm. Efficiency, Hydro- Carbons	Relative Efficiency, Alcohol 95 Vol. %	Relative Efficiency, Hydro- Carbons
3.8:1	26.8	26.3	65.0	63.7
5.0:1	32.5	31.7	68.5	66.8
7.0:1	38.2	37.4	70.7	69.3

From this table it will be observed that the thermal efficiency obtained with ethyl alcohol at all compression ratios was some 2½ per cent higher than that obtainable with hydrocarbon fuels, when the calorific values in all cases are subjected to the same corrections for the latent heat of evaporation. The explanation of this gain in efficiency is to be found in the reduction in the temperature of the cycle due to the evaporation of the alcohol within the cylinder. In all cases the heat input to the carbureter at 1500 r.p.m. was at the rate of 65 B.t.u. per minute.

TABLE XI

Fuel	Total Heat of Fuel, B.t.u. per Hr.	Heat to I.h.p., B.t.u. per Hr.	Heat to Jacket Water, B.t.u. per Hr.	Heat to Exhaust, Etc., B.t.u. per Hr.
Gasoline	253,000	66,800	72,400	113,800
Alcohol, 95 vol. %	275,000	73,900	67,200	133,900

In the last article it was shown that the drop in temperature of the working fluid due to the evaporation of the liquid fuel was, in the case of gasoline "A," 20 deg. C. (68 deg. Fahr.), and in the case of ethyl alcohol 98 per cent., 85 deg. C. (185 deg. Fahr.), while in the case of 95 per cent volume it would, owing to the high water content, be equivalent to 97 deg. C. (207 deg. Fahr.). There appears to be no doubt that practically the whole of the fuel and the water contained in it evaporates completely either during entry to the cylinder, or, at any rate, before the completion of the compression stroke; it is clear, therefore, that the temperature at the end of compression will, in the case of alcohol, be some 70 deg. C. (158 deg. Fahr.) lower than in the case of gasoline. Since the maximum flame temperature of an alcohol

mixture is also about 100 deg. C (212 deg. Fahr.) less than that of a gasoline mixture, it follows that in the former case the highest flame temperature attained will be approximately 170 deg. C (338 deg. Fahr.) lower than that of a gasoline mixture, and the loss of heat to the jackets and that due to change of specific heat, etc., will be substantially reduced. Again, when running with alcohol, the total weight of working fluid passing through the cylinder is greater as explained previously, hence the relative loss of heat will be even slightly less than would appear from a consideration of the temperatures alone.

Table XI shows the heat distribution observed when running with gasoline "A" and with 95 volume per cent ethyl alcohol with a compression ratio, in this instance, of 3.8:1. The mixture strength both for the gasoline and for the alcohol was that giving maximum efficiency. From a comparison of the proportionate heat loss to the cylinder cooling water, it will be observed that the amount of heat given up to the cylinder walls is considerably greater in the case of gasoline than alcohol, indicating again a considerably higher cycle temperature.

Figs. 24 and 25 show respectively the observed variation in the distribution of heat (to indicated work, to cooling water, and to exhaust) with different mixture strengths on gasoline and alcohol in both cases at a compression ratio of 5.45:1. The horizontal scale denotes the total number of B.t.u. per hour supplied to the engine, and the vertical scale the percentage accounted for in i.h.p. and cooling water. The upper curve is plotted by difference, and represents the heat rejected in the exhaust and by radiation.

Table IX gives the observed minimum fuel consumptions in lb. and in pints per indicated horsepower hour. Columns H and I show the consumptions for a fixed compression ratio of 5:1. Columns J and K give the minimum fuel consumption obtained when running the engine with the highest useful compression ratio for each fuel.

## Strength of Screw Fastenings in Plywood

IF the screw fastenings in plywood construction are to be as strong as the plywood itself, it is important to adapt the size of screw, spacing, and margin to the particular species and thickness of plywood used. Tests made at the Forest Products Laboratory have shown that the commonly-used plywood species may be divided into the following groups, all woods in any one group requiring the same screw fastening to develop maximum strength.

GROUP I—Low Density		
Basswood	Douglas fir	Pine, white
Cedar, Spanish	Fir, true	Poplar, yellow
Cottonwood	Hemlock	Redwood
Cypress, bald	Pine, sugar	Spruce, Sitka
GROUP II—Medium Density		
Ash, black	Gum, cotton	Mahogany
Ash, pumpkin	Gum, red	Maple, soft
Elm, white	Hackberry	Sycamore
Gum, black	Magnolia	Walnut, black
GROUP III—High Density		
Ash, white	Birch	Elm, cork
Beech	Cherry, black	Maple, hard

The screw sizes, margin, and spacing for use with each species and plywood thickness will be found in the following table. The gage is the smallest that can be used with the thickness specified and not cause failure through breaking of the screw when the full strength of the plywood is developed. The length of screw is the shortest which will prevent the screw from pulling out before the full plywood strength is reached. The margin is the

smallest distance from edge of hole to edge of plywood which will insure against failure by shear. The spacing is the distance from center to center of screw holes which gave maximum strength per linear inch.

SIZE AND SPACING OF SCREWS FOR MAXIMUM STRENGTH IN PLYWOOD

Species of Plywood	Thick- ness of Plywood in Inches	Gage (Num- ber) of Screw	Screw Length in Inches, Species Receiving Point		Margin in Inches	Spacing in Inches
			White Ash	Spruce		
Group I	3/30	4	1½	¾	1½	¾
	3/24	5	1½	¾	¾	1½
	3/20	6	¾	¾	¾	1½
	3/16	7	¾	¾	¾	¾
	3/10	9	¾	1	¾	¾
	3/8	11	1	1½	¾	¾
Group II	3/30	5	1½	¾	1½	1½
	3/24	6	¾	¾	¾	1½
	3/20	7	¾	¾	¾	¾
	3/16	8	¾	1	¾	¾
	3/10	10	1	1½	¾	¾
	3/8	12	1½	1½	¾	¾
Group III	3/30	6	¾	¾	1½	1½
	3/24	7	¾	1	¾	¾
	3/20	8	1	1½	¾	¾
	3/16	9	1½	1½	¾	¾
	3/10	11	1½	1½	¾	¾
	3/8	13	1¾	2	¾	1

About equally good results were obtained with flat-headed screws without washers and round-headed screws with washers. Round-headed screws without washers proved an inferior means of fastening. The spacing given in the table is for screws in a single row, but staggering is recommended wherever possible.

# The Specification and Testing of Castings

Every engineer is aware of the difficulty of satisfactorily testing castings. Various methods are used, but each is subject to certain defects. Dr. Rosenhain analyzes here the different methods, points out their merits and deficiencies, and indicates the best practice under present conditions.

By Dr. Walter Rosenhain, F.R.S.

**C**ASTINGS play an important part in all automobile construction and it is correspondingly important that satisfactory methods of making tests and drawing up specifications should be arrived at. Yet there can be no doubt that it is a much more difficult matter to deal with castings in this respect than with other materials of construction. The reason is that the physical properties of metal which has undergone forging and rolling operations are rendered, to a considerable extent, uniform thereby, minor inequalities which may have existed in the ingot or slab being more or less "smoothed out."

It is true, of course, that no amount of hot or cold working will make really sound metal out of an unsound or segregated ingot, but enough is known about the nature of ingots or slabs to make it possible, by reasonable supervision, coupled with sound practice, to eliminate the grosser defects and differences, and minor differences only affect the properties of the final wrought product to a secondary degree.

It is quite different with an actual casting. In nearly all metals the physical properties depend to a very large extent upon the rate of solidification and cooling, so that the temperature of the metal at the time of pouring the casting, the temperature (or dryness) of the mold and its heat capacity, as well as the mass of the casting or of any particular portion of it, all affect the properties of the resulting piece. There are other factors also—dependent upon the design of the casting and the manner in which it is molded—which bring with them differences in the degree of soundness in different parts of the same casting. Taking all these factors together, it would seem that it is no easy or simple matter to state what is the "strength" of a given casting, even when the conditions under which it is made are carefully considered.

Some experiments to test this point have been carried out under the auspices of the British Aircraft Inspection Directorate of the Air Ministry, who took several crank-cases cast in aluminum alloys for aeroplane engines, cut them up and prepared a number of test pieces from various parts of the same casting so as to represent portions of varying thickness. Very great variations in tensile strength were found; as a rule, test pieces cut from the thinner portions proved to be much stronger than those cut from the thicker portions, but the relative position in the casting of the test piece and the "gates" and "risers" was also of importance. It may be that these differences are particularly well marked in aluminum alloys, but there is every reason to believe that the same results would be obtained with castings made of other metals. Further, if in a sand-casting, for instance, local chills were introduced with a view to affecting the rates of cooling of different portions, the effect on the resulting

tensile properties of test pieces cut from various portions of the casting would be still more marked.

If we face the facts squarely, then, we must admit that the material of any given casting does not possess any definite "strength" or even "tensile strength." How, then, are we to test our castings and how specify their strength? Various methods have been adopted and are more or less strongly advocated, and it will be worth while to examine them somewhat closely in order to arrive at a reasoned answer to our question.

## Testing Whole Casting

An obvious first suggestion is to test the casting as a whole in some well-defined manner, much in the way in which a railway tire is tested by placing it under the drop-hammer. With castings of complex shape, however, this is a difficult matter. It is, first of all, rarely possible to carry out such a test except under compression, and the compression properties of a casting are by no means necessarily representative of its tensile properties or of its "strength" generally.

Then, too, there is the difficulty of securing any reasonable degree of accuracy in a test upon a body of irregular shape. Slight variations in the position of the casting during the test, and, still more, slight variations in the thickness of the casting at the most heavily stressed point, are liable to bring with them variations greater than those which would normally be found as between a "good" and a "bad" casting of the same nominal metal.

Indeed, were the method of testing in this way once specified, it would be quite an easy matter for the founder—if he so wished—to thicken the casting slightly in the right place in such a way as to make it stand up to that particular test. Since the test can scarcely be made to correspond to real service conditions, the result might be anything but satisfactory so far as the real usefulness of the casting is concerned.

## Test Pieces and Bars

The next method to be discussed is one which has been widely used for certain purposes; it consists in making tests on test pieces cut out of definite places in actual castings. It shares with the previous method the serious disadvantage that a certain number of apparently good castings are destroyed for testing purposes, and, where large and complicated castings are concerned, this would be a serious matter. Nor is the cost of such a proceeding counterbalanced by any real advantage. If the portion of the casting to be used for the test is specified beforehand, it is a comparatively easy matter for the foundryman to make sure that this particular portion of the casting is entirely satisfactory. Quite apart from difficulties of that kind, however, such a test piece will

not, in the ordinary way, be truly representative of the casting as a whole; it may show too high or too low a strength, according to the kind of part from which it has been cut.

The third and most widely used and advocated method consists in specifying that one or more "test bars" shall be molded along with the casting and connected to it in a suitable runner, so that these bars are cast together with the main casting. The advocates of this method suggest that in such "cast on" test bars we have, substantially, a portion of the main casting itself, cast under the same conditions and in the same kind of mold, but always of a standard thickness, so that the effects of variations in the rate of cooling do not occur. This looks satisfactory at first sight, but there are difficulties about it.

The first of these is that there is no certainty whatever that the bars are really cast under the same conditions as the main castings. It is true that they are poured with the same metal and at the same temperature. On the other hand, the founder, in his own interests, will and must take care that these bars turn out as sound and strong as possible, and it does not follow, therefore, that the conditions of feeding, etc., will be the same for the test bars as for the casting to which they are attached.

Cases have been known where the test bars were so placed that during solidification the test bars were fed by metal drawn from the rest of the casting, which thus actually suffered "drawing" for their benefit. Nor need such an occurrence be the result of any intentional action on the part of the founder; it may easily occur without his knowledge or desire, and it is not, therefore, to be regarded as a difficulty of the same order as that which would arise if the test bars were "helped" by the insertion of suitable chills into the mold. Yet even if all these pitfalls be avoided, the "cast on" test bar is not a true index of the strength of any part of the casting itself, since the effects of drawing, contraction stresses, etc., are all more or less completely eliminated in the case of the bars, while they play a most important part in the main casting.

### Determining Metal Quality

If we feel obliged to admit the force of these destructive criticisms of the three methods of testing castings which we have so far discussed, what possibility remains open to us? The answer is that, although it is more or less futile to endeavor to obtain tests representing the strength of actual castings, it is possible and desirable to obtain tests representative of the quality of the metal of which the casting has been made.

If we are satisfied that the metal was right in composition, temperature, etc., and inspection shows that the casting is a good one—sound and free from "drawing"—then we can be sure that the strength of the casting will be as good as the material in question can yield. If one thinks of it carefully, no test can really establish more than this, unless it is one which can be applied to every casting without causing destruction. Our problem, then, resolves itself into devising a means whereby the quality and condition of the metal from which any casting has been poured can be satisfactorily tested. This is a relatively simple problem, since it is only necessary to have a sample of the metal poured into some standard mold immediately before and, preferably, also immediately after the main casting is poured.

It may perhaps be urged that the "cast on" test bar constitutes the simplest and safest way of doing this, but certain objections to the "cast on" bar have already been mentioned. Beyond these, however, there is this

very serious one, that "cast on" bars have nearly always to be cast in a sand mold, and it is by no means easy to standardize a sand mold to a satisfactory extent. Small differences of ramming, venting, gating, etc., make large differences to the resulting bar. All these objections are removed if the test bars are cast in separate small chill molds. These can easily be made and kept to a closely defined standard, nor can they be in any way tampered with or altered in such a way as to give a "better" result than the metal deserves.

These considerations do not, perhaps, apply to cast iron, in which material a chill cast bar would obviously be quite unsuited for testing and entirely out of relation with any casting molded in sand. For other metals, however, and particularly for aluminum alloy castings, with which the automobile engineer is deeply concerned, it may safely be said that the results obtained with a bar cast in a chill mold 1 in. in diameter and from 9 to 12 in. high are a good approximation to the best results which can be obtained from cast material without heat-treatment.

### Weakness of Test Bar Method

It is this very consideration, that the separately cast chill test bar gives the best value obtainable with the alloy, which is both the great strength and—in one sense—the weakness of this method of testing and specifying the strength of cast material. Its strength lies, as already indicated, in its easy standardization and in the practical impossibility of improving, by any ordinary device, upon the results which the straightforward use of the chill will give.

The test thus furnishes the clearest and most definite measure of the quality of the actual material used in the production of the casting. The weakness of the method—such as it is—lies in the fact that the strength found in the chill-cast test bar is not even approximately the same as that of the actual casting. It is sometimes suggested that the appearance, in the specification, of the high tensile test figure which the chill-cast test piece must produce is apt to mislead the designer and to give him the impression that the material is much stronger than is in reality the case. This is, surely, an aspersion on the intelligence of the designer, who must know enough of his materials to appreciate the difference between a standard chilled bar and the various portions of a casting molded in sand, with or without the introduction of local chills.

Provided that such unintelligent misinterpretation of specifications need not be considered seriously, the value of the test figure from a chill-cast test piece is at least as great as that from any other test piece that can be used. None of them, as we have seen, can be taken by itself to represent the real strength of the casting, and the only sound method of handling the problem is to correlate the actual strengths found by a few preliminary tests on pieces cut from various parts of a casting with the results of a standardized test made upon the metal at the same time. Once such correlation has been obtained, and provided that the inspection of the castings is carefully carried out so as to insure the absence, at least, of visible unsoundness and drawing, then the data obtained from current tests on a standard chill-cast bar can be safely used as a guide to the quality of the metal used and, therefore, of the castings themselves. It is, at all events, a sounder guide than can be obtained from test results of pieces produced in a less standardized and more readily varied manner.

### Accessory Tests

While the whole problem of the testing and specification of castings is thus a difficult one, there are certain

accessory tests which can be usefully employed. These are the ordinary "hardness" tests by means either of the Shore scleroscope or some modification of the Brinell ball-indentation test. By either of these methods it is possible to make tests, if desired, upon definite parts of every single casting.

By itself such a test could scarcely be regarded as adequate, since the correlation between tensile strength and Brinell or scleroscope number is not very reliable in aluminum alloy castings unless very careful control of the chemical composition is at the same time maintained. But as an adjunct to the system of testing by means of standard chill-cast tensile test bars, these hardness tests are particularly valuable. They can be made in such a manner as not to affect the usefulness or the appearance of the casting, and they can be made rapidly and, therefore, cheaply. Their utility lies mainly in serving as a test of uniformity of quality, but correlation with the tensile properties, both of the casting itself and of the test bar, is perfectly possible for any given alloy and type of casting.

Apart from the purely mechanical tests which have been discussed above, a number of other problems arise, particularly in connection with aluminum alloy castings. For certain purposes, particularly pistons and cylinders of engines, porosity is regarded as dangerous and tests are often specified to guard against such a defect. This generally takes the form of a test under hydraulic pressure of moderate severity—200 to 300 lb. per square inch, and the casting is required not to "sweat" under this test. If it does, the question arises whether any form of "stopping" or "doping" shall be permitted. Under war conditions British practice permitted "doping" with solutions of silicate of soda in the case of all castings other than pistons, but it is very doubtful whether such treatment is not unduly risky for other than war purposes. It is certainly a thing to be avoided if at all possible, and recent progress in the casting of aluminum alloys suggests that aluminum foundries should be perfectly

able, under normal conditions, to produce castings which do not require "doping." They may cost a little more—on account of occasional rejections—but the automobile engineer is well justified in insisting upon having them.

While insisting upon having his castings sound, non-porous and free from "drawing," the engineer should not attach undue importance to one feature which is frequently found in aluminum alloy castings. This consists of numerous very small spherical holes which can be seen on most of the machined surfaces of such castings. These appear to be due to very minute gas bubbles liberated at the moment of solidification. If one watches the surface of the molten alloy just prior to solidification, it behaves rather like the surface of very weak soda-water—minute bubbles rise and burst or remain on the surface—there is, indeed, a very mild kind of effervescence. Very great care in melting the metal is required to reduce or eliminate these minute bubbles, but fortunately they do not appear to be seriously harmful. The writer has repeatedly found that test pieces giving exceptionally good results were apparently full of these bubbles, while others, nearly or quite free from them, gave lower results. They are not, of course, a desirable feature, but they do not indicate real porosity and it would be unwise to reject a casting on their account if they are not unduly large.

While the remarks in the last few paragraphs of this article have been devoted specifically to aluminum alloys, most of the general considerations put forward apply to castings in most metals, although cast iron presents problems of its own. Enough has been said, however, to suggest that the specification and testing of castings is a matter which requires careful consideration. Under war conditions it has received this consideration in England, and the method of the separate chill-cast test piece has been adopted very widely. In American practice this is not the case, and for that reason it has, perhaps, been worth while to set forth the whole case, as fairly as possible, here.

## A Four-Valve Motorcycle Engine

**R**ICARDO has designed for the British motorcycle maker with the largest output (Triumph), a four-valve single cylinder engine for use in the recent Isle of Man motorcycle road races. The new engine has the valves in pairs at 90° in a detachable cast iron cylinder head. They are operated by a pair of push rods. A separate pocket and pipe is provided for each exhaust valve, but the inlet valves have a single pipe and port. A machined steel cylinder with horizontal ribs is used and is held to the aluminum crank case by four set screws in steel bushes. The head is secured to the cylinder by four long bolts passing down through the double bottom rib. Pistons are of the slipper type in aluminum with two narrow rings.

The inlet valves are of the Ricardo masked type having their seatings recessed in the valve pocket, so that a quick effective opening and cut-off is secured, with a comparatively gradual initial and final movement, from and to the seat respectively.

This new engine is not yet standardized, has not, in fact, yet passed the experimental stage; but it is intended eventually for the Triumph standard machines, displacing the 550 c. c. 4 h.p. side valve engine used for some years past. Its bore and stroke are 80.5 x 98 mm. and it is designed to run up to 5000 r.p.m. The peak of its power curve reaches 20 b.h.p., admittedly a remarkably high output for a single cylinder of this size.

The B. S. A. Company also put up a special overhead two-valve engine for the Isle of Man (Tourist Trophy) Races. This, too, has a single cylinder and a peculiar feature of the valve system is the adoption of "knife edge" bearings for the overhead rockers.

## New Make of Laminated Wood Disk Wheel

**A** VEHICLE wheel in which a disk of laminated wood takes the place of the usual spokes has recently been developed. The wheels are made from the same grades of wood as used for airplane propellers and are laminated in such a way that the grain in each lamination runs in a different direction from the grain of the other laminations.

These wheels are claimed to be of about the same weight as spoked wheels but to have four times the lateral strength. Tire inflation does not involve any unusual difficulties with this wheel, the air tube being attached to the outside of the wheel. The air valve pocket has a flat cover front and back, so there is no projecting part to be knocked off and no open pocket to catch dirt. No spare wheel needs to be carried, only a spare rim with tire. The wheel is manufactured by George W. Smith & Co., Inc.



# Machining an Eight-Cylinder Crankcase

A production of 20 engines per hour is maintained in the new engine plant discussed here. Machining the crankcase presents problems in the construction of jigs and fixtures. Many special machines are used to produce this eight-cylinder, V-type aluminum crankcase.

By J. Edward Schipper

**M**ANUFACTURE of the crankcase for an eight-cylinder engine entails some very interesting production problems on account of the V-construction. In order to have the proper angle between the blocks, the landing faces for the cylinder flanges are, of course, at a complementary angle. Some difficult manufacturing problems must be solved, particularly in the way of jig and fixture construction, in order to perform simultaneous drilling and other machining operations.

The new Oldsmobile engine plant, which has been completely tooled and equipped for the manufacture of the small, eight-cylinder engines, is arranged for a production of about 20 engines per hr. The operations on the different machines are all timed for about this pace, and the machine tool equipment is very closely balanced so that practically all of the machines are in operation during the entire 9-hr. working day to maintain a smooth flow of manufacture. The crankcase material is aluminum and of orthodox construction.

The finished crankcase is shown in Fig. 1, receiving its final inspection. This finished view of the case will give an accurate idea of the machining problems required for its manufacture. As will be noted, it is a unit powerplant type of case and has the camshaft centrally located above the crankshaft, as is customary in eight-cylinder, V-practice.

The crankcases are first checked over to determine if there is sufficient metal for all machining cuts. The locating points are checked at the foundry. There are three locating points, two supporting arms and the boss for the oil line, which runs to the front camshaft bearing. These same locating points are used for the first manufacturing operation, which consists of milling the oil pan or bottom face of the crankcase. This work is done on an Ingersoll miller with a rotary table. The machine holds five cases and gives both a rough and finish cut. There are three cutters, two being for the rough cut and one for the finish cut. The cases are secured to the table by clamps which hold the supporting arms of the case and location is fixed by stops at the points described. The machine readily takes care of 20 crankcases per hour, and provides practically continuous cutting, the operator being only required to load and unload the cases on the rotary table. This machine, which is illustrated in Fig. 2 is a special machine made by the Ingersoll company for this particular work.

After the oil pan face has been milled off, the milled face and the dowel pin holes are used for locating practically all of the following operations. The next operation is to drill and ream the oil pan and dowel pin holes. The work is done on the Leland-Gifford two-spindle machine. The work is located from the oil pan face and the two pads

on the right side of the case. There is a V-block for end-wise location.

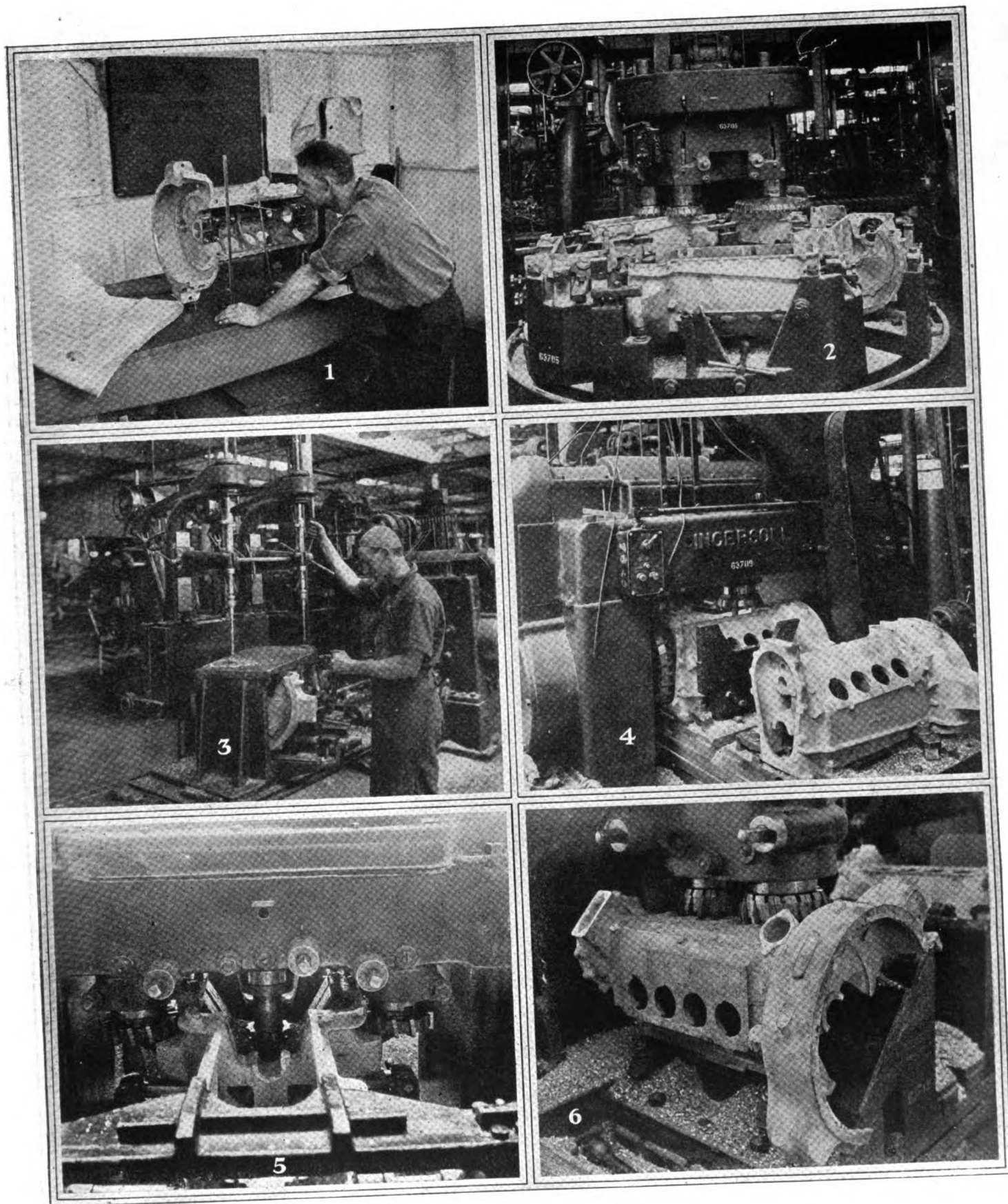
An Ingersoll miller is used for facing off the timing gear ends of the crankcase and also the generator and distributor pads. These pads are on the top surface of the case and the work necessitates the simultaneous operation of three cutters. The machine is designed to be loaded while in operation so that a minimum amount of time is lost between cuts.

Another Ingersoll machine mills the main bearing surfaces and the motor support arms. This requires three cutters, the operation being shown in Fig. 5. The location for the work is from the oil pan face and the two pads on the right side of the crankcase. Following this operation, the cylinder contact face is rough milled on an Ingersoll milling machine. The location for this work is from the dowel holes and the work is handled by putting the crankcase in, first on one side and then turning over to the other side to take care of both cylinder block contact faces. A similar machine is used for taking the finish cut on these contact faces, the operation being similar to that shown in Fig. 6, which illustrates the rough cut.

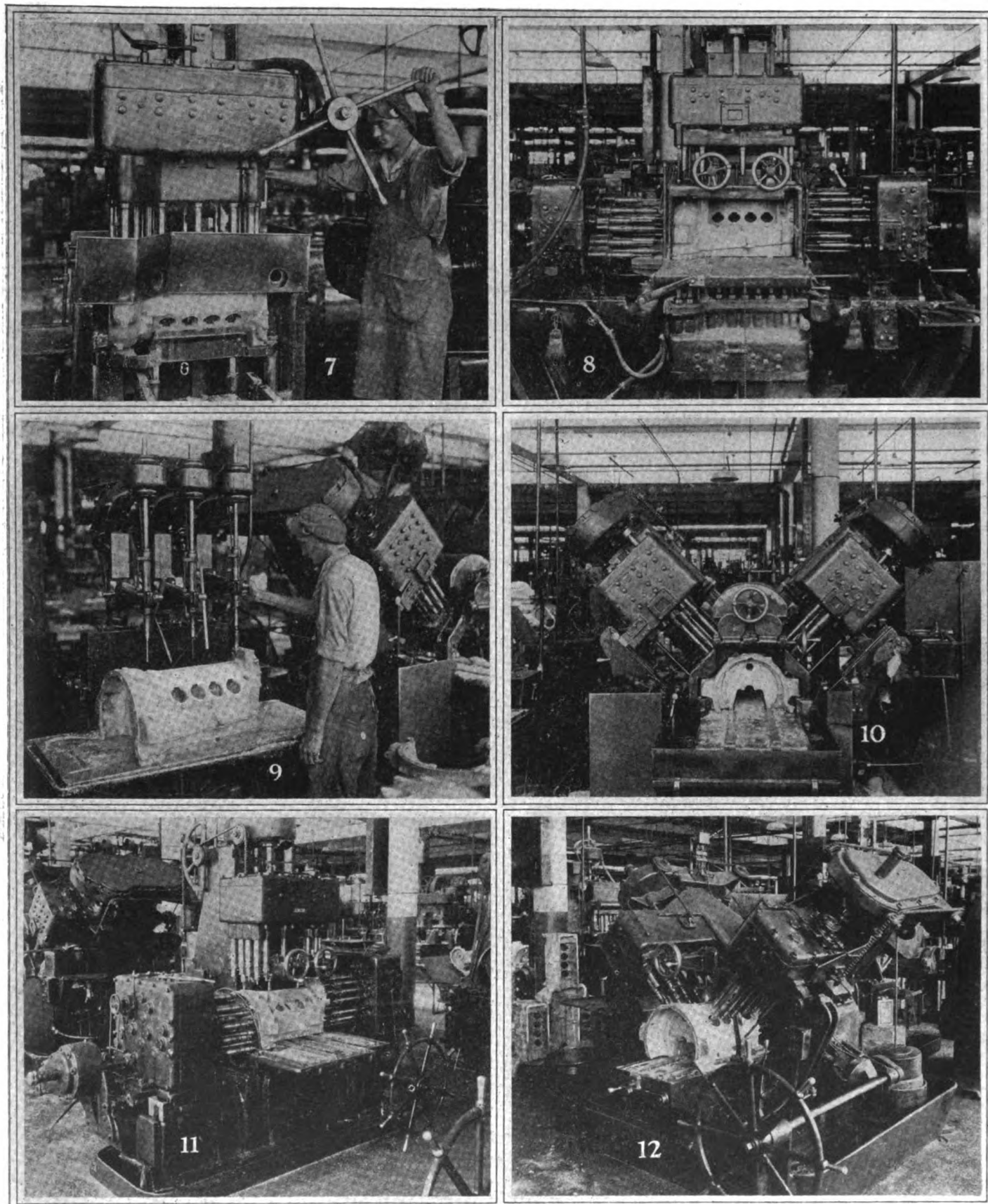
A 22-spindle Foote-Burt machine drills all the holes for the main bearing studs, for the main bearing dowel holes, the oil pan holes and the motor support holes. The work is located from the dowel holes and the crankcase is handled in a pedal operated, elevating jig. This is a very good example of special machine drilling work and is illustrated in Fig. 7. Another very good illustration of this type of work is in the following operation, which is also handled on a Foote-Burt machine, as illustrated in Fig. 8. The work consists of drilling the oil pan holes and also the holes for the clutch housing, crankcase cover, rear, gear-case cover, front cam bearing stud, distributor brackets, spark control brackets, generator bracket stud, main oil line, and the oil pressure gage screw hole, giving a total of 77 spindles. It is a four-way machine and supplants equipment which a few years ago would have comprised from five to ten machines. This work is all located from the dowel holes.

For drilling the center cam bearing lock screw hole and the front cam bearing oil hole and spot facing both these holes a 3-spindle Leland-Gifford is utilized. These are all separate operations done one at a time on this machine as illustrated in Fig. 9.

One of the operations which illustrates the special machine required for eight-cylinder V-type crankcases is illustrated in Fig. 10. This is a Foote-Burt, two-way machine, which reams the piston clearances and drills the holes for the cylinder contact studs, the dowels for the cylinders, oil returns and main bearing oil leads. The machine also reams the cam bearing lock screw holes and the

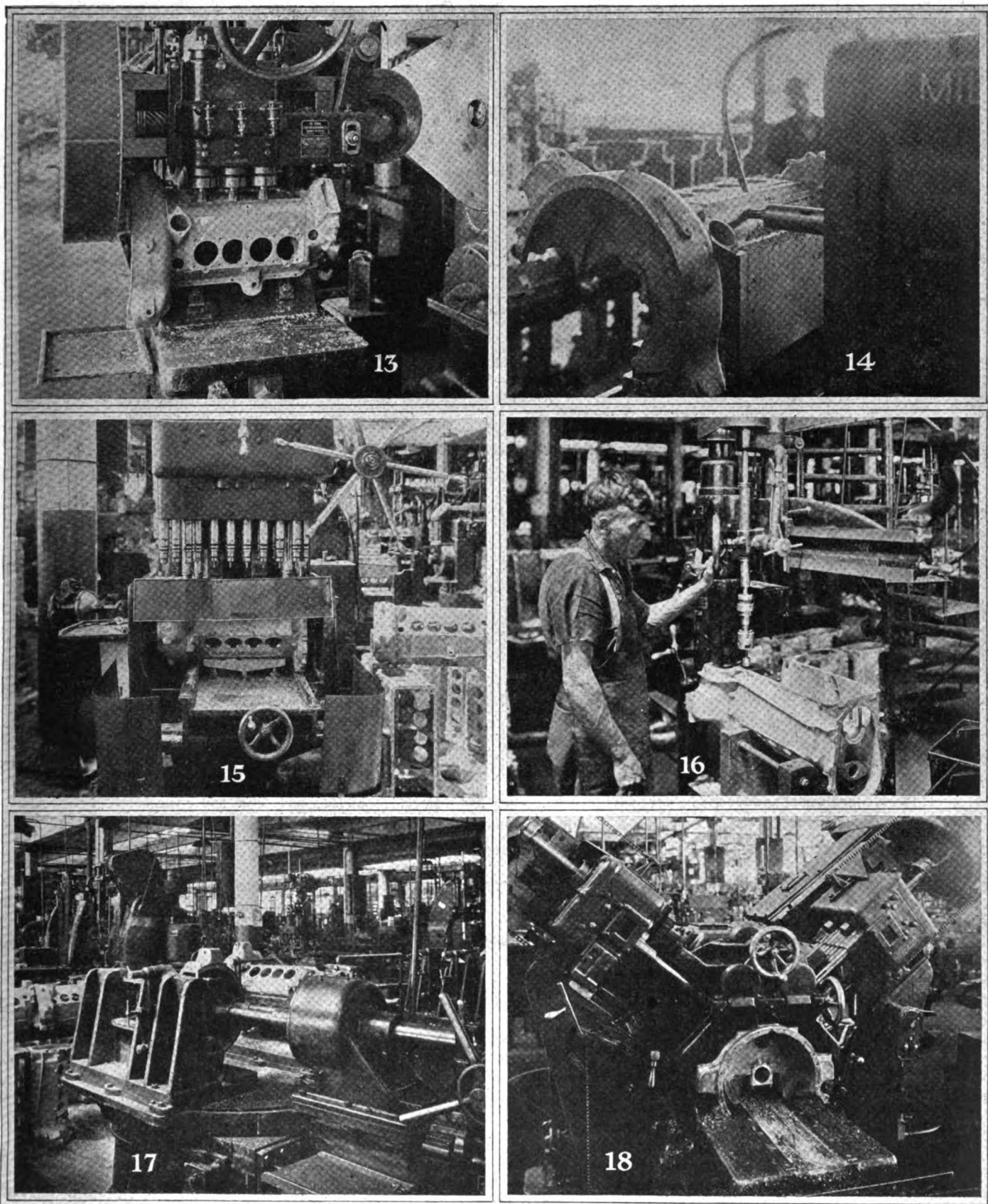


- 1—Final checking and inspection of crankcase on surface plate.
- 2—Milling the oil pan face on Ingersoll rotary miller which holds 5 cases at a time.
- 3—Drilling and reaming oil pan and dowel pin holes on a Leland-Gifford two-spindle machine.
- 4—Milling timing gear end, generator and distributor pad at the same time on Ingersoll miller.
- 5—Milling main bearings and motor support arms at same time on Ingersoll miller.
- 6—Rough milling the cylinder contact face with two cutters operating simultaneously on Ingersoll miller.

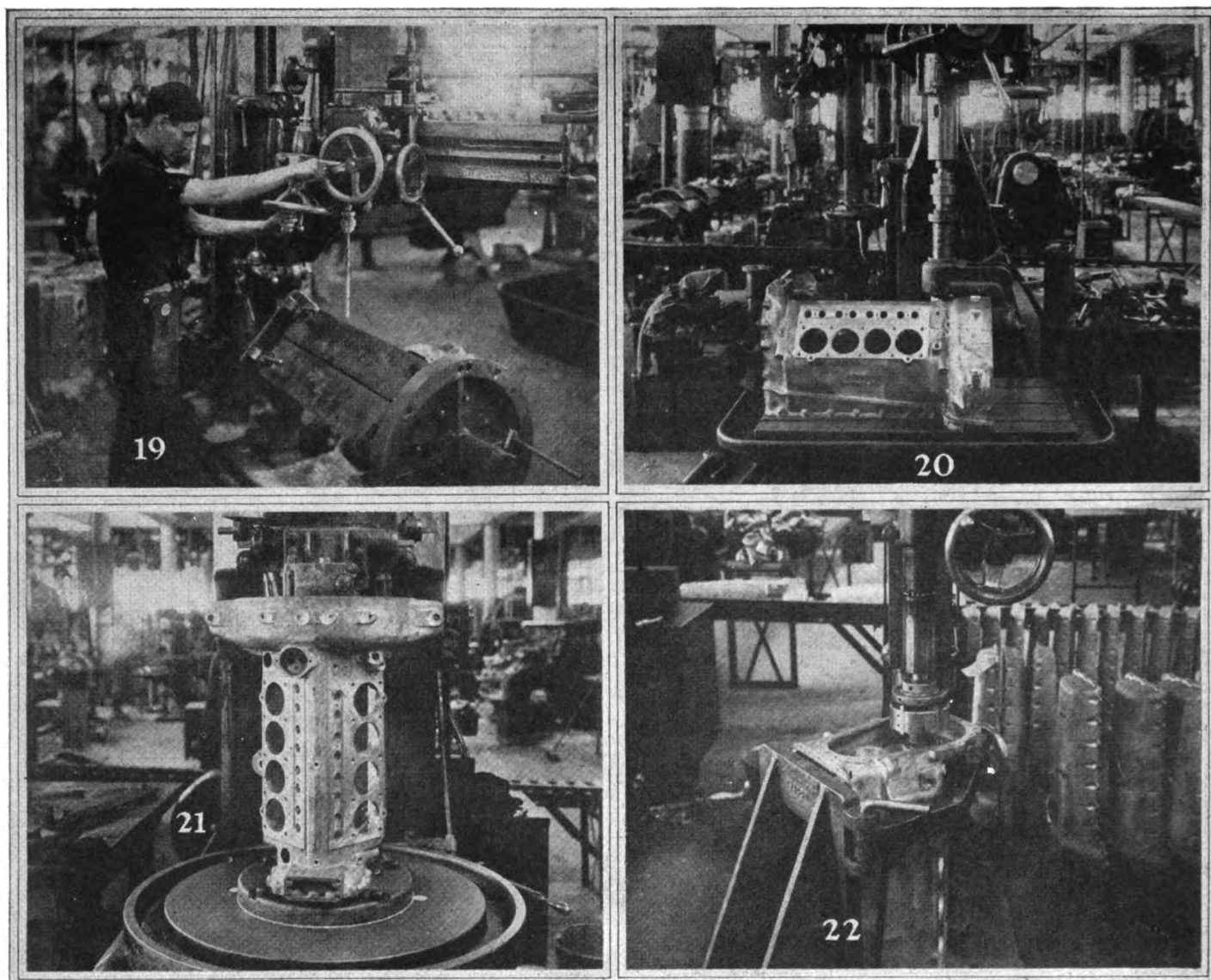


7—Drilling for main bearing dowel and other holes on Foote-Burt machine  
 8—Four-way drilling operation on special Foote-Burt machine with 17 spindles  
 9—Leland-Gifford machine drilling center cam bearing lock screw holes, front cam bearing oil holes and spot facing holes  
 10—Reaming piston clearance on special Foote-Burt machine, which also performs other operations described in text  
 11—Three-way taper which takes care of clutch housing and other holes. This is a 48 spindle machine  
 12—Two-way Foote-Burt taper taking care of cylinder block stud and other holes





- 13—Automatic profiler for milling valve lifter guide seat  
 14—Milwaukee miller for valve inspection cover  
 15—Tapping main bearing stud holes and oil pan screw holes with 31 spindle Foote-Burt machine  
 16—American radial utilized for retapping oil pan and other screw holes  
 17—Rockford horizontal drill for rough boring cam and crankshaft bearings  
 18—Two-way Foote-Burt machine for drilling valve lifter guide holes



19—Holland radial and tumble jig used with indexing fixture for drilling valve lifter guide stud and other holes. 20—Reaming distributor bracket hole on Foote-Burt machine. This machine also drills and reams oil pump shaft hole and other openings in the case. 21—Ingersoll machine for milling clutch housing and rear crankcase cover. The work is located in this operation from the crankshaft bearing by means of bar which passes straight through. 22—Facing front camshaft bearing on Cincinnati drill

breather tube and oil gage holes. It handles the work for all eight cylinders at a time, having 39 spindles and being a specially designed machine throughout, particularly for this V engine. The machine has a capacity of from 20 to 30 crankcases per hr., which readily allows it to take care of capacity production by the rest of the machines in the shop.

A special, three-way, Foote-Burt taper taps the clutch housing holes and also the holes for the rear crankcase cover, control brackets, distributor brackets, generator bracket pad, main oil line, gear cover stud, and the front cam bearing stud. This necessitates 48 spindles for the work and the holes are all tapped simultaneously. It will be noted from the illustration that in practically all of these operations the crankcase slides on the jig and the locating dowels are elevated when the case is in place. The nature of the machine equipment for a V-type of engine is again brought out by the two-way Foote-Burt taper shown in Fig. 12. This machine taps the cylinder block stud holes, the rear cam bearing lock screw holes, the main bearing oil line holes and reams the breather holes and the holes for the oil gage. The location is by the dowels as for the other similar operations and the clamping arrangements for the work are also similar.

The profiling operation for milling the valve lifter guide seat is done on an Automatic Machine Co. profiler with three cutters. This operation, which is shown in Fig. 13, is handled at the rate of 20 per hr. readily, so that this machine holds its position in the production line and balances with the rest of the shop equipment. A Milwaukee miller, shown in Fig. 14, mills the valve inspection cover face. This work is located from the cylinder dowel holes and the jig is so arranged that the work can be turned over for the similar operation on the other side of the case. A Foote-Burt taper taps the main bearing stud holes and the oil pan screw holes. This is a 31 spindle operation and is shown in Fig. 15. The same dowel location is used for this work.

In order to be sure of the size and quality of the threads in the oil pan screw holes, an American radial is utilized for re-tapping all of these holes and also the main bearing stud holes. This machine drives 8 studs and the bearing and cap is assembled on this same operation. The nuts are put on the studs and the machining shims put in place in the bearing. An Errington tap chuck with a friction release is used for putting on the nuts with uniform tightness.

After this operation, the work is passed along to the



Rockford horizontal drill shown in Fig. 17. This rough bores the cam and crankshaft bearings on Kelly reamer bars. To expedite the work, a rotary indexing table is utilized so that one may be loaded while the other is being cut. The table is then swung around, indexing properly for the operation to go ahead on the next case while the first case is being unloaded and another slipped in place.

Another Rockford horizontal drill exactly the same as for the previous operation is used for facing the crankshaft bearing. The Kelly bar has four cutter slots, allowing two cutters to work forward at a time and then two back at a time. Another machine of the same description is used for making the finish cut.

After the bearings have been cut by this method, the case is forwarded to a Foote-Burt, two-way machine for drilling the valve lifter guide holes, as illustrated in Fig. 18. These are all drilled simultaneously and the crankcase is then passed to a Holland radial drill, which drills the valve lifter guide stud holes, the main oil line holes and spot faces the control bracket bosses and the oil gage bosses. This work is handled in a tumble jig with an indexing fixture, illustrated in Fig. 19.

The case is then reamed on a Foote-Burt reamer which

takes care of the distributor bracket hole and also drills and reams the oil pump shaft hole and distributor drive shaft hole. This is a single spindle machine. This machine also finishes the distributor boss, using a combination facing tool and reamer.

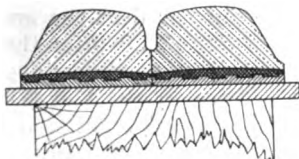
The crankcase is stood on end for the next operation, which takes place in an Ingersoll milling machine. This mills the clutch housing and the rear crankcase cover. The work is located from the crankshaft bearing holes by means of a bar which passes straight through. There are five cutters on this machine taking care of this work. The operation is shown in Fig. 21. The front camshaft bearing is faced on a Cincinnati drill, the work being located from the dowel holes. This operation is shown in Fig. 22. The crankcase is then passed to a Holland radial drill which takes care of the rear crankcase cover dowel holes, the oil return pipe holes, two stud holes in the main oil line and drills on top the oil line lock screw hole in the front end of the case. The finishing operations on the case consists of drilling the bearing studs on a Hammond radial and tapping the valve lifter guide stud holes on a two-way, eight spindle, self-reversing Leland-Gifford automatic tapping machine.

## Some Recent Automotive Developments

### A French Solid Tire

**A** NON-SYMMETRICAL dual solid rubber tire has been put on the French market by Bergougnan specially for use on the rear wheels of 3 to 7-ton trucks. It is claimed that this new construction combines all the advantages of the round with the flat tread tire without any of their respective disadvantages, and is an improvement on the big single solids commonly employed by American makers.

The recognized advantages of the flat tread tire are



The Bergougnan non-symmetrical dual solid rubber tire for use on heavy trucks. It is employed on the Renault 7-ton trucks.

that it conforms to the profile of the road, the load is spread over a bigger surface and it is less inclined to heat. On the other hand, the flexions of the tire under load break down the walls and have a tendency to loosen the soft rubber from the hard rubber base by which it is secured to the steel rim. This tendency is considerably reduced with the round tread tire, for the pressure is transmitted through the axis of the tire; as a disadvantage, the area in contact with the road being reduced there is a greater tendency to overheat.

On the new Bergougnan the two rubber bands are brought closer together than usual, as shown in the illustration, giving the theoretical advantages of the flat with the practical advantages of the round profile.

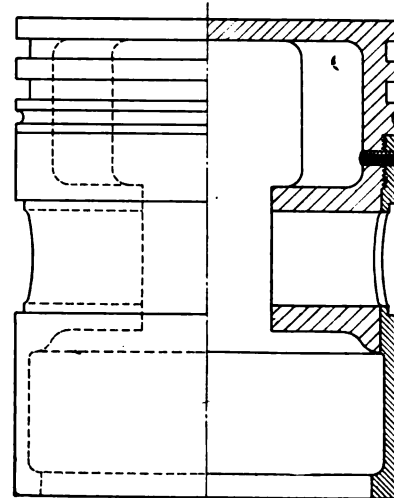
### New 10-Ton Caterpillar Tractor

**A** NEW 10-ton tractor model specially suited to conditions on the Pacific Coast is announced by the Holt Mfg. Co. It has a rating of 60 hp. on the belt and 38 hp. on the drawbar. Among the new features are pressure oil feed to the crankshaft bearings and better protection of working parts from dust and dirt. The valve push rods are enclosed, the breather and oil filler is of a new

type claimed to be dust and dirt proof, and the cylinder heads are completely covered. A new type of air cleaner is included among the items of standard equipment. The transmission has large bearings and cut steel gears.

This new Western model is designed particularly for orchard and road work, logging and general farm work. Full spring mounting is provided. The split truck construction makes the tractor flexible and adapts it to work on extremely rough ground. The driver sits on a cushioned swivel seat and controls the brakes used for steering with his feet. The steering column carries the spark and throttle controls and the two-armed clutch control that releases the drive to one or the other of the tracks. Hand levers control the main clutch and gear shift. A geared hand starter is operated from the driver's deck. The fuel tank is filled from the deck and the flow of oil to the tracks is controlled from there also. Access to the engine can be gained by removing the engine hood and the interior of the engine can be reached by taking off large hand-hole plates.

### Aluminum Piston with Cast Iron Skirt



Chase composite piston

**T** P. CHASE, formerly chief engineer of the King Motor Car Co., has invented a piston with the head and wrist pin bosses cast integrally of aluminum, while the skirt or remaining portion of the piston is formed of cast iron. In this piston the aluminum is cast on the iron portion. The piston is illustrated in the accompanying part sectional view.

# Insurance Is a Sales Resistant

Present methods of handling automobile insurance are not satisfactory. Mounting insurance rates are increasing resistance to car sales. It costs more than \$150 a year in one town of 175,000 to insure a well-known car for fire, theft, liability, and collision. That is enough to make a man think twice before buying a car. The problem must be considered.

**E**VERY factor which acts as a sales resistant is being closely scrutinized by the manufacturer. The mounting costs of automobile insurance are of serious concern, since the item of insurance has now grown to such proportions as to be an important financial factor in car ownership. When an ordinary owner is compelled to pay several hundred dollars a year insurance, in addition to the regular garage and upkeep charges on his car, he is apt to count his resources more carefully before buying the next car. Especially is this true since insurance rates give no indication of having reached a maximum.

One of two things is likely to happen in the case of any individual in the class of what may be called marginal car buyers: those who have just about enough income on which to operate a car but not much more. Such a man is likely to buy the car and take a chance without insurance or simply do without the car.

It will be readily granted, probably, that insurance rates have become a definite sales resistant; that they have increased enormously during recent years. The question of responsibility and possible remedies then arises. It is not possible to decide these questions fully at the present time, especially within the scope of a brief article. The manufacturer should be interested, however, in a brief outline of the situation as it now stands, the contentions, and opinions of some of those concerned on both sides of the case, and an indication of what improvement may be expected from future developments.

There are four kinds of automobile insurance to be considered, each of which presents a somewhat distinct problem. These are:

1. Fire
2. Theft
3. Collision
4. Liability

## Fire and Theft

Fire and theft insurance are usually written in one policy and present similar problems to a large extent. The theft question was discussed at length at a recent meeting of the Metropolitan Section of the S. A. E. At that meeting automobile men, police officials and insurance men voiced their various opinions. The expressions of this meeting, together with interviews with a number of persons intimately connected with this work, gives a clear general idea of the present situation.

The N. A. C. C., representing the views of the manufacturers, feels that the reason for high insurance rates is "the loose methods of accepting risks" used by the insurance companies. It has been the habit of the insurance companies to write fire and theft insurance up to the full value of the car. Since a car continually depreciates, of course, this practice makes it actually profitable for a man to have his car stolen.

Such a condition is a direct encouragement to the dishonest man and is an incentive to carelessness on the part of the average owner. The objections to present methods of writing such insurance can probably be best stated by quoting from the statement recently issued by the N. A. C. C. This statement says in part:

"The moral hazard receives no consideration. A burglar just out of jail gets the same rate as a respectable citizen.

"The amounts allowed on cars and trucks almost encourage their being burned up or destroyed to be reported as stolen.

"We hear many times of legislation to force everyone to take a bond on their car on the ground that it would prevent accidents. Such action would make accidents more frequent because it would shift the responsibility of the driver.

"It would be of more help in preventing accidents if no owner was permitted to carry liability insurance and no car was equipped with a horn.

"A sedan insured new last year for fire, transportation and theft to the amount of \$2,600 at a cost of \$33.80 has just been renewed at a cost of \$55.00 and is now covered for \$2,500. The policyholder in this case is displeased at the amount of the premium and surprised at the amount of the coverage, as he would gladly take \$2,000 for the car.

"At the same time we read, within the last few days, of several automobiles being found in Lake Erie, near Buffalo, where they had been intentionally dumped, another in New York Bay and a half dozen in an old quarry in Illinois.

"These facts undoubtedly throw a great light on the high cost of automobile insurance, and it is evident that the methods of writing ordinary fire insurance on buildings and furniture without actual knowledge of the value of the property insured, will not do at all for automobiles."

## Companies Changing Attitude

The attitude is that the insurance companies care chiefly about writing as high amounts of insurance as possible because the higher the amount the greater is the broker's commission; that the increase in rates is a matter of little moment.

An examination of the situation indicates, however, that there is something to be said on the other side of the case. As insurance rates rise, a greater sales resistance is created for the insurance companies as well as for the automobile manufacturers. The insurance brokers have a problem of salesmanship on their part. Some of them, at least, realize that lower rates would probably mean the writing of a greater amount of insurance. In any case, the insurance companies claim that they are constantly striving for minimum rates and that they are directing strenuous efforts in that direction.

A new type of policy is being written by the so-called conference companies which is a step in the direction of removing the incentive to dishonesty previously mentioned.

This is what may be called a non-value policy. It insures a car without naming a definite value. Then when the loss occurs, the value is determined by the used car value of the car. If a 1921 Buick were insured to-day, for instance, and were stolen in 1922, the owner would receive from the insurance company the value of a 1921 Buick at that time.

This policy meets many of the objections raised, and while not the last word, is a definite step in advance. It is still possible, however, for the owner to get definite value fire and theft insurance from certain companies. The chief difficulty with the non-value type of policy is well stated by C. S. Disbrow, president of the American Automobile Insurance Co., who says in a recent number of *The Weekly Underwriter*:

"Some underwriters maintain that any amount of insurance may be granted if a non-valued form of policy is used. This is not so. The psychological effect of the large insurance policy and the much smaller sales value of the car is still there. Few assured know the meaning of the non-valued policy and the broker is apt to gloss it over. . . . In some states the law makes all policies valued anyhow. . . .

"If the companies wish to eliminate crooked losses it is easily within their power to do so, either by lowering the amounts of insurance or by issuing a daily or monthly depreciating policy, so that the amount of insurance will at no time exceed the trading in value of the car."

The manufacturer has several sources of direct, but comparatively unimportant, contact with the matter of fire and theft rates. These are in connection with identification systems, theft locks, and mechanical construction and equipment as regards fire hazards.

A number of suggestions as regards identification systems have been made and work along this line is already being carried on. It would probably be to the advantage of the manufacturer to equip his cars with a recognized theft prevention device. In New York City at the present time there is a definite insurance rate penalty of \$25 on the car not so equipped, while the car that is equipped saves that penalty and 15 per cent besides. The manufacturer can always equip a car with such a device, of course, cheaper than the owner can buy it retail after he has purchased the car.

The Underwriters' Laboratories are carrying on extensive tests for the purpose of classifying automobiles as to protection against fire and collision hazards and their equipment of theft retardants. The schedule recognizes seven principal groups of items affecting the fire hazard and to each group is assigned a certain proportion of the total points to be used in rating. While these tests are very comprehensive and the results are likely to be excellent, their importance is minimized by the fact that the factors which they consider are of slight moment when compared to the larger factors just discussed here. The chief difficulties lie in methods of writing insurance rather than in mechanical features of car construction.

### Collision Insurance

Methods of writing collision insurance have been subject to many of the criticisms directed against fire and theft methods. It has been objected that the driver, being fully covered for all damages to his car, was likely to be more careless in driving than if he had some personal responsibility in the matter.

A number of the larger companies have recently eliminated full coverage collision insurance. The policies written by these companies now make the owner responsible for the first \$50 or \$100 of each collision loss. Such a policy tends to make the owner more careful and at the same time gives him insurance in case of a serious accident. Thus it operates to the benefit of all concerned, as

well as reducing expenses for the insurance companies by eliminating the handling of small claims which cost more in overhead than in actually loss payment.

### Liability Insurance

Liability insurance constitutes the most important phase of automobile insurance both from a financial and a human standpoint. The cost of fire and theft insurance is not nearly so large actually as liability insurance, while the rise in liability rates means more than money—it records an increase in human suffering and the loss of human life. It is a matter of record that the number of automobile accidents have increased in this country during recent years. But it is not this increase alone that has caused liability insurance rates to advance. The claim cost to the insurance companies has increased greatly. That is, the cost of court actions, payment of awards, etc., have increased per case; an increase not affected by the actual increase in accidents. The figures for one of the largest companies, for instance, run something like this:

The cost per liability case in 1918 was 24% greater than in 1917.

The cost per liability case in 1919 was 45% greater than in 1917.

The cost per liability case in 1920 was 60% greater than in 1917.

This increased cost has been brought about largely by the increased amounts which juries have been awarding to injured persons in liability suits. As the cost of everything has risen during recent years and as people have lived on a more expensive scale, so have the liability awards kept pace. This fact, together with the tremendous increase in the number of accidents, has sent liability rates far up, until they are now a very large factor in the minds of many prospective automobile owners.

There is nothing being done as regards liability policies that is analogous to the elimination of the full coverage collision policy. In other words, it is still possible for the owner to insure himself for a large amount and then run down a man or woman without losing a cent. It would certainly seem logical to provide some form of policy which would place a certain amount of liability on the owner of the car. Such financial liability might go a long ways toward reducing the number of accidents.

Among the chief faults attributed to present insurance methods is that of failure to properly consider the moral hazard when writing insurance and of failure to properly investigate claims after accidents have occurred. Both of these things could be discussed at great length without any decision being reached, as conversation with several persons interested in one side or the other indicates that there is a very great deal to be said on both sides.

### The Mutual Company Idea

The mutual insurance company idea is being seriously discussed as a means of relief from high insurance rates. To quote again from the N. A. C. C. statement on this subject:

"It is very well to say that one who uses the mutual assumes a liability, but this is losing force from experience to the contrary; dividend of from 25 per cent to 50 per cent, compared with standard rates, have for long periods been received on premiums by their policyholder.

"According to figures given out by 131 insurance companies the fire and theft premiums received by them in 1920 amounted to \$74,472,250. The losses paid amounted to \$42,985,748. It would be interesting to know the proportion of these losses that went to reimburse such costs as noted above (i. e. to careless or dishonest owners).

"Surface indications certainly point to urgent necessity of scrutinizing this moral hazard.

"The makers are convinced that insurance would have offered a much greater sales resistance than it has were it not for the relief offered through lower rates from mutual companies which are operating in all sections of the country."

The objections to the mutual company may be summed up as follows:

1. The ever-present, though perhaps remote, possibility of assessment of the members
2. The lack of facilities for proper service. The big insurance companies with their branches are equipped to render instant and competent service in any part of the country, while the mutual company is likely to have to depend upon a local agent of some kind.
3. In fighting court cases, in paying claims promptly because of the necessity of preserving good will for future business, in permanency and stability, the regular large insurance companies are equipped to render many services not possible in the case of the mutual company.

One insurance man put it something like this: "Yes, you can get lower rates at the mutual companies. You can buy fish at a cheaper price if you go down to the dock and carry it home; you can get the fish for nothing if you go out and catch it. The regular insurance companies render a service for their higher rates that is far more valuable than the difference in the rates."

It has been suggested that a law compelling every car

owner to carry insurance might be of advantage. It is argued that such compulsory insurance would protect the pedestrian by making every driver financially responsible and would benefit the driver by setting definite money judgments for specific injuries.

The effect on rates of such a law is problematical. Some insurance men, for example, believe that it would tend to reduce rates because of the greatly increased number of persons who would be paying insurance premiums. Moreover, the stated amount for injuries would tend to reduce the amounts necessary for the insurance companies to pay out to injured persons, with a corresponding decrease in cost per case.

On the other hand, the fixed judgment limits and the freedom from financial liability on the part of the driver might increase careless driving and the taking of risks. It would place the driver at the mercy of the insurance companies to some extent, as their rates would be governed then only according to competitive rates of other companies and not by the sales resistance factor which now operates. This would not be true, of course, if the rates were regulated by the law.

It is not the purpose of this article to decide the merits of the case; the two sides have merely been presented for the consideration of the manufacturer. The entire problem of insurance is important at the present time and calls for serious and thoughtful consideration by the automobile manufacturer.

## A Steel Disk Wheel

A STEEL disk wheel the disks of which are spoked on their circumference is shown in the accompanying cut. Lightness and the possibility of quick tire changes are claimed as the advantages of the design. The disks are solid to within  $3\frac{1}{2}$  in. of the rim, where they branch into spokes. They are of convex shape and come together on the circle where the disks and spokes join, the eight spokes of the outer disk abutting an equal number of lugs on the inner side of the rim and the spokes on the inner disk abutting lugs on outer side of the rim. This trussed construction gives great strength to resist lateral stresses, it is claimed. The disks are further reinforced by beading. Disks and rim are held together solely by the pressure of the hub nut, the radial component of this pressure against the rim lugs amounting to 15 per cent of the total pressure. A locking device is incorporated in the nut.

It is claimed that the wheel will always run true, even though the rim might have been out of true before assembly. The disks are secured to the wheel hub by means of six or more studs. As compared with the full disk wheel, the advantage is claimed that there is no interference with access to the tire valve. As regards weight, it is

stated that the 30-in. wheel is 10 lb. lighter and the 32-in. wheel 15 lb. lighter than the standard wood wheel.

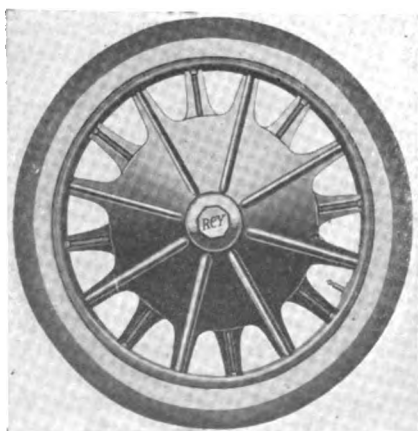
When a tire and rim change is to be made, the hub nut is loosened (not removed), which allows the plates to contract. The finger is then placed on one side of any spoke in the outer disk and the disk is rotated so as to clear the lug, whereupon the rim and tire may be removed. The disks are made of molybdenum steel, the hubs and hub nuts of malleable iron or forged steel, and the brake drums of pressed mild steel. It is the intention of the manufacturers, the Rey Wheel Co., to first put out a Ford wheel of this design, to be followed by 30, 32 and 34 in. sizes.

## New Stewart Speed Truck

A NEW 1-ton speed truck is announced by the Stewart Motor Corp. The machine is claimed to cover from 14 to 16 miles on one gallon of gasoline, to be capable of a maximum speed of 40 m.p.h., and to be able to negotiate grades of 22 per cent with capacity loads.

The engine is a Buda four cylinder  $3\frac{3}{8}$  by 5  $\frac{1}{8}$  in. Ignition is by Eisemann magneto, and the carburetor is a Zenith. Fuel is fed by gravity from a 16 gal. tank under the seat. Engine lubrication is by the full pressure system and chassis lubrication by the Alemite system. The radiator is of the cast iron armored type with vertical tubes and has a capacity of 5 gal. The clutch is of the multiple dry disk type making use of molded asbestos disks. Annular ball bearings are used on the transmission shafts. The rear axle is a Clark internal gear drive type with a 6.75 to 1 reduction ratio. Other ratios are as follows: Intermediate, 11.48 to 1; low, 27 to 1, reverse, 30.38 to 1. Frame side rails are of channel section of the following dimensions:  $4\frac{1}{2}$  x  $2\frac{1}{4}$  x  $\frac{3}{16}$  in.

The truck is equipped with 35 x 5 in. cord tires all around. The regular equipment consists of electric headlights, electric tail lamp, tool box, 111 amp.-hr. Willard storage battery, tools, jack, horn, etc. The price of the chassis f.o.b. Buffalo is \$1,875.



Rey steel disk wheel



## Aluminum Pistons

Editor, AUTOMOTIVE INDUSTRIES:

We have read with much interest Dr. Rosenhain's article on "Problems and Possibilities of the Aluminum Piston," which appeared in your publication for June 16, 1921. On the whole this article brings out many interesting and valuable points concerning the aluminum piston. A few statements in the article lead one to believe, however, that Dr. Rosenhain is not familiar with all of the latest developments made in aluminum pistons. In the paragraph headed, "Advantages and Disadvantages of Aluminum Pistons," he mentions the higher co-efficient of expansion of aluminum over that of cast iron. This, of course, is quite true. Recent experiments, however, have definitely shown that the maximum temperature drop is across the rings, which would seem to indicate that most of the heat leaves the piston through the rings, leaving the skirt comparatively cool. Dr. Rosenhain makes a statement later on in his paper exactly opposite of this, inasmuch as he states that most of the heat leaves the piston through the skirt. The temperature of the skirt is not high enough to account for all of the clearance it was formerly necessary to give aluminum pistons, even though the co-efficient of expansion of aluminum is about twice that of cast iron. The only conclusion that can be reached is that the skirt expansion can be divided into two parts:

- (1) The thermal expansion due to the actual temperature of the skirt.
- (2) A mechanical expansion due to the thermal expansion of the head.

The head being so much hotter than the skirt will naturally expand more and to a certain extent will pull the skirt of the piston with it. To make this skirt expansion harmless a new design having a slot separating the head from the skirt immediately below the last ring on the thrust faces has been made. The head can, therefore, only distort the piston skirt along the axis of the wrist pin. This expansion is made harmless either by relieving the piston on the side or by means of a vertical slot in the low thrust side of the piston. The expansion of the piston skirt along the axis of the wrist pin actually sets up forces tending to contract the piston across the thrust faces which still further reduces the clearance necessary. Pistons of these designs as well as the temperature distribution obtained by actual measurements were discussed in a paper which the authors read at the Buffalo Section of the S. A. E. and which appeared in the S. A. E. Journal, issue for May, 1921.

It seems as though Dr. Rosenhain were laying too much stress on the reduction of strength of aluminum piston alloys at high temperatures. Piston failures due to the metal actually failing in pistons has been very rare, particularly in automobile engines.

Under the heading of "Piston Pin Bushings and Piston Rings," the statement is made that when a floating pin is used it is necessary to cast in, or screw in a cast iron bushing. It has been the experience with aluminum that it affords an excellent bearing surface for a hard-

ened steel wrist pin and the practice of inserting bushings of any description for floating wrist pins is not general, in fact, it has been resorted to only on very few occasions for the simple reason that the performance obtained by simply floating the pins in the aluminum has given such good results. It is, of course, necessary to make the pin a rather tight fit when the piston is cold.

Piston rings have, in the past, given trouble both in aluminum and cast iron pistons. Experience seems to point toward the use of the narrower rings than have formerly been in use. Under no circumstances should an eccentric ring be used in an aluminum piston.

FRANK JARDINE,  
FERDINAND JEHL,

Engineers of Aluminum Manufactures, Inc.

## Standardization and Individuality

Editor, AUTOMOTIVE INDUSTRIES:

Mr. T. V. Buckwalter's letter in your June 9 issue demands attention mainly for the fact that it comes from Mr. T. V. Buckwalter. It is, however, an example of the somewhat loose talk and discussion that is given to this question of standardization. It is a curious thing that the pendulum in this discussion seems either to swing to the extreme right in favor of complete standardization or to the extreme left in favor of none at all. Surely there is some middle, logical, scientific ground on which we can reason out this subject very fully.

Mr. Buckwalter believes that I think that the automotive industry exists primarily to furnish employment to certain classes of workers. I am at a loss to understand why he should so think, but at the same time even this is a pretty good excuse why the question of standardization should be approached with great care. Would anyone want to see the automobile engineer eliminated? Mr. Buckwalter states that it is undoubtedly true that standardization may result in a certain loss of individuality to the engineer.

This is something very greatly to be deplored. The engineer is the brains behind the design and in many cases behind the construction and production of the vehicle. He is the available human mechanism that brings forth the improvements on which we must run. One has only to contrast the automobile of to-day with that of three years ago, six years ago, nine years ago, twelve years ago, and so on in cycles of three years, to realize the wonderful steps that the automobile engineer has taken. I believe that this has been brought about by the fact that the automobile engineer has a freer scope in individuality of design than the engineer of any other industry. This is typified by the fact that the N. A. C. C. has practically pooled all patents, thereby giving engineers a free range.

At the root of industry you will find a desire to work by certain men. It has been stated that a particular industry is nothing more nor less than the shadow of one man, and behind the incentives that lead this man to create the industry you would find a desire for work and opportunity for himself. Only under conditions



where a tremendous service would be done to the people would the taking away of incentive from a body of men be desirable. One has only to read Mr. Harry Tipper's articles to appreciate the effect of incentive in the human field.

Mr. Buckwalter is very imperative in his statement that "industry must face this fact, that the great American public has let it be known in a most emphatic manner that less expensive automotive transportation is demanded." If this were so, one could readily see a line of people waiting at the doors of the Ford company or the Chevrolet company, and the salesrooms of all other automobile companies absolutely deserted. Mr. Buckwalter has evidently not yet learned that the great American public is composed of a series of strata depending largely upon their incomes. Those with the lowest incomes are naturally content with the cheapest car. Those with greater incomes want better and better cars—the element of the cost of transportation not being the only thing by a long way that enters into the question. I myself have sold a limousine because the color of the upholstery matched the color of a lady's dress.

Naturally, some of this talk does not pertain to the realms of motor trucks, but it is quite conceivable there should be a standard front axle for a one-ton truck and a standard front axle for a two-ton truck, and so on up to the five-ton truck capacity. After reading Mr. Buckwalter's article I am tempted to ask him if he can furnish any good reason why there should not be a standard truck of each capacity. In fact, going back to the war days, why should we not have a standard  $\frac{3}{4}$ -1-ton truck like the Class AA, a standard  $1\frac{1}{2}$ -2-ton truck like the Class A, and a standard 3-5-ton truck like the Class B? Ask the various manufacturers if they would like this, and ask the customers if they would like this, and I believe the answer would be emphatically no. There must be free competition in order to get reduced costs and, what is just as important, improved results.

I stated in my original article this hub standardization has been called for largely because of a failure to standardize the size of taper roller bearings, and in this matter I cannot hold Mr. Buckwalter or his company altogether innocent. At the present moment, although there is an S. A. E. standard for taper roller bearings, it is very rarely used, and, to the best of my recent knowledge, the Timken company has not recognized this standard. There are certain fundamental things which should be standardized, and the size of taper roller bearings is one of them. Not only does the standardization of taper roller bearings affect the front hubs, but it affects the rear hubs, transmissions and other places where taper roller bearings are used. This would be a real far-reaching standardization and of international character.

At the present moment the ball and roller bearing division is considering new standardization work and has held this up due to the fact that Timken are changing their sizes and want a further revision. In other words, the printed, approved S. A. E. taper roller bearing standards are held farcical by one of the leading members of the specific industry.

I believe it was in 1916, at a standards meeting in Cleveland, that I pointed out the desirability for standardizing the boundaries of contact in fundamentals and not details. I still believe in this. I believe, for example, in the standardizing of certain widths and gages of steel for springs; I am a believer in the standardization of rims for all tires, so that one can buy a tire anywhere along the road. Tires do wear out, it is a recognized fact, and therefore there must be a standardization of the boundary of contact between the tire and the vehicle. I am a tremendous believer in standardization in one's

own shop, making the smallest number of models or products that will fill the demand, and standardizing these and their component parts to the best possible combination. I still feel that the introduction of a standard has quite often meant merely the addition of another article to be manufactured.

I had an experience some years ago when I sought to standardize bushings for a line of passenger cars and trucks, five models in all. I confess I found it an impossibility, as the bushing is so often used as the flexible link in a chain of mechanism, and yet, at first glance, the bushing would seem to be something which should be standardized. Similarly with a great many other parts. It is so easy to find reasons why one should not adhere to standards, as they often give way before the elements of expediency.

I apologize for taking up so much of your space on this matter, but the question of retaining our individuality and of keeping in the line of progress, not merely from a cost standpoint, but from the final result standpoint, is so strong within me that I feel I have to answer this. I just received a letter from the headmaster of the largest technical school in the city of Glasgow—Dr. John G. Kerr—in which, in connection with another matter dealing with the standardization of examinations that are given to young men before they start out in the universities, he states: "I may perhaps be wild in my belief about the importance of individuality, but that belief grows more and more with the years." This statement is made by a man who has had the training of men in his hands for some fifty years. I think you will find the desire to escape from monotony one of the strongest incentives of the human race.

JOHN YOUNGER,  
Vice-President, Standard Parts Co.

## Horsepower Correction Factors

Editor, AUTOMOTIVE INDUSTRIES:

In your June 30 issue appeared a Horsepower Correction Alignment Chart, which is based on the assumption that power is proportional to air density. The Bureau of Standards tests and many others have shown us that power is not proportional to density for temperature changes. Is the assumption used correct? The power should be proportional to air density if the volume were constant, which would be the case if the engine were a straight displacement proposition. This is not the case, however, with the air passing through poppet valves. These have the effect of orifices and the air flow should be investigated on air orifice flow bases. An examination of the orifice equations for air flow will show that the volume of air changes with temperature, which eliminates the density assumption as far as temperature changes go. Further examination of the orifice equations will show us that the horsepower

should vary as  $\frac{1}{\sqrt{T}}$  absolute. Therefore our correction formula should be

B.Hp. (corr.) = B.Hp. (obser.)  $\times (P_s \div P_o) \sqrt{T_o \div T_s}$ ,  
where  $P_s$  and  $P_o$  are respectively standard and observed barometric pressure and  $T_s$  and  $T_o$  are standard and observed absolute temperatures.

The writer has checked this formula against "air temperature vs. power" tests from different sources, including part load tests, and found that the horsepower change was very well expressed by this new equation, whereas the density assumption showed a change nearly twice as great as actually observed. The Bureau of Standards correction gives practically the same factors as the new equation.

Why, then, should we continue to use a correction for

temperature that is 100 per cent in error? For example, to correct power at 29.92 in Hg. for air of 90 deg. Fahr. we get from the chart a correction of 5.8 per cent., while the Bureau of Standards correction factor shows us that actually the engine would only pull 3.1 per cent more power at 60 deg. Fahr. than at 90 deg. Fahr. With our present day air stoves, raising the air temperature to 150 deg. Fahr. and over, the error involved in these corrections certainly deserves consideration. At least let us question the density assumption until it is shown to be correct. I believe the orifice flow basis to be the correct one to work on and the new equation is the result of work on this basis.

HAROLD S. WHITE.

## Reasons for 56 in. Gage and Contracting Brakes

Editor, AUTOMOTIVE INDUSTRIES:

The remarks by Mr. W. J. P. Moore, published in last week's Forum, in which mention is made of some of the statements made in my letter published in your issue of June 16, in connection with passenger car brakes and passenger car seating capacity are well worth considerable thought.

In regard to paragraph 7 I am under the impression that the standard tread of automobiles is taken from railroad practice in regard to the standard gage of railroads. In the majority of countries this is 56½ in., though there are a number of other gages in use. I do not believe that there was ever any very definite figure in regard to the standard carriage tread, though it has been for years recognized that in the neighborhood of 56 in. was the standard for the Northern States, and, I believe, 60 in. for the Southern States. The writer made the tread during the last fifteen years 56 in., until the time that we used the cross section of tire of 5½ in. instead of the 5 in. that we formerly used. Then in order to provide the same clearance between the rear wheels and the wheel housing and in order to obtain the same lock on the front steering wheels when tires of 5½-in. cross section were used, the tread of 56½ in. was adopted and the slight increase has been appreciated. I believe that there are many reasons why automobile manufacturers in this country should adhere to approximately this tread as standard—the trolley rails are also 56 in. gage and there are many cases where it is desirable to run automobiles along the trolley rails, although this is not good practice where the rails are worn because it may result in badly cut tires. Although there are a great many miles now of improved highway, the vast majority of roads in this country are clay, mud and dirt and these roads have very distinct ruts that make it almost impossible to travel on unless the car has approximately 56-in. tread. Due to the means of repairing roads in this country, it is rarely ever possible to take a trip even along the main highway between such cities as Buffalo and New York without having to make detours which, in most cases, take one along dirt or clay roads, which very soon become deeply rutted.

If the buying public would consent to the elimination of seats to carry three people in automobiles, there is nothing wrong with making approximately 56 in. the standard tread, and there is absolutely no objection to a standard tread of this kind where good concrete, brick or macadam roads are prevalent, as on such roads a car rarely if ever follows in the track of the preceding car. Almost all drivers keep close to the middle of the road except when passing another vehicle when they go over to the right-hand side, so that almost every part of such a road is traveled on and there is certainly no need for cars of varying treads on such roads.

In regard to paragraph 21, in cases where good roads prevail it is an advantage, perhaps, to have a narrow tread on very small cars. This is the regular practice in France and England. In the case of large cars it would appear to the writer to be impractical to have a tread in excess of 60 in. The present design of automobile has had such an enormous start that it will be impractical to-day to make cars of 65 or 70-in. tread, as there are thousands of exceedingly expensive garages that have been built with the width between the doors that only permits of a clearance of 6 in. on each side with the present type of car with approximately 56-in. tread, and it would be impossible to drive into such garages with a tread much in excess of this. Unfortunately many of the latest improved highways are almost too narrow for cars of approximately 56-in. tread and would certainly be inadequate for cars of from 65 to 70-in. tread.

The obstacles in the way of increasing the tread appear to be exceedingly great, whereas the matter of width of seats is largely one of public opinion and is a matter that should be changed without imposing any great sales resistance or any hardship to anyone. Either closed or open bodies have a much better balanced appearance when they are about 10 in. narrower than the regular three-passenger rear seat body. The problems of body construction are much easier to meet in the narrower body—the side window glasses can be made to entirely disappear when down, in a narrow body, the riding of a car can be made much better and the adoption of such a design should result in an advantage all around.

In regard to paragraph 31, unfortunately internal expanding brake shoes rarely give the same efficiency as external contracting brake shoes and the most effective brakes on American cars where both brakes are on the rear wheel, are almost always the external contracting brakes. Many American manufacturers have tried experimentally two internal brake shoes side by side on the rear wheels and found that neither foot nor hand brakes were powerful enough to hold the car. This is especially dangerous when a little oil gets on the brake surfaces, which practically never happens in the case of the external contracting brake. The external contracting brake, when in the form of a band brake, gives very much greater braking surface, and this type of brake can be made to be free from the drum when not in use. The internal expanding brake shoes rarely come in contact for the whole of their surface, in many cases they bear only on the ends of the shoes, resulting in very rapid wear to the brake lining and necessitating very frequent adjustment. The majority of American car manufacturers use the external brake as the service brake because of its being much more powerful and having a great deal more life than the internal brakes.

In the case of four-wheel brakes it is probably essential that external rear brakes will still be required in order that the car may be equipped with two absolutely independent brake systems, so if the foot-brake connection should become severed the driver will always have the hand brake to fall back on with its absolutely independent set of brake shoes, levers, rods, etc.

DAVID FERGUSON, Chief Engineer,  
The Pierce-Arrow Motor Car Company.

## Interchangeable Automobile Parts

**A**UTO Gear Information Service, published by Auto Gear Information Service, is a booklet containing 300 cases of interchangeable gears and axles, including cars from 1912 to 1920, giving the gear ratio on various cars that have identical gears.

# Human Difficulties Predominant in Building Trades Wastes

The recently issued report of the American Engineering Council concerning waste in the building industry indicates that many difficulties grow out of unsatisfactory human relations. Mr. Tipper here analyzes this report and illustrates the significance of the most important points.

By Harry Tipper

**A** FEW days ago the newspapers were quoting quite extensively from the Report of the American Engineering Council upon the building industry and the causes for the inefficiency in this industry. The quotations made in the general publications from this report give a fair idea of the conclusions, but do not indicate very thoroughly the most important reasons for the difficulties.

A very large part of this report is devoted to the industrial relations and evidently the difficulties in the industry are to a great extent human ones due to the lack of co-operation and the misunderstanding very prevalent in this field.

The jurisdictional regulations of the union and the restriction of output very properly receive condemnation in the report of the committee and are indicated as great sources of waste and increased cost.

The restrictions of output by the employer through maintenance of price, collusion in bidding and so forth, are mentioned as further difficulties facing this important line of work.

In regard to low output and the general inefficiency of labor, the committee report states:

"One of the greatest fundamental causes for low output is the fact that all members of unions in the same trade are paid the same wage. There is no incentive. As a result of records made by the authors on actual construction work, it was found that in the building trades on every job there are usually a few men who do one-third more work than the average man on this same job. These men also do better work. Is it fair to these good men for them to receive the same wage as the others?"

These articles have mentioned from time to time the general tendency of uniformity of wages to lead into a uniformity of output below the possible average of a proportion of the men, in other words, the tendency for a uniform wage to bring about a minimum output suited to the average of the less efficient. The more efficient worker will not put forward his power without the incentive of a proportional reward or a difference in the reward established between himself and the other members of the same craft.

Particularly where the other incentives of confidence, visible usefulness and individuality of skill are not emphasized and brought out, the plan of the same wage destroys the only incentive remaining. Despite all the developments of organization rules and regulations, the pay is recognized unconsciously as an indication of the value of the skill. The man who is more skillful than his fellows is

aware of his skill and he is not likely to put forth his extra capacity where it brings no reward of a visible character.

The building trades have been notorious for unruly labor conditions and inefficient management. Generally speaking, the unions in this line of work have been more dictatorial in their attitude and more severe in their adherence to privilege than in the manufacturing trades. On the other hand, the employers have been more mandatory in their attitude, less willing to study and determine the reasons for difficulties and less efficient in their ideas of management.

These things are all brought out in the report and they indicate the enormous amount of waste involved in the building industry because of these inefficiencies and these misunderstandings.

The report deals with the difficulty of the seasonal labor as it is at present employed and the cost of maintaining skilled workers on a basis of about half time in order to provide a sufficient number for the peak loads.

This question of continuous employment or fairly regular employment is a very important one for this industry, but the question should not be overlooked in dealing with the future of more stable industries where the temporary surplus or shortage affects the regularity of employment. We have not yet arrived at the industrial condition in this country which was the usual thing in Great Britain before the war. We do not have periods of low employment in some industry or another every year. In the readjustment we are likely to find that conditions will remain more or less spotty and the unemployment will bring real hardship or require increased taxes, unless measures can be taken to regularize the employment as much as possible.

The economic fear of starvation has not operated very actively in this country because of the easier economic conditions. This fear has had its effect in the strongly disciplined unions in Great Britain and in the bitterness existing between the unions and the employers.

Altogether the report is interesting as indicating the very large percentage of waste obtaining in one of the most important industries in the country and showing that a major part of that waste is due to the human conditions and not to the mechanical arrangements.

The report includes the following statement:

"The most encouraging feature in the building industry to-day is the action of a few of the builders and a few groups of building trade workmen in

making intensive studies of the causes and remedies for irregular employment and haphazard conditions of work. Along with this is the growing appreciation on the part of both labor and management that to build more buildings and maintain high wages it is necessary to attain greater and greater productive capacity per man.

They see as proof of these facts that the 1921 depression was caused and extended by too high costs of all products, and that business, either in manufacturing or in building industries, is improving only as the costs of material and the cost of labor are reducing. All are recognizing, in fact, that no progress can be made without paying greater and greater attention to the elimination of waste.

Never in the history of our country was it so important that certain fundamental principles of economics—principles which are not mere theories, but are based positively on facts—should be accepted and established as a working program.

These principles will throw overboard the fallacy that restricting production can make work go further, and will supplant this with the knowledge to get one must give, that to receive the equivalent must be given in money or in time or in effort, and that increased returns can only be attained through increased production."

It will be seen that the hope indicated in this conclusion is a hope for the betterment of human understanding and relations. In fact, the whole question of mechanical improvement, the reduction of costs, the increase in stabilized employment are predicated upon a greater understanding of these fundamental requirements and a greater co-operation between the builders and the unions in working them out.

This report serves to emphasize what these articles have been stating continually—that the wastes in industry are governed most largely by the human conditions and not by the variations in the mechanical equipment and system.

## Spur Gear Erosion

**F.** W. LANCHESTER in an article in *Engineering* of June 17 describes a peculiar form of failure in the spur gears of motor car change gear boxes, which has been observed repeatedly in recent years. In these cases of failure there appears to be a complete breakdown in the region of the pitch line. Usually the gears brought to the repair shop are in an advanced state of erosion; in that case, although the ordinary involute tooth is convex over its whole surface, there is on each tooth a marked depression—a concavity or groove—running along the tooth about the middle part of its face.

When a pair of gears so affected are mounted on correct centers, it is noticed that the depressions are not exactly opposite each other; they are not symmetrical about the pitch line. Generally speaking, the width of the groove covers that portion of the tooth face from a little below the pitch line considerably outwards towards the point of the tooth, and it appears that when the gears are in action the shoulder of one groove eats into and progressively increases the trough of the other.

In the incipient stage of the pitting there is what appears to be an irregular pitting of the gears in the pitch line region, with a certain amount of radial grooving from each pit. Observation of such gears suggested the following explanation to Mr. Lanchester:—

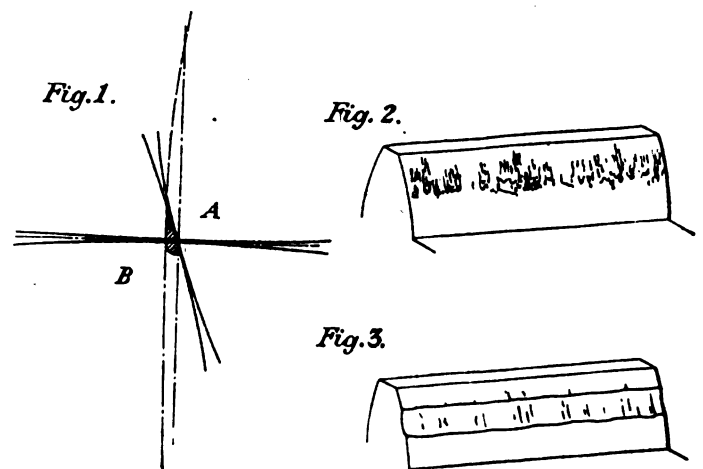
Where gears are under heavy duty the local pressure between the contact lines or areas is so great that no oil film can withstand it for any appreciable length of time. If the oily surfaces sweep rapidly past each other, as in worm gearing for instance, the lubricant has no time to escape. This also applies to spur gears at points remote from the pitch line region, and consequently the tips and roots of the teeth show no signs of failure. On the pitch line itself, where there is only rolling motion, there is no reason to anticipate injury, even though the oil film may break down, for the action is exactly the same as in roller bearings. But adjacent to the line of actual rolling, and far more important, as it is an area rather than a theoretical line, there are regions or bands in which the motion is very slight and where, while there is insufficient relative movement between the surfaces to drag in lubricant in adequate quantities, there is at the same time a measurable degree of sliding. Here there is definite metallic contact, the oil film having broken down, and at the same time slow rubbing motion under heavy pressure. Under these conditions seizure between the contact surfaces must be expected, or

at least seizure between the surfaces must be regarded as imminent, and a tearing away of one surface by the other.

Furthermore it is quite clear that if we follow the conditions during the passage of a line of tooth contact over the pitch line region we have, before the rolling point is reached, a slowing up of the sliding motion that is symmetrical and in the reverse direction to the subsequent motion after the rolling point is past. Since an oil film takes a certain time to squeeze out, it is evident that the actual metallic contact will tend to take place at or near the rolling point or immediately after that point; the seizure or welding together of the surfaces follows and the tearing away of these surfaces, which causes the phenomenon of erosion, will therefore take place when the rolling point has been passed.

Mr. Lanchester is disposed to think that the remedy lies in the use of high carbon in the steel, obtained either by carbonizing or by providing it in the stock. Where heavy loads are carried seizure can generally be successfully obviated by the use of well hardened steel. In a high duty gear box the elasticity of the gears and the individual teeth is so great that arguments based on the assumption of complete rigidity are of no weight.

In Fig. 1 herewith the sectioned area represents a small particle of the gear B torn out, and the blackened area the consequent groove. Fig. 2 illustrates the incipient stage of erosion and Fig. 3 the advanced stage.





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## The Highway's Chief Enemy

**A**N interesting statement was made recently by J. N. Mackall, Chairman of the Maryland Highway Commission, in answer to a challenge from a truck manufacturer as to his evidence that the heavy truck destroyed his highways during the war. Mackall, in answer, said that his only evidence was that during the war unlimited loads were permitted on Maryland highways between Washington and Philadelphia and the highways were broken down. After the war, regulations as to weights and overloading were changed and the resurfaced highways had stood the test. Thus, he has removed one cause of failure and the roads have withstood the wear.

In a later statement Mackall revised this viewpoint somewhat and made a statement that brought nods of approval from all his auditors. Without a promise that his words are quoted exactly, his statement was like this:

"We have heard much recently about the effect of sprung and unsprung weights on the highways. I believe there is something in this, but I want to say

that while I believe the five-ton truck, weighing a total of ten tons, with half of the weight unsprung, does damage to the roads, I believe that the greatest enemy of the highway is the two-ton truck, carrying a load of five tons with the entire seven tons unsprung."

The manufacturers then had something to say about the damage to the truck that was carrying this excess load. They agreed that the overload was the cause of greatest damage to both truck and highway.

## 40 or More Miles Per Gallon

**W**HENEVER high efficiency is of paramount importance a powerplant is operated with the best possible load factor that is as near as possible to the load at which maximum thermal efficiency is secured. This is the condition which controls operation of most large powerplants, but it is unfortunately a condition seldom realized in the average automotive powerplant.

The cycle employed in practically all automotive engines is a cycle of high efficiency when a reasonably high compression ratio is employed, providing the engine is run at or near full load. Under these conditions a well designed engine will consume from about 0.5 to 0.6 lb. of gasoline per b.hp.hr. When, however, such an engine runs at light load—the condition which applies during perhaps 90 per cent of the time the average passenger car is running—the consumption per b.hp. will nearly or more than double, due in part to the low mean pressures developed as a result of throttling, and in part to the fact that pumping and other friction losses are approximately the same at a given engine speed whether the load is high or low.

This being the case it is evident that car operating conditions can be improved by at least two methods: by resorting to means for maintaining a constant compression regardless of load or by so arranging the transmission system as to enable the engine to run always at or near full load.

We have discussed the first of these methods in recent editorials. The second method is also worthy of careful study. It will, of course, involve the use of higher gear ratios, and unless changes in transmission design are made, more frequent gear changes than the average American car user is accustomed to, or, according to some persons who are presumed to know the demands of the buying public, willing to use. Theoretically it is possible to design a transmission which will enable, or even automatically compel, the driver to operate the engine at or near full load. Just how practicable a mechanism this would involve remains to be seen, but the possibilities of benefit from an economy standpoint are sufficient to make serious efforts in this direction very much worth while.

One engineer who appreciates the possibilities in this direction fitted to a well known make of car gears which give a 2.5 to 1 reduction as against the standard reduction normally furnished with this car, about 4.8 to 1. The fuel consumption fell from about 28 to approximately 43 miles per gallon. The car is, of course, less convenient to handle, but the owner con-



siders the saving worth the slight inconvenience, and we believe there are a great many owners in precisely the same class.

Be this as it may, it would seem to be no very difficult engineering problem to secure the advantages which are manifestly possible, without either serious inconvenience or undue mechanical complication. We believe the day is not far distant when some progressive manufacturer will reap a well earned reward by putting on the market in advance of less progressive makers a car which will not depart radically in general type, performance or size from the average car of to-day, but which will be capable of traveling in average use fully 40 miles per gallon of fuel. It is quite within the realm of possibility, and to say the least is a contingency which every car manufacturer should be in a position to meet.

## Rejuvenating Old Cars by Grinding

THE grinding machine industry recently has been putting considerable effort into the development of machines for regrinding various wearing parts of automobiles. It is claimed by some that by regrinding all the major wearing parts, the engine at least can be put into a better operating condition than it was in originally. This claim is based on the fact that after an engine has been used for a couple of years and subjected numerous times to both the maximum operating temperature and the lowest atmospheric temperature, its castings have attained a state of molecular equilibrium, and consequently there will be no further distortion. The claim might be disputed on the ground that not all the wearing surfaces of the engine will be ground, and that those bearings or joints which are not refitted will be more or less loose and therefore noisy. At the same time it must be admitted that the engine can be put back in a very good working condition, and there is no doubt that complete overhauling of engines, in which process grinding will play a prominent part, will become more popular in the future than it has been in the past. This will react on the automobile industry in two ways.

Regrinding the cylinder bores, fitting new over-size pistons and rings, and refitting the piston pin, crankpin and crankshaft main bearings will undoubtedly serve to restore the power and fuel economy of the engine, and thus to increase the value of the engine to the user. The latter will not only get better service from the car at less running expense, but the car will last him for a longer period and thus prove a better economic investment. By thus reducing the cost of automobile service the possible field of the automobile will be widened. On the other hand, if cars last for a longer period, the proportion of the machines in use that is scrapped each year will be reduced. While this might be regarded as a loss to the industry, it is hardly to be compared to the gain resulting from the more extensive use of the vehicles consequent upon the lessening of the operating cost as outlined above. Improvements in the methods of

maintaining motor vehicles in a good serviceable condition strengthen the economic foundation of the industry and should therefore be welcomed.

## Dr. P. P. Claxton

IN the retirement from office of Dr. P. P. Claxton, former U. S. Commissioner of Education, the automotive industry has seen the official passing of a firm friend. Dr. Claxton viewed, privately and officially, the automotive vehicle as a great transportation unit, one in which there were great social and industrial possibilities. He regarded the automotive vehicle as a means to better and more education and used his official position to make effective that view. He was particularly active in advocating the automotive bus as a means of promoting the long-needed consolidated schools in the rural district. Also he gave credit to the automotive vehicle for the promotion of good roads, which he regarded as one of the greatest educative steps of the last score of years.

His greatest work for the industry, and he regards this step as one of his chief accomplishments from an educational point of view, was his service in injecting into the school systems of the country the study of transportation and of traffic. He strongly supported the movement for traffic safety education in all schools and of studies that gave the pupil an appreciation of transportation at an early age, with a proper development of this subject through the advanced studies.

Dr. Claxton becomes Provost of the University of Alabama, located in a State which stands at the bottom of the list in automotive ownership. It is to be hoped that he will avail himself of his automotive knowledge as an aid in promoting education in that State. Also it is hoped that his official successor will continue the educational work he so well began.

## A Good Man for a Good Job

THE Society of Automotive Engineers is to be complimented upon being able to secure so excellent a man as Dr. H. C. Dickinson of the Bureau of Standards to act as manager of its new research department. There are few men with such a fund of information or so keen an appreciation of the value of research, and especially of fundamentals upon which all sound research work must be based.

It is to be hoped that the industry will lend its hearty co-operation in formulating and carrying through the research program decided upon, for the success of the whole venture is dependent upon a readiness to co-operate. In so doing what is given will be repaid a thousand fold in returns ultimately received.

Much commercial development work is now wrongly termed research. Such work is important but is to a large extent outside the field of activity to be fostered by the S. A. E. Sound development is, however, based upon sound fundamentals, and there is real need for gathering and disseminating the fundamental information which is to be sought in the new undertaking.

# Future Sales Prospect Brightens

## Hot Weather Decline Is Not Significant

Better Business in Farm States  
Probable With New Harvests  
—Conditions Sound

By JAMES C. DALTON

NEW YORK, Aug. 1—The inevitable summer slump in the sale of automobiles has begun in scattered sections of the country and will be reflected in curtailed factory operations. The surprising feature of the situation is not that the slump has come, but that it has been delayed so long. Seldom, if ever before, have July sales compared so favorably with those of preceding months. In many cities they surpassed the June totals, which probably is unprecedented.

A few of the factories have orders on hand which will keep them going at the present pace through August, and dealers in the most popular lines are several weeks behind on deliveries. Ford proposes the largest output in his history for August. In few cases have sales dropped back to the levels of May.

The future is in the lap of the gods. After periods of prolonged depression predictions are unsafe, but there is every present indication that there will be a revival in the automotive industry by mid-September. It will not be a boom, and that is fortunate, for most business men have learned to their sorrow that a period of unexampled prosperity is inevitably followed by a period of unexampled depression.

### See Substantial Revival

There are many reasons to believe, however, that the revival will be of substantial proportions and that sales will steadily increase in volume except for periodical depressions in the curve. Motor car sales in the future will depend more than in the past on general business conditions. Fundamentally, conditions are sounder than they have been in a year and a half.

Railroads and steel are barometers of general conditions. The carriers are doing better and the \$500,000,000 they soon will receive from the Government is provided with the distinct understanding that the major portion of it will be used in the purchase of needed supplies. This will give added impetus to the steel and iron trade which already shows slight improvement with lower prices.

Analysis of automobile sales for the first half of the year shows that they have been chiefly in the industrial states. There probably will be a falling off in these states for the last six months, but there is substantial reason to hope that this decline will be more than counter-

balanced by increased business in the great agricultural areas.

As a matter of fact, the outlook for the farmer is brighter than it has been since the collapse in the prices of farm products. He has been thoroughly "liquidated," but the sharpest edge of his grouse against the world has worn off. He is approaching a frame of mind where he will be willing to buy.

Crops of all kinds promise well and further declines in prices to the farmer are highly unlikely. Because of the general drought in Europe export demand is certain to be larger than it has been in many months. Exports of grain the first five months of this year were 60 per cent greater than for the same period in 1920 and were equal to a whole year's exports in the pre-war period. Exports of dairy products in 1920 were eight times as great as in pre-war years.

Increasing farm operations have relieved unemployment in many of the agricultural states. Except in the South, the unfavorable balance between agricultural and manufacturing districts is disappearing. Full harvests, plenty of farm work and substantial wage payments are stimulating business in Kansas and other early wheat states. Nothing resembling normal business can be expected in the farm states in the fall, but there will be a marked improvement in Kansas, Nebraska, Iowa, Missouri, Minnesota and the Dakotas.

### South Gains for Fall

There will be some improvement in the South, but it will not be so marked. Cotton prices must recover sharply before sales in this section show much gain. Little improvement can be expected in the stock-raising, mining and lumbering states, although they undoubtedly have seen the worst of their depression. Fall probably will bring a strong upward trend in wool prices.

California continues, generally speaking, to offer the least sales resistance, but there are indications it is reaching the liquidating point. Other sections which offer fair promise for sales are New England, with the exception of Connecticut, New York, Pennsylvania, Indiana, Wisconsin and Chicago. May sales of general merchandise also were good in Arizona, Maryland, Nevada, some parts of Texas, West Virginia and Wyoming. There are some bright spots in almost every state, even in the South, which can be studied with advantage by sales managers.

The long swing of credit conditions will be toward further easing, but the season for crop moving is approaching and this seasonal demand upon bank resources will have tendency to tighten loans temporarily except in the agricultural districts. When the new crops

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## Reserve Bank Lauds Trade's Initiative

Cleveland Financial Institution  
in Statement Pays Compliment  
to Automotive Industry

CLEVELAND, Aug. 3—After stating that certain interests are holding business improvement back by failing to reduce living costs, the Fourth Federal Reserve Bank of this city pays a compliment to the automobile industry for reducing prices.

"It looks as if we are traveling in a helpless circle," reads the bank statement, "but the action of certain automobile makers in the recent past casts considerable light on the subject. Instead of hanging back and complaining that the other fellow was to blame, they reduced the prices of their products and convinced prospective buyers that they meant business. The theory that the man who has nerve enough to cut his prices regardless of what others are doing will get the trade, was proven correct by the increase in orders. And this same theory could be used to good advantage in practically all lines which are responsible for the present high cost of living."

Continuing the report states that mid-season depression still has the upper hand in most lines of business. Business about holding its own appears to fit the situation.

There appears to be a little better feeling in the passenger automobile line as compared to last month, and some good effects have resulted from the many price cuts. Some improvement is noticeable in the country districts where business has been very quiet for some time past.

The market for motor trucks is reported somewhat firmer. One large truck manufacturer reports sales as running a trifle over 50 per cent of last year.

### Atlanta Is Optimistic

ATLANTA, GA., Aug. 3—Business, industrial and economic conditions in the southeast are more nearly normal today than they have been at any time since the armistice, and business generally is on a sounder basis, according to the monthly report of the Federal Reserve Bank of Atlanta, published the latter part of July, and covering general business conditions throughout the sixth Federal Reserve district.

Investigation of the records of licenses issued during July and of transfers of licenses, at the office of the Secretary of State in Atlanta, indicates that auto-

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# Bill Calls for Federal Motor Tax

## Measure Carries Out Treasury's Proposal

N. J. Representative Also Considers Reciprocal Proposals of N. A. C. C. and the A. A. A.

WASHINGTON, Aug. 2.—Congressman Appleby, of New Jersey, has introduced a bill providing for a special license tax on automobiles and for a Federal license tax for motorists. The broad principle of his bill is in line with the proposal of the Treasury Department that a Federal license tax should be imposed as a part of the internal revenue bill. A reciprocal feature would carry out the principles for which the National Automobile Chamber of Commerce and the American Automobile Association and other automobile organizations have sought in a legislative manner.

### No Estimate Made

In an interview with AUTOMOTIVE INDUSTRIES, Congressman Appleby today said that he had not estimated the probable revenue that would accrue from the license tax. He appeared before the House Committee on Ways and Means and explained his bill today.

Ninety per cent of the revenue derived from the licenses would go to the Federal Government and 10 per cent to the State. The rate as proposed by the Appleby bill would be forty cents per horse-power or a fraction thereof in the case of all vehicles having pneumatic tires, with a minimum charge of \$5 for any motor vehicle.

For each motor vehicle equipped with solid tires and having a rated carrying capacity of not more than one ton, the rate would be \$10, and \$10 for each additional ton up to 7 tons, when the Federal rate would be \$70. Motorcycles would be obliged to pay \$3 per year, with an additional tax of \$1.50 for each side-car.

Manufacturers of or dealers in motor vehicles other than motorcycles would be obliged to pay \$3 for each registration tag, and registration tags would be interchangeable among the cars owned or used by such manufacturers or dealers during the current year for which the tax is issued, and would be allowed to be used only on new vehicles being brought under their own power from a factory to a dealer.

It is further provided that "no such dealers' tags shall be used on any car employed in transportation for hire or livery business. For each registration tax issued a dealer in motorcycles, \$1.50, such tags to be interchangeable as in case of dealers in other motor vehicles. For each rubber-tired vehicle with a carrying capacity of one ton or less, trailed

or propelled by any motor vehicle on which a Federal license is required to be displayed, \$5; and \$5 additional for each additional ton of carrying capacity or fraction thereof."

It is significant to note that the Appleby bill provides that the charges which it prescribes shall be for the twelve months period, "and shall in no way conflict or interfere with the license fees imposed by the respective States."

The administration of this proposed Act would be vested in the Bureau of Public Roads, after authority had been conferred upon it to negotiate with motor commissioners of the various States. The penalizing provisions of the bill call for a fine of not less than \$50 nor more than \$200, when any person operates an automobile without a Federal license. A Federal license is not obtainable until the State authorities have been convinced that the applicant for a license

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## Staff of Class Journal Bids Sherman 'Au Revoir'

NEW YORK, July 28.—The staff of the Class Journal Co. gave a farewell luncheon at the Woodstock to-day to Ray W. Sherman, executive editor, who has resigned to become merchandising director of the Automotive Equipment Association. Sherman was presented with a handsome watch as a mark of esteem.

David Beecroft, directing editor of the Class Journal publications, presided. He praised highly the work done by Sherman in building up Motor World, with which he was connected for more than seven years. An address of similar purport was made by H. M. Swetland, president of the United Publishers Corp. and the Class Journal Co.

The presentation of the watch was made by Neal G. Adair, editor of Motor World.

Sherman will leave for Chicago tomorrow with his family to take up his new work immediately.

## 500 Buy Durant Stock in Lansing Territory

LANSING, MICH., Aug. 1.—More than 500 persons in Lansing and vicinity have purchased stock in the Durant Motors, Inc. Stock sales have exceeded 6,000 shares.

This was announced Thursday morning by G. N. Murchey & Co., local Durant representatives. Most purchases have been in 10, 15 and 20 share lots, Glenn Murchey stated Thursday. The recent statement by the corporation that no more than 20 shares may be purchased at one time on the Durant partial payment plan has not apparently retarded sales.

## Bosch Magneto Head in U.S. to Fight Sale

Otto Heins Here to Press Suit to Have Auction by Palmer Declared Void

NEW YORK, Aug. 1.—Otto Heins, former president of the Bosch Magneto Co., has arrived in this country from Germany to press his suit to have the sale of that property declared void. It recently was charged that A. Mitchell Palmer as alien property custodian showed undue favoritism to the present owners in the sale of the assets at auction.

Heins is represented by his attorney, Harvey P. Andrews of this city, who also is acting for several other German interests which are seeking the return of the property they formerly owned. Associated with him in this work are Clarence D. Miller, secretary of the Republican National committee and John Thomas Taylor, head of the Washington office of the American Legion, according to a statement by Andrews. Andrews has had much correspondence with the Republican senators and representatives who are members of the Foreign Relations committees of the two houses of Congress. Andrews himself has been prominent in Republican politics in this city.

Heins, who is a German citizen but is said never to have been declared an enemy alien, returned to Germany early in 1920, having been reduced from the status of a millionaire almost to that of a pauper. He has completed the reorganization of his business interests in Germany and has visited England, France and other countries. He now has come to the United States to make a strong effort to regain control of the company now known as the American Bosch Magneto Corp.

### Will Go Into Business

Regardless of the success of his suit, Heins intends to go into business in competition with the American Bosch Magneto Corp., according to Andrews, "and expects to surpass them all in the manufacture of magnetos." His attorney added that he expects to file patents very soon and will manufacture a new spark plug and lighting system.

The action started against Palmer on behalf of Heins over the sale of the Bosch Magneto Co. alleges fraud and demands that the sale be declared null and void. It is charged that Palmer sold the property to Martin E. Kern, a personal friend, for \$4,500,000, although it was worth \$12,000,000.

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## Many Resignations Follow Goodyear Cut

**Sweeping Salary Reductions  
Cause Break in Personnel—  
Budget System in Force**

AKRON, Aug. 1.—With all office and factory departments of the Goodyear Tire & Rubber Co. placed on a budget system effective Aug. 1 under the new financial control of the company, sweeping salary reductions have been made in the offices in addition to reductions in office personnel. In order to keep each department within its respective budget, many departments have cut personnel over 10 per cent, while all departments have reduced salaries from 10 per cent to 20 per cent under the budget paring.

The readjustment of office personnel at Goodyear has resulted in the resignations this week of some of the company's oldest officials and employees, including George Rogers, in charge of credits and collections, who has been with Goodyear for 20 years. He was one of the first associates of F. A. Seiberling when Goodyear, then two years old, was struggling for a foothold in the rubber industry.

### Assistant Treasurer Out

Other resignations announced include those of Harry Blackburn, assistant treasurer; Marshall Morris, formerly assistant general manager of the Goodyear Co. in California and more recently in charge of the new stock issues under the refinancing program; F. F. Dugan, in charge of sales personnel; Don Stevens, in charge of the factory labor department, and Dr. Clyde Leeper, medical officer in charge of the office dispensaries and nurses' staff.

W. D. Shilts, chairman of the board of control under the Seiberling régime, which was abolished when E. G. Wilmer succeeded Seiberling as president, has been assigned to install the budget system in Goodyear branches and to reduce expenses in all branch offices. C. C. Prather, manager of the products department, has been transferred to the sales department and assigned to Cincinnati as a general line salesman. C. T. Crudginton, editor of the *Goodyear Tire News*, and lately assigned to Council Bluffs, Iowa, as a general line salesman, has resigned and returned to the East.

### PLAN TRACTOR FIELD SHOW

MONMOUTH, ILL., Aug. 2.—Tractor dealers are co-operating with the Chamber of Commerce, the farm bureau and local farmers in arranging a field demonstration Aug. 11. It is probable that the program will require two days and committees are completing outline of the field work.

To emphasize the value of power farming, teams of horses will be employed on adjoining fields to demonstrate the greater efficiency of the tractor operated machine.

### GRAND CENTRAL PALACE SCENE OF 1922 SHOW IN NEW YORK

NEW YORK, Aug. 2.—Definite announcement is made by the National Automobile Chamber of Commerce that the annual New York show will be held at the Grand Central Palace Jan. 7-14. Earlier in the year it was supposed the Palace would not be available and Madison Square Garden was the next best location. Plans for converting the Palace into offices have been delayed, however, and the N. A. C. C. will be able to use it for the 1922 exposition which will be one of the most important ever held.

## Surplus Truck Sale Will Be Continued

WASHINGTON, Aug. 2.—All surplus property of the War Department scheduled for sale during August will be disposed of as previously arranged and unserviceable motor vehicles will be sold wherever possible. This policy was determined upon to-day following a conference between Director of Budget Dawes, Assistant Secretary of War Wainwright and Col. Hartshorn, Director of Sales, War Department. Director of the Budget agreed to the plan after learning that the War Department had canvassed other branches of the Government again and given them an opportunity to make requisition for surplus stocks held by the War Department, thus meeting the requirements of recent order from the Director of the Budget. This agreement between Government officials, now applicable for August only, is expected to be extended and other stocks probably will be sold when it is shown that other departments have been given opportunity to make requisition on War Department material.

## Several Changes Made in Personnel of G. M.

NEW YORK, Aug. 1.—General Motors Corp. announces the following assignment of duties and changes in personnel in the central office, Detroit:

James McEvoy has been appointed to the Advisory Staff, in charge of legal matters under the general counsel. J. G. Stevenson will be associated with McEvoy in legal matters.

A. C. Anderson, assistant comptroller, will be in charge of matters relating to insurance.

C. E. Stowe, assistant treasurer, will be in charge of matters relating to employees' fidelity bonds.

H. W. Webster, of the treasurer's department will be in charge of matters relating to taxes other than Federal taxes.

L. B. Robertson, in charge of taxes and insurance, has resigned.

## Fisk Stockholders to Readjust Capital

**Will Change Par Value of Common Stock from \$25 to No Par  
—Will Buy Federal**

NEW YORK, Aug. 2.—Stockholders of the Fisk Rubber Co. will meet Aug. 9 to act upon a readjustment of the capital stock and debt of the corporation and to change the par value of the common stock from \$25 a share to no par. The proposals under the plan provide for the creation of bonds without limitation on maturity and the creation of a class of stock with voting rights superior to any now outstanding. In addition, authorization will be asked for the creation of one or more mortgages to secure the bonds. Another proposal is to acquire the assets and the liabilities of the Federal Rubber Co. and the Ninigret Co.

The Fisk Rubber Co. is controlled by John N. Willys personally and not by the corporations of which he is the head. The Fisk company in 1915 acquired control of the Federal Rubber Mfg. Co., which was succeeded by the Federal Rubber Co. It owns \$2,550,000 of the \$5,000,000 common stock of the Federal company. The Ninigret company is a Rhode Island corporation with a capital of \$550,000, with mills at Westerly in which all kinds of textile fabrics, including automobile tire fabrics, are manufactured.

### \$8,500,000 from Surplus

In a letter to Fisk stockholders outlining the situation, it is stated that inventory adjustments resulted in a deduction of about \$8,500,000 from the surplus accounts, so that the balance sheet now shows a deficit. Thus far this year Fisk has accepted nearly two-thirds of the rubber and fabric for which it was committed. While prospects for earnings and for a substantial reduction of the debt are excellent, Fisk and Federal will remain dependent upon bank loans for a large amount of working capital.

The plan calls for a bond issue to the amount of \$10,000,000. Stockholders in the Federal Rubber would receive first preferred stock of Fisk, share for share, and in addition 58 2/3c. a share as a dividend adjustment. Holders of Ninigret stock would receive in exchange common stock of Fisk.

### WAINWRIGHT RUNNING AT TOP

CONNEERSVILLE, IND., Aug. 3.—The Wainwright Engineering Corp. is running its plant at full capacity on the day shift and 50 per cent at night, turning out 3600 pistons a day, chiefly for the jobbing trade.

John D. Carmody, for the past seven years district manager for the Champion Spark Plug Co. has been appointed Pacific Coast manager for the Wainwright company, with headquarters at San Francisco.

## Interlocking Cord Receiver to Go Soon

**If Stockholders Raise \$20,000  
Fund Receivership Will End  
in 30 Days**

AKRON, Aug. 3.—The receivership of the Interlocking Cord Tire Co., of Akron and Mogadore, will be lifted within 30 days, conditional upon the raising among stockholders of a fund of \$20,000 to pay part of the company's claims in cash and to make a 15 per cent payment on the balance, according to an agreement entered into by officials of the company with receiver Elihu Harpham and Judge W. J. Ahern of Common Pleas Court.

The receivership was created last January upon indictment of officers of the company for alleged violation of the Ohio Blue Sky Laws. New officers elected since then are Edward Kohl, president; W. B. Smith, vice-president; R. E. Cartledge, treasurer, and R. A. Rukamp, secretary.

Claims against the company total approximately \$80,000, including general claims of \$35,000, preferred accounts of \$45,000, work and labor claims of \$1,300, and attorney and receiver fees of \$12,500, in addition to \$1,200 owed the Ohio Industrial Commission and \$5,000 owed the Government in excise tax and penalties. Under the agreement entered into a mortgage on the company's property will be executed and delivered to the Ohio Savings & Trust Co. to secure these claims. Stockholders will be asked to raise \$20,000 to make full cash payment of the claims of the Government, Ohio Industrial Commission, attorneys and receiver, and the work and labor items, and also to make a 15 per cent payment on the \$60,000 balance. The preferred balance is to be paid in one year, and the balance due on general claims will be payable in full within two years.

Stockholders already have paid in over \$15,000 towards the fund, which will mean lifting of the receivership. The company expects to get back into production with 30 days, with the Akron Engineering Co. handling all production. Suits filed by the receiver for collection of nearly \$200,000 in unpaid stock subscriptions will not be prosecuted for the time being, pending the lifting of the receivership.

The indictments against former officers of the company are still alive in the Common Pleas Court of Akron.

### WINTER CHANGES NAME

DOVER, DEL., Aug. 3.—The Winther Motor Truck Co. has filed a certificate changing its name to Winther Motors, Inc., and announcing that its capital has been increased from \$22,000,000 to \$61,000,000. The Kenosha Wheel & Axle Co. and the Marwin Truck Co. recently were consolidated with the Winther company.

### JIMMY MURPHY FACED DEATH IN PRACTICE BEFORE GRAND PRIX

NEW YORK, Aug. 1.—Friends of Jimmy Murphy, who won the French Grand Prix at Le Mans in a Duesenberg car on July 25, are convinced he is a favorite of fortune. They are talking about his remarkable escape from injury in practice prior to the race when his car turned over while he was trying to avoid running down a horse which had strayed on the road. Louis Inghibert, who was serving as mechanic, was taken to a hospital with three broken ribs and was unable to take part in the race, but Murphy escaped without a scratch and his car was not damaged.

## Farmers and Labor Open Fight Against New Roads

TOLEDO, Aug. 3.—Organized farmers and labor of Ohio have begun a fight against the carrying out of the road construction contracts let by the State Highway Department, which provide for the building of nearly 100 miles of new highway with an expenditure of nearly \$3,000,000. The contracts have had included in their provisions an agreement that any lowering of freight rates will result to the benefit of the state.

But even though the contracts place the cost per mile about \$36,000 as an average for all kinds of improved roads, the labor organizations say that that figure does not represent the decrease in wages taken by labor this summer and the farmers declare that under any circumstances the road building at that cost must await the return to normal. They point out that the same roads were built before the war for \$10,000 a mile.

It is doubtful whether the road-building campaign will be interfered with this summer, as the contracts have been legally let. However, the result of the agitation may be to suspend contemplated projects next summer.

### CANADA'S EXPORTS INCREASE

OTTAWA, ONT., Aug. 3.—Canadian motor cars, chassis and parts exported to Australia during the fiscal year 1919-1920 amounted to a value of \$2,308,360 an increase of \$372,535 over the figures for the year previous, thus giving Canada second place in the list. America being first and United Kingdom third.

### MAINE AFTER HEAVY TRUCKS

BOSTON, MASS., Aug. 3.—Maine has started a campaign to rule off the highways trucks exceeding the 18,000 pound limit law passed by the last legislature. It will particularly affect commercial vehicles carrying loads from Massachusetts into Maine, if the campaign is effective.

## Studebaker Income Shows Healthy Gain

**Net Profits Three Months Ending  
June 30 Come to \$4,270,547  
Report Says**

SOUTH BEND, IND., Aug. 1.—The Studebaker Corp. for the three months ended June 30 reports net income of \$4,270,547 after all charges and reserves for inventory adjustment. After payment of preferred dividends this was equivalent to \$6.83 a share on the outstanding common. In the first three months of the year the company reported net profits of \$2,210,577.

Net sales for the second quarter of 1921 were \$33,059,834, as compared with \$22,249,299 for the same period in 1920. Total assets are \$96,880,381, including trade name and good will, which are valued at \$19,807,277. Inventories amount to \$20,926,304, cash to \$6,376,030, sight drafts to \$3,318,068 and accounts and notes receivable to \$5,879,734.

The company has no notes payable and accounts payable amount to only \$3,892,413. Miscellaneous liabilities are listed at \$3,165,772 and the reserve for Federal taxes at \$2,617,023. There is a special surplus account of \$3,645,000 and the regular surplus stands at \$13,760,000.

Production of cars in the quarter ended June 30 reached 8498, as compared with 4811 in the same quarter last year.

The directors have declared the regular quarterly dividends on the preferred and common stocks.

## Threefold Demand For Endurance Race Meets

SAN FRANCISCO, CAL., Aug. 2.—Public demand, met more than half way by the desire of the manufacturer and the distributor, seems to be bringing back the old-time demonstration and endurance races, designed to show exactly what each car will do. The object of these races, of course, is twofold, first to bring home to the public mind the performing ability of the automobile, especially the stock car, and, second, stimulate improvements in construction and mechanical design. On the Pacific coast there also is manifest an appreciable revival in interest in the racing game, and large crowds greeted the finishes of the races at Tacoma, Seattle, and Reno this year.

### TIMKEN LAYS MEN OFF

COLUMBUS, Aug. 2.—A slight depression in business has caused a lay-off of a number of men at the Columbus plant of the Timken Roller Bearing Co. Since the plant resumed operations gradual increase in the working force has been made until approximately 400 men were employed. The depression is expected to be temporary and men will be put back at work as soon as things improve.



## Dr. Dickinson Heads Research Bureau

**Quits Work with Bureau of  
Standards to Assume New  
Duties with S. A. E.**

NEW YORK, Aug. 1.—Dr. H. C. Dickinson, who has been assisting Dr. S. W. Stratton, Director of the Bureau of Standards, Washington, D. C., has been engaged by the Society of Automotive Engineers to manage the research department which was created by the Council of the society at its February meeting in Chicago. Dr. Dickinson will assume his new duties on Sept. 1, after which date he will be located in this city.

For some months the council of the society has been carrying on its efforts to secure Dr. Dickinson, but his work in connection with the Bureau of Standards has been of such importance that it was only after repeated presentations of the case that Dr. Stratton consented to grant the necessary release. Dr. Dickinson's work with the Bureau of Standards has been very closely connected with the automotive industries in that this phase of research work in the bureau has for some years come directly under his control. No one better qualified to handle the research program of the society could have been secured. He has a mind peculiarly trained for research work. His coming with the S. A. E. assures the success of the research program.

### Presents His Views

In the August issue of the *Journal of the Society of Automotive Engineers*, Dr. Dickinson presents some of his views on the subject of research. He classes research under three heads:

- 1—Explorational research.
- 2—Intensive research.
- 3—Developmental research.

**Explorational research.**—This research deals with the fundamental analysis of problems through the study of available literature, and of the technical and economic condition involved.

**Intensive research.**—This includes the major part of research usually accomplished in experimental research laboratories. It requires considerable laboratory equipment.

**Developmental research.**—Developmental research involves the application of experimental facts and principles to the solution of practical problems. It seldom leads to the highest efficiency and never to a knowledge of principles. It is the method of evolution, as well as that by which practically all of the mechanical arts have received their initial development.

Dr. Dickinson believes the aims of the research department of the Society of Automotive Engineers for the immediate future are to encourage and secure as far as possible a more systematic survey of the research field as applied to our

### FIGHT ON GEORGIA GAS TAX WON BY AUTOMOBILE DEALERS

ATLANTA, GA., Aug. 2.—Contrary to expectations the bill before the Georgia State Legislature providing for a one cent per gallon retail sales tax on gasoline has been defeated. Automobile dealers bitterly opposed the bill, not so much because of the additional one cent per gallon they would have to add to the price of gas, but because of the extra amount of book-keeping such a law would compel.

industry, to bring to the attention of the various laboratories such problems as appear in most pressing need of solution or of increased attention, and to secure to the greatest extent feasible a more general interchange of information between the various laboratories and individual investigators.

In carrying out this work, Dr. Dickinson believes it necessary to draw a sharp line of distinction between developmental research and fundamental or intensive research. Developmental research must be considered of a private and confidential nature; whereas intensive research is distinctly of more value, if mutually shared by the members of the industry.

Dr. Dickinson proposes to use existing laboratories to the fullest extent. In this work there are three types of laboratories to be utilized:

- 1—Corporation laboratories.
- 2—Educational institution laboratories.
- 3—Government laboratories.

Each should be occupied with the kind of problems with which it is best fitted to deal. There are many corporation or industrial laboratories that have excellent material facilities, and able men, but are doing little that can properly be classified as research work.

The laboratories of educational institutions require a closer contact with the problems and requirements of industry. The Government laboratories have inadequate contact with industries and do not always appreciate the relative importance of various problems.

### FORM DISCOUNT COMPANY

QUINCY, ILL., Aug. 3.—The General Discount Corp. has been issued incorporation papers in Springfield with a capital stock of \$225,000. Rolland M. Wagner, Arnold V. Scott and C. B. Parks are incorporators.

The firm will make loans from its capital upon automobiles, deal in automobile dealers' notes, conduct rediscount business on contracts and handle mortgages. Scott, the manager, has been associated with the State Savings Loan & Trust Co., but is resigning to devote his entire time to the new organization. A. E. Gibson will be fiscal agent for the company.

## 45,000 Less Employed in Akron Tire Plants

**Records Show Drop from 72,000  
in Spring of 1920 to 27,000  
with Production 80%**

AKRON, Aug. 1.—Employment records from the nine major rubber companies in Akron show that between 26,000 and 27,000 day workers and tire builders now are being employed as compared with about 72,000 in the same factories during the peak months of the tire industry in the spring of 1920. The low ebb of employment is reported to have been slightly under 19,000 factory workers in December of last year and January of this year. The records apply only to day workers and not to office employees or salaried factory employees.

The employment figures are regarded as significant in view of the fact that these same nine rubber companies are producing over 80 per cent of their peak production of 1920. This indicates over 80 per cent of peak production with 36 per cent of peak employees, showing a high percentage of increased efficiency both individual and collective among factory workers.

For example, the Goodyear company when it had a peak production of 31,181 tires daily had nearly 33,000 employees on its payroll, including its office personnel. To-day Goodyear is producing 28,640 tires with about 13,000 employees.

The employment figures cover the Goodyear, Goodrich, Firestone, Miller, Kelly-Springfield, Swinehart, Star, General and Mohawk factories in Akron.

## Freight Barge Fleet to be Operated by Ford

NEW YORK, Aug. 1.—Henry Ford is preparing to put into operation at an early date a fleet of freight barges to transport automobile material from Detroit, via the Erie Canal, to Troy and this city. The barges have been planned by Ford, and will be propelled by marine gas engines. They will be 150 feet in length and 20 feet in width, having a capacity for 1000 tons of freight.

The barge shipments, in addition to supplying the Kearney plant with material, will be used for shipping motor parts and freight to the Ford plant to be built at Troy. Work on the large power house there is now under way, but the factory will not be ready for operation until nearly a year hence.

### TRACTOR SALES GROWING

INDIANAPOLIS, Aug. 3.—Tractor business in this territory is picking up materially, branch managers here declare. They say the farmer is fast recovering from the shock of lower grain and live stock prices and is returning to the markets in a buying mood. Dealers here do not believe the price decreases will have merely a temporary effect in stimulating sales.

## Germany Goes After South African Trade

### Post-War Models Arrive in Johannesburg—Demonstrate Benz Models

JOHANNESBURG, June 28 (By Mail)—The first tank steamer carrying oil fuel in bulk has paid a visit to the newly completed storage tanks at Durban, Natal. For a considerable time the policy of importing oil fuel in bulk has been advocated and at several other ports the construction of large tanks now is being proceeded with.

More post-war German models have arrived. The Benz cars and trucks have been demonstrated in various parts of the country and consignments of Adler models are expected. Germany intends to capture part of the South African automobile trade and efforts are being made in different centers to popularize German automobiles.

The Vacuum Oil Co. has announced a reduction of two shillings current rate of exchange (40 cents) per case of 8 gallons in the wholesale price of petrol. This cut in price was not wholly unexpected but was welcome nevertheless. A consignment of power alcohol which is compounded with other substances and marketed under the name of Natalite, has been sent to England for demonstration and experimental purposes. It has been on the South African market for about four years and was widely used during the petrol shortage. The price is considerably less than that of petrol and the results given are considered excellent. The verdict of the English automobile bodies is being awaited with interest.

A number of price reductions in cars has been announced during this month, and Studebaker models are selling at very low prices indeed. The "Big Six" is now obtainable at \$2,887, whereas only six months ago it was selling for \$3,562. With these price reductions ruling the sales of English and Continental cars have become slower, as no reductions worth mentioning, with the exception of the Vauxhall, have been made.

Ralph Dort of the Dort Motor Car Co., has been touring S. A. studying trade conditions. This is the first occasion on which a principal of a large American motor manufacturing firm has visited this country. Dort motor cars are few and far between in Africa, but after Mr. Dort's visit it is expected agencies will be fixed up in various parts of the country.

The trade position still looks hopeful for the second half of the year, and the results given by the motor sections at the different Agricultural Shows held in the country districts give evidence that the farming community are open to buy automobiles if the territory is properly combed out. More intensive sales methods are being used with the result that in the spring the car business ought to be brighter.

### FRANKLIN EMPLOYEES DRINK 2,000 PINTS OF MILK EVERY DAY

SYRACUSE, Aug. 1—Employees of the Franklin Automobile Co. have become the champion milk drinkers of the city. The company has installed a refrigerating system and sells the milk at any time of the day. On one hot day recently 2500 pint bottles were sold and the usual daily consumption is 2000 pints. The proceeds from the sale of the milk are used for the support of the Franklin Employees band, numbering forty pieces.

### Company Is Organized to Take Over Root Firm

SPRINGFIELD, OHIO, Aug. 3—With a capital of \$300,000, the Automotive Supply Co. was organized to-day to take care of the wholesale business of the H. G. Root Co. J. L. Zismer was elected president and treasurer and L. W. Peaz, secretary. Besides these men the directors are H. G. Root, general manager of the Westcott Motor Car Co., J. Stanley Weigel and W. C. Webster. The new company will take over the wholesale business of the H. G. Root Co. Aug. 1.

Speaking of the new company Zismer said: "We will carry all kinds of auto supplies. Retail stand will be maintained as usual. We will operate the wholesale business in Springfield and Columbus and will develop this wholesale automotive supply business in this territory."

### Braender Rubber Has Reorganization Plan

NEW YORK, Aug. 2—The creditors' committee for the Braender Rubber & Tire Co. of Rutherford, N. J., which was thrown into bankruptcy in May, has worked out a plan for reorganization which has been submitted to creditors. It calls for the formation of a new company to take over the assets of the old and under the plan all creditors except the Braender family would take first preferred stock at par, equal to their claims. Claims less than \$100 would be paid in cash. Management and control of the business would be vested exclusively in the first preferred stock until all this class of stock had been retired out of earned surplus. By vote of holders of two-thirds of this stock the company could be liquidated at any time.

The total liabilities of the company are \$1,028,638. They are divided as follows: Federal taxes and wage claims, \$90,819; claims of creditors secured by collateral and indorsements of members of the Braender family, \$190,606; claims of general unsecured creditors, \$202,481; claims of members of the Braender family, \$369,731; claims for damages by unsecured contract creditors for undelivered merchandise, \$175,000.

## Italy Building New Motor Car Speedway

### Hope to Have Brescia Track Completed for Races September 4-11

MILAN, ITALY, July 20 (By Mail)—That Italy is determined to maintain the position it has occupied in the past in automobile road racing is established by the building of a special road-racing circuit in the form of an 11-mile triangle close to the town of Brescia where Italy's greatest road races have taken place in the past. The Automobile Club of Milan, with the aid of the citizens of Brescia will have this 11-mile racing triangle completed in time for the week of September 4-11, when a three-day program of motor races supplemented by an aviation program will take place.

The new Brescia circuit makes use of approximately 10 miles of existing highways and includes 1 mile of new highway built to avoid going through the town of Montichiari, which is the only town on the circuit. Two sides of the triangle are approximately 3½ miles straightaway. The new roadway being built over the entire 11 miles has a minimum width of 26 ft. and a maximum of 32½ ft. It is being macadamized and tarred throughout the complete length. Curves are being specially prepared for speed. One parabolic curve connecting the two 3½-mile straightaway sides is expected to admit of very high speed.

A complete equipment of grandstands, restaurants, press-stands with telegraph and telephone installations is being installed.

The program for the September week opens with the Grand Prize September 4, a 3-liter classification of thirty laps or approximately 324 miles.

On September 8 there will be the Grand Prize for light cars, 1½-liter piston displacement at 216 miles. On this day kilometer trials for all classifications will take place.

September 11 will be given over to the Grand Prize for gentlemen drivers in which engines of any capacity over 2 liters will be admitted. There will be three classifications in this event.

### NAME MONITOR RECEIVER

COLUMBUS, Aug. 2—Upon the application of the J. E. McNally Lumber Co. who held a note against the company, Judge Rogers in the Franklin County Courts has named Ernest W. Pavy, receiver for the Monitor Motor Car Co. under a \$50,000 bond. It is claimed that the company has a considerable amount of finished cars, partly finished cars and materials on hand and pressing creditors threaten a dissipation of the assets. The receiver has announced that the assets aggregate \$400,000 and the liabilities, \$190,000. Operations at the plant, outside of furnishing service, have been suspended.

## Big Labor Efficiency Increase for Willys

Production With 7700 Men 50 Cars Greater Than With 13,000 Year Ago

TOLEDO, Aug. 2—That the Willys-Overland plant is getting greater production today with 5,000 less employees than it did a year ago was the finding of President John N. Willys while here on a visit to the factory this last week.

Willys sent out some interesting information to the stockholders as a report of how he finds things here.

He said the company with 7,700 employees now is producing 50 cars more per day than a year ago when there were 13,000 men at work.

"You will be interested to learn that our business in the last two months has been very close to normal. June and July have averaged between 10,000 and 11,000 cars a month," the letter sent to all shareholders said.

"Since March I have talked to more than 2,500 of our dealers and distributors and I am pleased to state that since then we have added more than 400 to our dealers' list.

"I think you will agree that is very good under the distressing business conditions, which have been general all of this year.

"For the past 10 days I have been studying every detail of the business here, and I find the whole organization working thoroughly in harmony under the direction of C. B. Wilson, vice-president in charge of operation.

"A great many economies have been made and we are going to make a great many more. For instance, last week we made approximately 550 cars a day, which is about 50 cars more than a year ago, and the total number of factory employees at present is 7,700 as compared to 13,000 a year ago.

"This shows an increase in efficiency that is very gratifying."

Following in line with the reported decrease due for this month in the working force at the Overland other Toledo subsidiary plants were planning cuts in their forces.

The Electric Auto-Lite Corporation plans on operating through August with very little reduction in its force of 1300 employees. Possibly 100 will be let out.

The Overland is reducing its force gradually paring off a few hundred each week.

This week the company shipped several boatloads of cars to Buffalo.

### DENY RUTENBER CLOSING

INDIANAPOLIS, Aug. 3—In denial of the rumors circulated to the effect that the Rutenber Motor Co., at Marion, Ind., had discontinued business, R. S. Bower, general manager of the company, stated that such rumors are absolutely false. He says the Rutenber Motor Company is doing as much business

as the majority of the factories in Marion to-day, and that there has never been any ground for such statements. He said it was true that the company had sold their old factory to another company, but that they had immediately purchased another plant where they have since continued doing business.

## Preston Motors Brings on New Roadster Model

BIRMINGHAM, ALA., July 30—Preston Motors Corporation have recently brought out a roadster, a new model for 1922.

The roadster has the same chassis as the touring car, having a wheel base of 117 in., and the same standard units throughout that have featured the Premocar since it was first put on the market. The roadster has the same high, well-arched hood, streamline effect, with beveled edge and a sloping rear end, that makes its whole appearance quite attractive.

The seat is roomy and comfortable, and the doors are large. A noticeable feature is the rear compartment, which is unusually large. The lid lifts up and is held by side arms, uncovering a space large enough to carry a large size steamer trunk or all sorts of bags and baggage. The price of the roadster is the same as the touring model and production is now going on.

## Duesenberg Shipments Will Start September 1

INDIANAPOLIS, July 18—Deliveries to dealers who have been established in all parts of the country, will be begun Sept. 1 by the Duesenberg Automobile & Motor Co., Inc. Orders for more than 3,000 cars which will cost in excess of \$12,000,000 now are on the books.

Factory production will be in charge of A. W. King, formerly production manager for the Buick Motor Co. and the Northway Motors Co., who recently returned from France where he reorganized the production system of the Berliet company.

The sales organization is being perfected by Harry W. Anderson, who has served as sales manager for Stutz, Templar and the Buda Co.

### U. S. PRAISES N. A. C. C. IN WAR

NEW YORK, Aug. 1—The National Automobile Chamber of Commerce has been awarded a certificate of merit by the War Department in recognition of loyalty, energy and efficiency in the performance of its war work, which materially advanced the war program.

### FORD TRACTOR CUTS FORCE

HAMILTON, Aug. 2—C. A. Anderson, manager of the Ford Tractor plant announces that all but 75 men employed in the factory will be laid off July 30 until Aug. 15. This means that 325 men have been laid off until that time. No explanation for the action was made.

## Brazil Invites U. S. to Tractor Trials

Ministry Anxious for American Entries for Annual Meet at Praia Vermelha

NEW YORK, Aug. 3—The annual Brazilian tractor trials for 1921 will be held on Oct. 1 at Praia Vermelha, a suburb of the capital, Rio de Janeiro, under the auspices of the Brazilian Ministry of Agriculture. This information was contained in a cablegram from the ministry received to-day by EL AUTOMOVIL AMERICANO, the Spanish automotive publication of the Class Journal Co. Entries from American manufacturers are asked by the ministry which states that the trials will be similar to those held last year.

The 1920 competition was held early in October at Santa Cruz and Deodoro, also suburbs of the Brazilian capital, with entries of Twin-City, Allis-Chalmers, Monarch, Titan, Moline and Fiat tractors. A six-hour plowing match was held that was carefully observed by representatives of the ministry and a report was later made showing the cost and results as it applied to each entrant. The field chosen last year was not entirely suitable for satisfactory plowing as it had been deforested only a short time before the contest. Although today's cablegram did not mention this subject, from other correspondence it is believed the trials will be held this year in more suitable territory.

Conditions in Brazil, so far as they pertain to the automotive industry, are reported as showing much improvement, despite the fact that present exchange conditions make immediate business very difficult. Some American manufacturers, realizing that this condition is only temporary, have come to satisfactory arrangements with their Brazilian representatives and have made recent shipments of complete cars and trucks. Road building is continuing in Brazil and much new mileage is being gotten under way. The 107 kilometer road between Sao Paulo and Campinas, in the coffee country, has just been opened for traffic and is one of the numerous roads that are being put in first class condition.

### ACCESSORY MEN TO CONVENE

PHILADELPHIA, Aug. 1—The Automobile Accessories branch of the National Hardware Association will hold its fourth annual meeting and exhibition on Young's pier at Atlantic City, Oct. 19-22.

### DENIES FREIGHT RATE CUT

NEW HAVEN, CONN., Aug. 1—E. J. Pearson, president of the New York, New Haven & Hartford Railroad, denied to-day that there would be a general reduction in freight rates to meet the keen competition offered by motor trucks.

# Detroit Production Gained in July

## Output Increased in Most Factories

### Some Propose Continuance of Present Schedules This Month —Sales Holding Well

DETROIT, Aug. 2.—Production in a majority of Detroit plants for July shows a general increase over June and in some of them schedules for August indicate a continuance of the present output. The Ford Motor Co. closed the month with a total production of 107,132, about 5 to 6 per cent of which was trucks. This was slightly under the schedule outlined, due to manufacturing conditions only. In August the company is adhering to its 109,000 schedule.

Studebaker is running to capacity. July production totaled 8100 in all models which is as many as the company can build. August will witness the same output. Unfilled orders under present schedules can't be brought down at all.

Buick is going to build 11,750 cars in August, which includes both the new four and the former models. This will be within 250 of the biggest month the company ever had. July production ran between 9000 and 10,000, which is big business.

Hudson-Essex in July ran at about 60 per cent of its 1920 business. This same rate in August will mean 75 per cent of its 1920 business. "Sales are holding up beautifully," is the factory statement and while conditions are admittedly peculiar the companies are confident of plenty of business ahead.

### Cadillac Running Well

Cadillac business is running at the rate of 80 to 100 cars a day. Production in July was slowed somewhat owing to moving operations which are now completed with all equipment installed. The company will devote all of its labor in August to car production. The sales outlook is considered especially bright.

Maxwell and Chalmers produced 1085 and 257 respectively, in July. With Maxwell this represented an increase from 878 in June. Chalmers showed a falling off. Production in August will be based upon business conditions and will adhere to approximately the same schedule shown in July.

Packard business in July showed an increase in twin six sales, ascribed at the factory to the cut in prices. The single six business approximated that of June. Production will continue at the same rate in August. The factory reports little business in trucks.

Oldsmobile business ran at about 70 per cent of normal capacity. Produc-

tion in August will be at about the same rate as in June and July.

Dort reports business in July as running at about 1500 cars. In making comparisons the company, through President Dort, declared business is running in excess of 1919 which it considers a busy year. The company declares business best in big industrial centers.

Hupp in July turned out 1925 cars, or 175 more than in June. The outlook for August is satisfactory and schedules will be continued along present lines. Columbia business in July approximated 60 per cent of normal, keeping up with the June rate.

### Improvement in Briscoe

Briscoe reports a marked improvement in July sales. The plant ran at about 50 per cent of normal. Many dealers and distributors were taken on by the company in July. Liberty business bettered June by 25 per cent. The company's new sport car is making its appearance.

Paige reported July as its biggest month since April, about 1200 cars being produced, which represented a 40 per cent increase over June. The company looks for good business in August.

Saxon business in July ran 20 per cent better than June. The company's new line is making good headway and it reports greatly increased interest on the part of dealers. Wills-Lee is running along at the same rate reached following the introduction of the car to the trade. Sales are steady and good business is looked for in August.

## Larrabee-Deyo Makes New 1-Ton Truck Model

BINGHAMTON, N. Y., Aug 3—A 1-ton, six-speed model is the latest addition to the line of trucks made by the Larrabee-Deyo Motor Truck Co., this city. With this new model, the line now consists of 1½, 2½, 3½, and 5-ton sizes.

This new model is at present being tested out on the road. It has a speed of 55 m.p.h. with 2450 lbs. of dead weight. In a test recently made, the truck was driven from 2 m.p.h. to 30 m.p.h. within 50 ft.

Specifications include the following units: Continental 7-R engine; Brown-Lipe clutch and gearset; Gemmer steering gear; Fedder radiator; and Spicer universal joints in the rear and Thermoid in the front. Other equipment includes metal disk wheels; steel cowl, seat riser and back, with fore doors, all integral.

The wheelbase is 138 in., allowing for 9 ft. of loading space back of the driver's seat. This job complete with electric lights, starter, cab, windshield and express body will list for approximately \$2,000. Tire equipment includes 34 by 5-in. cords.

## North Dakota Sales Dependent on Crops

### Distributors Expect Better Business but Improvement Will Be Slow

NEW YORK, Aug. 3.—With crop conditions fairly well understood, and the crops nearly matured, the automotive distributors of North Dakota are arriving at their estimates of the possible fall business in the sale of cars, trucks, and tractors, and also in the possibilities for business next spring.

North Dakota as an agricultural State is typical of those areas where business in all lines other than agriculture, is reflected almost directly in the condition of crops. As North Dakota did not profit during the war by large crops and war prices business in the State did not get far away from the crop.

Crop conditions in the State are in general a little better than a year ago. In the Southwestern part there is literally no crop, whereas a year ago they had some.

In the Minot area in the Northwest, with the exception of a local zone surrounding the city, crops are 50 per cent over a year ago. In the Devils Lake area in the central north, they are 25 per cent ahead of last year. In Grand Forks, representing the Northeast, they are as good as last year. In Fargo, representing the Southeast, they are about the same as last year. In general motor business throughout North Dakota during this fall and next spring will largely reflect these crop conditions.

### Three Questions Asked

In a canvass made of automotive distributors in the cities of Fargo, Grand Forks, Devils Lake, and Minot, three questions were asked:

1—To what extent do you think the farmer will be a greater buyer of automobiles and tractors in the next twelve months than he has been in the past twelve?

2—How much improvement in the sale of automobiles to the agricultural community are you expecting during the coming fall?

3—Do you think the city and town population will constitute as good a market in the next twelve months as they have in the past twelve?

The replies may be summarized thus:

1.—The farmer's purchases next fall will pretty generally be reflected by his crop condition. In Minot, where crop conditions are good, distributors of low priced cars expect a greatly increased business over last fall. As the scale of prices increases a distributor does not expect a much greater business with far-

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## Many Detroit Plants Planning New Models

### Ford Company Denies Story About New Car—Prices to Change Also

DETROIT, Aug. 2—Many of the factories in the Detroit district are planning new models for appearance in the late summer and early fall months, but the Ford Motor Co. will not be one of them. A statement by the Ford company to-day says:

"Our attention has been called to recent newspaper articles to the effect that there is to be a new model Ford car on the market Aug. 15 with change in design such as a ventilating windshield and one-man top. As we do not contemplate any such changes and there is no foundation to the rumors circulating in this connection, we have no hesitancy in making a denial of the report."

Columbia Motor Car Co. will present its 1922 models on Aug. 15. The new line will embody many new features and is designed to meet the demand for cars along sport lines. New prices will be announced in connection with the new line.

Liberty Motor Car Co. is bringing out a new sport model which will soon be ready for delivery. Prices will be announced when general delivery starts.

Maxwell will meet the demand for cars of greater wheelbase and generally improved appearance by changing its line to a larger vehicle. Necessary changes in equipment are now being made at the factory and by early fall the company will be in production on the new models solely.

## Atlanta Bank Predicts Good Business Future

(Continued from page 236)

mobile sales in this city and in the state at large are considerably less than they were in June. About 400 sales are shown in the city of Atlanta alone, this including trucks, passenger cars, used cars and used trucks, the total for the preceding month being much larger than this. Outside of Atlanta, and especially in the smaller towns, sales during July are also considerably less than June.

Tire sales in this section improved materially during July, in most cases sales for the month being reported in excess of the totals for July, 1920. The increase evidences an early return to pre-war conditions in the tire business. Most of the sales have been in the rural districts, especially in the peach, berry and melon belts, where the farmers and growers have experienced one of their most successful seasons in years. If the business continues as good the remainder of the season as it has the past two months the tire industry in this section, at least, will be on as firm a basis as at any time prior to the war.

### WILLYS FULFILLS PROMISE, 10% OF BANK CLAIMS PAID AUG. 1

NEW YORK, Aug. 3—Fulfilling the promise made a short time ago by John N. Willys that a part of the cash surplus of the Willys-Overland Co. would be used on Aug. 1 to make a substantial reduction in the corporation's bank indebtedness, 10 per cent of the bank claims were paid on that date. The obligations of the company to bankers approximate \$20,000,000. The payment, therefore, was about \$2,000,000. This will leave a substantial amount of cash on hand.

## Harper Bean Balances Show \$600,000 Losses

LONDON, July 22 (By Mail)—The report and balance-sheet of Harper Bean, Inc., covering a period from its inception in November, 1919, to December, 1920, shows a loss for the period amounting to nearly \$600,000, and this does not cover the depreciation which has taken place in the company's investments, which appear in the balance-sheet at cost.

The directors report that proposals will be submitted in due course to reduce the capital of the company by over \$10,000,000. The issued capital is \$30,000,000, but unpaid calls due from shareholders amount to over \$5,500,000 and the directors say it is impossible to collect the bulk of it.

Harper Bean was registered on Nov. 7, 1919, to acquire all the shares in A. Harper Sons & Bean, Ltd., approximately 75 per cent of the shares in the Vulcan Motor & Engineering Co., Ltd., 51 per cent each of the ordinary shares in Swift of Coventry, Ltd., and the British Motor Trading Corporation, Ltd., and, with one exception, all the share capital of six other undertakings, and has since acquired 100,000 ordinary shares in the Birmingham Aluminum Casting Co., Ltd., at \$15, and 196,898 shares in A. B. C. Motors, Ltd.

Conroy, late of Willys-Overland, U. S. A., who became production organizer to the company, has recently started in London as a consulting engineer.

## BIG ORDER FROM FORD

SPRINGFIELD, OHIO, Aug. 3—Ford Motor Co. has placed an order with the Victor Rubber Co. for 200,000 rubber mats for delivery during the remainder of the year. According to announcement made to-night by President H. S. Berlin of the Victor Rubber Co., formerly of Akron, this order is in addition to one for 250,000 mats received from the Ford company early in the year.

The company turned out 900 cord tires yesterday, the largest output of cord tires in its history.

## 500,000 Spark Plugs Sold to Italy in Year

### Gasoline Selling for 80 Cents—Heavy Automotive Taxes Burdensome

WASHINGTON, Aug. 3—The estimated consumption of spark plugs in Italy for 1920 is 500,000 to 600,000, according to a report received from American Consul North Winship, Milan. Of the spark plugs sold in that market, about 90 per cent are of European manufacture and 10 per cent of American make. The importation of German makes has increased and is now estimated to be 60 per cent of the total market. Lire 3 to lire 6.50 is paid by jobbers for plugs, which are resold to dealers from lire 4.50 to lire 7.50.

According to figures published by the government tax bureau for 1920, there were in operation in Italy 25,000 private automobiles, 3,000 public passenger cars, 25,000 trucks and 15,000 motorcycles. These figures are exclusive of army trucks and those used by other government and municipal departments. The number of airplanes in use is about 500, all of European manufacture.

Owing to heavy taxes imposed by the Italian government on the operation of motor vehicles, high-powered and pleasure cars are being stored by a great many owners. Where the use of automobiles or trucks is essential, their number is reduced to the minimum. The sale of spark plugs consequently is diminished.

Spark plugs are classified for import as scientific instruments of precision and the customs duty is lire 125 (gold) per quintal (220 pounds). The rate of exchange on gold is fixed by the ministry of the Italian treasury.

## Prospects for Future Sales Appear Bright

(Continued from page 236)

come into the market, however, there will be additional liquidation of loans by farmers which will tend to make money more plentiful throughout the country.

General buying power in farming communities will depend largely upon the attitude of the bankers. Countless farmers would require the entire proceeds of their crops to meet their bank obligations and if the loans are called relentlessly they will have little left with which to make purchases.

Altogether, so far as the automotive industry is concerned, sales have been far better than any one dared hope in January, and there is every indication that they will go up again with the end of summer. It should not be forgotten that passenger car production for the second quarter this year was 87 per cent of the same period in 1920, which was one of the largest quarters.



## Rolls Royce Reduces Chassis Price \$1250

**Cost Cuts in Production and  
Labor Responsible—Other  
Makes May Follow**

LONDON, July 22 (By Mail)—The Rolls Royce Co. has reduced the sales price of its chassis by \$1250 (normal exchange rate). The reason ascribed is reduced cost of production for labor and materials. The price now is \$9,250. It is believed that this marks the end of the \$10,000 chassis and that Lanchester, Napier and others will follow suit.

Opinion is fairly uniform that prices will have to fall below the new standards set by Rolls Royce before the demand for cars of this type returns with sufficient force to permit the full output of plants to be absorbed. With general industrial conditions settling down, however, it is believed manufacturers of these high grade cars will be able to work off some of the heavy stocks accumulated during the past nine months.

Several other price reductions have been announced in the past month. Charon-Laycock has reduced from \$3125 to \$2875; G. W. K. from \$1750 to \$1550; Hampton from \$2300 to \$2000; Sunbeam from \$4650 to \$4000; Warren-Lambert from \$1925 to \$1750; Waverley from \$2625 to \$2500; Anglo-American Ford from \$900 to \$825; Overland-Crossley from \$1975 to \$1925.

## All H. C. S. Prices Cut; Output to Be Reduced

INDIANAPOLIS, Aug. 1—Effective to-day, prices on all models made by the H. C. S. Motor Car Co. are reduced \$200 in price. The roadster and 4-passenger touring car are cut from \$2,975 to \$2,775, the coupe from \$3,650 to \$3,450 and the sedan from \$3,850 to \$3,650. Prices are f.o.b. factory. Prices were guaranteed until Aug. 1.

Coupled with the price reduction comes the statement that instead of producing nine or ten cars a day as at present, the plant output will be cut to five cars a day, which is the normal capacity.

Officers of the company say that under no circumstances will production be increased. They declare that the working force has been organized to make five cars a day and that nothing will be permitted to disarrange this program.

### HANSON MAKES FINAL CUTS

ATLANTA, Aug. 3—The Hanson Motor Company announces final 1921 price reductions on all its models, effective at once. Prices are f.o.b. Atlanta. Total reductions since Jan. 1 average \$600. The latest cut brings the roadster and five-passenger touring car from \$2,185 to \$1,795; the five-passenger sport model and the seven-passenger touring car from \$2,285 to \$1,895; the sedan from \$3,165 to \$2,885 and the coupe to \$2,775.

### WEED CHAIN PATENT EXPIRES SOON, COMPANY HASN'T "BEEN ASLEEP"

NEW YORK, Aug. 3.—Representatives of the American Chain Co. declined to-day to state what policy would be pursued in reference to the Weed chain when the basic patent covering it, No. 768,495, runs out Aug. 23 next. The only comment made was that "we have not been asleep in reference to the Weed patent." The inference was that the company has prepared to put an improved tire chain on the market. It was said an announcement covering the subject would be made about Sept. 1.

When the patent expires there will be nothing to prevent the manufacture of the Weed chain by anyone who cares to produce it. Infringements will be prosecuted up to the end of this month, however.

The Parsons patent, No. 723,299, under which tire chains were manufactured by the American Chain Co., expired on March 24, 1920.

## Harley-Davidson Cuts Motorcycle Prices

NEW YORK, Aug. 1.—Harley-Davidson Motor Co. has announced price cuts ranging from \$105 to \$130 on all models. The cut took effect August 1. The price changes on the various models are as follows: 74 cu. in. electric twin reduced from \$520 to \$390; 74 cu. in. magneto twin, from \$485 to \$360; 61 cu. in. electric twin, \$485 to \$365; 61 cu. in. magneto twin, \$450 to \$335; sport electric twin, \$445 to \$340; sport magneto twin, \$415 to \$310.

Reductions have also been made in side-car prices ranging from \$40 to \$50.

Other price reductions are looked for in the near future. It has been announced that the Hendee manufacturing company will make reductions on Sept. 1, but the extent of the cut has not been determined. Prices of the Cleveland motorcycle have been cut twice within recent months, while the makers of the Henderson and Excelsior machines made some reductions a few weeks ago.

### NEW PRICES FOR REO

DETROIT, Aug. 1—New prices have gone into effect on the Reo touring car and roadster. The new prices for the touring car and roadster are \$1,650 as compared with \$1,850. Series B coupe for \$2,700.

### CYCLONE TRUCKS REDUCED

GREENVILLE, S. C., Aug. 3—The Cyclone Starter & Truck Co. has reduced the price of its Cyclone truck from \$2,800 to \$2,685. This price includes steel cab top with curtains, windshield, starting and lighting equipment.

## England Hears U.S. May Produce There

**Rumor Also Has It Americans  
Likely to Take Over Existing  
Factories**

LONDON, July 20 (By Mail)—One of the topics which is being discussed by the British automobile trade concerned with the overseas market, is the curious and vexatious irregularities arising out of recent revisions of the preferential tariff in British dominions.

The Indian import rate has been raised to 20 per cent from 7½ per cent, the New Zealand preferential rate is now 10 per cent whereas in Australia it has been reduced to 5 per cent, in South Africa it is only 3 per cent and in Canada it is 7½ per cent. British critics are pointing out that a preferential rate of 5 per cent is insufficient to tempt British makers having regard to the cost of freight, etc.

It may be added that there are continual rumors that American factories will be opened here, or, at least, the taking over of existing ones by American interests for meeting the tariff and other restraints for which a section of the British trade and fiscal reform party are clamoring. It is too soon to deal with the matter, but there is support for certain rumors in well informed trade quarters.

## Palmer Defends Self in Bosch Plant Auction

(Continued from page 237)

In denying favoritism to Kern, it is asserted by Palmer that he did not appoint Arthur T. Murray managing director of the American Bosch but that Murray was elected upon recommendation of Palmer as alien property custodian. Palmer also denies the appointment of directors or any attempt to discourage competition for the purchase of the assets or that he sought to have them sold to Kern.

Palmer denies that Kern caused the company to issue \$1,800,000 in 7 per cent promissory notes and then sold the notes, retaining the proceeds for himself. He also denies that Kern pretended to bring about a dissolution of the company, saying that Kern lawfully brought about its dissolution Jan. 22, 1919, a few days after the American Bosch Magneto Co. was incorporated at Albany.

### SEIBERLING AT REPUBLIC

YOUNGSTOWN, Aug. 4.—F. A. Seiberling, former president of the Good-year Tire & Rubber Co., has inspected the properties of the Republic Rubber Corp. in Youngstown and Canton, now operating under a receiver. Seiberling may purchase the Republic business and plants and merge them with the New-castle Tire & Rubber Co., which he has acquired.

## Will Wage Hot Fight on Federal License

### A. A. A. Summons Owners to Battle Against Additional Impost

WASHINGTON, D. C., Aug. 2—Appeal has been made by the American Automobile Association to 10,000,000 owners of motor vehicles to oppose the proposal of Secretary of Treasury Mellon for a \$10 flat tax on automobiles irrespective of power or size. Statistics have been sent broadcast showing that automobilists are already carrying more than their share of tax burden and that further advances in rates would be obviously discriminatory and iniquitous.

It is said that Chairman Fordney of the House Committee on Ways and Means is opposed to the Mellon proposal for a tax on automobiles because he believes cars of small power should not pay the same rate as larger cars and heavy trucks. The recommendations of the Treasury Department have precipitated a bitter fight in Congress which is not confined to party lines. It is expected that representatives of agricultural districts where there are large numbers of motor vehicles in use will fight the enactment of a motor tax.

Because it is primarily a tax which hits the user of automobiles, the American Automobile Assn. is handling the movement against the Mellon measure but has the support of the National Automobile Chamber of Commerce and other large business organizations. Every automobile club in the country has been asked to bring pressure to bear on congressional leaders and with 10,000,000 automobile owners protesting, Congress is expected to give due thought to the possible economic and political effects of an automobile tax. Attention of House committee on Ways and Means has been called to the fact that car owners are paying a multitude of taxes on their cars including registration fee, driver's license fee, personal property tax, municipal franchise tax, motor fuel tax and other local assessments.

The excise taxes on automobiles will probably be maintained.

### Introduce Bill Asking for Special Motor Tax

(Continued from page 237)

is qualified to operate a motor vehicle upon a public highway.

Section 2 of the Appleby bill would authorize the reciprocity of licenses between all States. A measure of a similar nature is now pending before the Congress and is known as the Pittman-Sweet bill. The Federal registration tax would be affixed and would form a part of the State license tax, which tax could be recognized by the authorities of the several States, as permitting the owner of the automobile to whom the license was issued, to operate the machine within

the confines of any State he may be visiting, or through which he may be passing, without any additional registration or the securing of any other license or tax, or the payment of any additional tax.

### Make New Plea for Sales Tax

WASHINGTON, Aug. 2—Another strong plea was made for the sales tax by representatives of the automobile industry, in conference with Secretary of Commerce Hoover and Secretary of the Treasury Mellon, here. These administrative leaders were unable to hold out any hope for the adoption of the sales tax program because the Administration has advised Congress that a sales tax would not be recommended unless an additional assessment was needed for a soldiers' bonus. Secretary Hoover refused to commit himself and Secretary Mellon indicated that he could not run counter to his present program of tax revision.

The House Committee on Ways and Means has ruled out all testimony regarding the sales tax because it considered it a waste of time to continue hearings, inasmuch as they have already determined that the sales tax would not be incorporated in a new revenue bill.

C. C. Hanch, Chairman of the Tax Committee of the N. A. C. C. told Secretary Hoover that over-taxation and under taxation has been disturbing business equilibrium. He declared that the excise tax was a war measure and should be repealed in all fairness to the automobile industry. It was his contention that this tax is a "stigma" tax upon the automobile and other industries and forms a sales resistance which unbalances normal consumption.

### Hare's Motors Will Go On as Selling Agents

NEW YORK, Aug. 2—Notwithstanding the impending reorganization of the Mercer Motors Co. and the cancellation by Hare's Motors of its contract with that corporation, Hare's Motors will not be dissolved but will continue to function as at present. It will continue as the selling agency for the Kelly-Springfield Truck Co. and probably for the Locomobile Co.

The arrangement with Locomobile will depend upon the decision of the creditors with regard to an extension of their claims pending a possible reorganization, but it is considered practically certain such an agreement will be reached. The extension granted by Locomobile creditors expired July 31 but between 85% and 90% of the creditors already have agreed to a further extension which will run for at least six months.

There will be no change in the personnel of Hare's Motors and even if it is found necessary to liquidate Locomobile it is expected that other lines will be added as opportunity offers.

Stockholders of Mercer Motors will meet Aug. 11 to pass upon the reorganization plan and its ratification is regarded as certain.

## July Sales in Oregon Well Up with 1920

### Many Deferred Deliveries Cause Poor Showing in Figures for June

PORTLAND, ORE., Aug. 1—While registration figures on the sales of new cars throughout Oregon indicated that the month had been scarcely one-third normal, the month of July in Oregon, according to indications, will be unusually heavy in sales of new cars, and when registration figures are known within a few days it is expected they will show the month this year well up with sales of July 1920.

The reason for the poor showing in June was that dozens of buyers of cars during the last portion of that month asked that delivery be deferred until after July 1, thus putting off registration until after that time. This was done because, according to the Oregon registration laws, all licenses taken out during the first six months of the year must be paid for on the full yearly basis, while after July 1 one-half year licenses are required. Thus by deferring taking delivery on cars which they had purchased until after the first of the month purchasers were able to have their license fees cut in half.

Total registrations for June this year in Oregon were 2115 automotive vehicles, according to the report of the Secretary of State's office, of which number 889 were new passenger cars and trucks. During the first week of July registrations were 4200 cars, approximately half of which were new automobiles and trucks. Thus during the first week of July twice as many cars were licensed as during the entire month of June.

### Milwaukee Makers All Operating at Capacity

MILWAUKEE, WIS., Aug. 2—So much progress has been made by distributors and dealers in virtually all sections of the United States during June and July in the merchandising of passenger cars that manufacturers in this district are operating on the heaviest production schedules in effect since March 1. The same is true of manufacturers of motors, frames, transmissions, axles and other parts, which forms an important part of the industry of Milwaukee and southeastern Wisconsin. While substantial increases in output were effected during June, it was not until July 1 that operations assumed a more nearly normal stage and during the month just closed increases in output were made steadily and regularly, demands of distributors and dealers being more regular. At the close of July the Milwaukee plant, or four-cylinder car division of Nash Motors Co., was putting out 50 cars a day, which is capacity in the present works, employing 1000 men on a straight 8-hour schedule.

## June Sales Statistics Show 15.19% Decline from May in Business of 300 Motor and Accessory Manufacturers

NEW YORK, Aug. 1.—Sales statistics compiled by the Motor and Accessory Manufacturers Association from its members, who include the leaders in this branch of the automotive industry, show that there was a decline of 15.19 per cent in June as compared with May. This is the first month of the year to show a falling off in sales, as compared with the preceding month, although the increase for May was very small.

The total of past due accounts showed a small increase in June as compared with May. It was the first month of the year when they were not whittled down. It was encouraging to note, however, that there was a further material reduction in the total of notes outstanding.

The figures for the first six months, compiled from the reports of 300 members of the M. A. M. A., follow:

Month	Total Purchases	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	\$6,264,587		\$8,099,727		\$4,359,871	
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,063,118	39.08 Inc.
March	20,120,386	93.80 Inc.	5,608,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	00.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.

## Peak of Unemployment Reached in Kansas City

FORT WAYNE, IND., Aug. 2.—The unemployment peak, it is believed, has now been reached and with the approach of fall there will no doubt be a distinct improvement in local conditions. A survey of twenty-one employers of the city shows that during the month of July about 10,000 men were totally out of work for the entire month in this city, or worked only a few days. This is the greatest number that has been out of employment in this city during any one month yet.

Some of the city's largest industries are doing little. The General Electric Co., for instance, which at the height of its greatest activity employed 7300, now has about 3000 on its payroll and they are not working full time. These 3000 have just been informed of a wage cut of ten per cent immediately effective, this cut being the second ten per cent reduction of the year.

It is interesting to know that the local gasoline auto pump companies are standing up the best of any of the local industries. S. F. Bowser & Co. have been working 100 men at nights for some time. The Wayne Oil Tank and Pump Co. is quite busy, as is the Tokheim Pump Co.

## North Dakota Field Expected to Improve

(Continued from page 243)

mers. Business last fall with farmers was practically nil, a fact which should be kept in mind.

One tractor distributor in Devils Lake hopes to sell twice as many tractors as last year, and that the automotive sales of the territory will be greater this fall. Even in the Fargo area where crop conditions are about the same as a year ago, more country sales are expected this fall than last by distributors handling medium priced cars.

2.—There is general agreement that business for the next twelve months will show an improvement over the last twelve. The farmer will be a better buyer. He will be in better humor. He

will have liquidated many obligations and while he may not have much ready money he will be more favorably disposed. His credit will be better. Automotive apparatus has been wearing out during the past twelve months and in agricultural areas of sparse population the motor car is such a necessity that the farmer cannot do without it. There is no such thing as a luxury automobile in such a State.

3.—The purchasing capacity of towns and cities in North Dakota is not so definitely agreed upon by distributors in different cities. Minot distributors believe that city buying in the next twelve months will reflect crop conditions, and that buying will be heavier. In cities like Fargo the general feeling is that city buying will be in proportion to crop conditions. The same view is held by Grand Forks distributors.

## Wainwright Arranges 11-Hour Force at Night

CONNERSVILLE, IND., Aug. 2.—The Wainwright Engineering Corporation is starting a night force this week on an eleven-hour shift to supplement the nine-hour day force. This means that business is increasing, as has been the case since the first of the year. The trade in over-sized pistons has surpassed the most optimistic hopes.

So far the Lexington business to date for 1921 is only 12 per cent below 1920, and 1920 was 116 per cent above 1919, according to President F. B. Ansted's statement to department heads. Since the July 1 cut in price the orders for cars are coming at the rate of 250 per week, which is fairly normal, as compared with July, 1920. The price cut has satisfied the sales department.

## TRANSPORT TRUCKS CUT

MOUNT PLEASANT, MICH., Aug. 3.—Price reductions ranging from 11 to 25 per cent on three of the four models comprising its line, are announced by the Transport Truck Company. The 1-ton model is reduced from \$1,850 to \$1,395; 1½-ton from \$2,250 to \$1,995; 3½-ton from \$4,195 to \$3,885. The price of \$2,785 on the 2½-ton is the same.

## METAL MARKETS

AS to the trend of the steel market there appears to be only one opinion. Prices are headed for still lower levels. Considerable divergence prevails, however, in views as to how and when these declines will come about. Majority sentiment inclines to the belief that prices will continue to sag, and that for the immediate present declines of about \$1 per ton may be looked for as a weekly occurrence. In other quarters a more spectacular making over of the situation seems to be anticipated. A Sharon, Pa., correspondent wired early this week that "it is possible that within a week or two steel purchasers will see such a drop in prices as will convince them the bottom has been struck; this, it is said, will turn the industry back to a forward course." Conservative buyers refuse to permit such prognostications, even though they prove correct, to interfere in the least with the program which they have mapped out. They recognize that a period of declining prices is ahead, interrupted periodically by brief reactions. Their aim is to cover their wants as much as possible in the periods of declines and to avoid the necessity of figuring as buyers in periods of short-lived upward spurts of the market. They know that the buyer who would stay out of the market until the last \$1 a ton decline has been registered is usually obliged to place orders in a rising market. It is only natural that steel producers strive to bring about as early a date as possible a return to stability.

Pig Iron.—More inquiries for deliveries over the third and fourth quarters are in the market. Up to the middle of July only small tonnages for immediate shipment were sought, but now a decided upward swing in buying activity has set in. Prices are relatively firm.

Steel.—Full-finished automobile sheets, 22-gage, at around 4.70c. base, are somewhat more firm than the general run of the sheet market, and this in spite of the fact that the demand is rather easier. High-grade blue annealed sheets for crank cases which sold at 2.50c. base, reflect a somewhat lower figure than the 2.25c. quotation for No. 10, now "publicly" quoted. More inquiries are noted for strip steel, the cold-rolled being quoted at 4.25c., although the leading manufacturer of low-priced passenger cars is said to have bought 800 tons at considerably below this figure. Although producers of cold-finished steel bars contend that on the basis of a conversion charge of \$15 a ton they can not shade the 2.50c. base price (hot-rolled bars have now settled down to 1.75c. base), automotive consumers appear to be still offish. Inquiries for bolts and nuts continue to come out and some warehouse stock has passed into automotive consumption.

Aluminum.—The market continues in abeyance. Importers are contesting every inch of the market and some very low offers are reported.

Copper.—The market for the red metal has turned intensely weak and offers of spot metal at as low as 12c. have been turned down.

Tin.—The visible world's supply is placed at 65,000 tons with a continuance of 2000 tons more production than consumption every month. Hence the failure of consumers to respond to prevailing low prices is easily explained.

Lead.—Storage battery demand is slightly better, but the market generally continues easy to weak.

**BANK CREDITS**

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

As a result of an increase during the week of \$22,000,000 in gold and \$3,000,000 in other cash reserves, the total reserves of the Federal Reserve System on July 27 stood at \$2,685,000,000. Total deposits increased during the week by \$2,000,000, due to an increase of \$8,000,000 in the member bank reserve account, and a decrease of \$6,000,000 in Government and other deposits, total deposits standing on July 27 at \$1,695,000,000. On the other hand, note circulation decreased by \$27,000,000 to \$2,537,000,000. By reason of these changes the ratio of reserves to deposit and note liabilities combined, increased from 62.5 per cent on July 20 to 63.4 on July 27, while the ratio of gold reserves to note circulation after setting aside 35 per cent against deposit liabilities, increased from 80.6 per cent to 82.4 per cent. These ratios compared with 42.2 per cent and 49.2 per cent on July 30, 1920.

Bills discounted, representing the loans of the Federal Reserve System, declined \$36,000,000 during the week, while bills bought declined \$4,000,000; the total of bills on hand July 27 being \$1,670,000,000. Since Nov. 5, 1920, when bills on hand were at their highest point, \$3,127,000,000, a total decline of \$1,457,000,000 has taken place, of which \$553,000,000 represents the decline in commercial bills discounted. These figures suggest the contraction in the demand for credit since last autumn.

The contraction in the demand for credit is further evidenced by a continued lowering of money rates, which affords a sharp contrast in comparison with conditions a year ago when money was over 8 per cent. The tendency toward easier money, which has been noticeable for the past month, took an extreme form on Thursday of last week when call money dropped to 3½ per cent, the range of the week being 3½ per cent to 5 per cent, compared with a range of 5 per cent to 6 per cent in the previous week. Renewal rate at the end of last week was 4½ per cent. This is the lowest since November, 1919. Time money ranged from 5½ per cent to 5¾ per cent for all maturities compared with 6 per cent the previous week, but demand was light and comparatively little business was contracted. Prime bills for 60 and 90 days' maturities sold at from 5¾ per cent to 6 per cent, other names ranging ¼ per cent above the rate for prime bills, which compares with a rate of 6¼ per cent to 6½ per cent in the previous week.

**FINANCIAL NOTES**

Continental Casualty Corp., New York, in a statement of condition of June 30, shows cash in bank and on hand of \$2,049,242.33 and cash in trust from notes and acceptances

paid \$1,039,714.34. Bills receivable amount to \$841,310.75, notes and acceptances in trust, \$4,778,376.34, bills receivable in trust securing special collateral loans, \$2,822,428.81. Accounts receivable are \$431,381.63, investments \$890,925.21 and total resources of \$13,242,690.31. Collateral trust gold notes come to \$4,975,000 and bills payable, including special collateral loans, \$4,020,334.26.

Biggam Trailer Co., Milwaukee, a new corporation has organized with a capital stock of \$250,000 preferred, plus 1,500 shares of common stock without par value, to engage in the manufacture and sale of trailers and trailer trucks.

Ollgar Co. of Milwaukee, manufacturing transmission devices, has increased its authorized capitalization from \$150,000 to \$300,000 of preferred stock and 25,000 shares of common stock at no par value.

B. F. Goodrich Co. has declared a quarterly dividend of 1¾ per cent on preferred stock, payable October 1 to stockholders of record September 21.

Lee Rubber & Tire Corp. has declared the regular quarterly dividend of 50 cents a share, payable September 1 to stock of record August 15.

Chevrolet Motor Co. of Delaware has declared a dividend of \$3 a share, payable August 2 to stock of record July 30.

**Drake, N. A. C. C. Official,  
to Aid in Census Taking**

WASHINGTON, Aug. 1.—J. Walter Drake will represent the N. A. C. C. on a special committee appointed by the National Association of Manufacturers to co-operate with the Bureau of the Census in compiling the 1921 biennial census of manufactures. In addition, the statistics will be given the Bureau for publication monthly as to production.

The committee will confer with Bureau officials about August 13, regarding the simplification of questionnaires which will be sent out to manufacturers employing five or more persons and it is proposed to limit the distribution to establishments whose products have an annual value of \$25,000, and to approximate values below that figure, based on logical figures, which the conference held to be a logical plan in view of the fact that it was shown that 35 per cent of the plants have an annual production of less than \$100,000 each. It also will be the purpose of the census to set forth only essential facts.

**REVERE SAVED BY COURT**

LOGANSPOUT, IND., Aug. 2.—Judge Souder has ruled that the factory of the Revere Motor Car Corp. should not be sold by the receiver and that the plant shall continue to be operated under receivership of the Citizens Loan and Trust Company of Logansport. The receiver will continue to meet orders for cars. Since being placed in the hands of a receiver several months ago an average of one car a week has been completed at the plant.

**DRUMPELMANN WITH SAXON**

W. L. Drumpelmann, recently resigned as assistant sales manager of Hudson-Essex, has been elected vice-president and director of sales of the Saxon Motor Car Corp., succeeding C. H. Page.

**Transfer of Samson  
Truck Almost Ended****Removal of Plant from Flint,  
Mich., to Janesville About  
Completed**

JANESVILLE, WIS., Aug. 2.—The transfer of the Samson motor truck assembly plant from Flint, Mich., to the headquarters and main works of the Samson Tractor Co. at Janesville, Wis., has been going on throughout the month of July and is now about completed. From 20 to 25 carloads of truck parts, chassis, axles, etc., were received from Flint each week. The motor truck operation will be concentrated at Janesville, although the manufacture of certain parts will be continued at Flint. The Samson works at Janesville already form one of the largest units of the General Motors group and a five-year building program which is now about 40 per cent completed will make it probably the largest plant in the world devoted entirely to the production of agricultural equipment, which includes Samson tractors, Samson farm trucks, Samson nine-passenger farm cars, Janesville tractor implements, etc. J. A. Craig is president and general manager of the Samson Tractor Co., with headquarters at Janesville.

**Oshkosh Tractor Buys  
La Crosse Interests**

LA CROSSE, WIS., Aug. 1.—The Oshkosh Tractor Co. has purchased the entire assets of the La Crosse Tractor Co., which, for the past five years, has manufactured the Happy Farmer tractor, later known as the La Crosse tractor. All the machinery, tools and material will be removed to Oshkosh as soon as an adequate factory can be completed and production of the same models will be continued there. Work on the factory will be started at once.

The plans call for a main building 150 x 500 feet, modernly equipped. The Oshkosh Tractor Co. is capitalized at \$1,500,000 and is headed by A. D. Paine as president and general manager. Paine also is manager of the Wisconsin Tractor Sales Co. I. G. Hickman of Milwaukee is vice-president and C. C. Shanor is secretary, treasurer and sales manager. L. W. Melcher, factory manager and designer of the La Crosse tractors, will act in the same capacity for the Oshkosh company.

**DYER BILL FAILS TO PASS**

WASHINGTON, Aug. 3.—Efforts to pass Senate bill 1060, which is an amendment to "an act to punish the transportation of stolen motor vehicles in interstate or foreign commerce," failed in the House this week and the measure was restored to its place on the regular House calendar. It is known as the Dyer bill and provides a penalty of five years or a fine of \$5,000.

## MEN OF THE INDUSTRY

**R. S. Abbott**, for the past ten years manager of the Atlanta district for the Ford Motor Co. and in charge of the large assembling plant there, has been promoted to the management of the district with headquarters at Houston, Texas. This district includes a large part of Texas and all of Mexico. Abbott is succeeded by W. W. Mitchell, for the past two years assistant manager of the assembling plant at Oklahoma City.

**Ferris R. Miller**, formerly of the publicity department of the Goodyear Tire & Rubber Co., who was transferred to California last year as publicity manager for the new Los Angeles Goodyear Co., has resigned to become commissioner in charge of the Los Angeles Better Business Commission, established to stop misrepresentation in advertising and questionable business methods among merchants.

**Jos. C. de Varona** has been appointed special representative for the Maxwell Motor Corp. De Varona has been with the General Motors Co. for the past five years. He had charge of the Modern Housing Corp. at Flint, Mich., when the General Motors subsidiary erected one thousand houses for its employees. More recently he was sales manager of the Buick branch at El Paso, Texas.

**Roy Davey**, who has been manager of the Detroit branch for the American Bosch Magneto Corp., has been given larger responsibilities at the main office in Springfield, Mass., as acting manager of the manufacturers' trade department. Davey was formerly advertising manager of the Chalmers and sales manager for Bethlehem Motors.

**Sterling H. Keene**, service manager of the National Car & Vehicle Corp., has been granted a leave of absence to enter the U. S. Public Health Service Hospital No. 60, at Oteen, N. C., so that he may completely recover from the effects of being gassed during military service in France.

**C. H. Landsittel** has become sales engineer of the Climax Motor Devices at Chagrin Falls, Ohio, a suburb of Cleveland. He formerly served as director of purchases for the Templar for three years, and prior to that in the same capacity for the Haynes at Kokomo.

**Paul Jones** will direct the new correspondence supervision department of the Franklin Automobile Co. Jones goes to the Franklin company from General Motors in New York, with whom he has held a similar position.

**Alfred Reeves**, general manager of the National Automobile Chamber of Commerce, is spending his vacation at Cape May, while **J. S. Marvin**, assistant general manager, is spending three weeks at Manchester, Vt.

**Klare F. Covert** has been appointed as sales manager in charge of the general sales offices of the Harrison Radiator Corp. of Lockport, N. Y. Covert succeeds H. R. Lewis, who resigned.

## INDUSTRIAL NOTES

**National Gauge & Equipment Co.**, of La Crosse, Wis., manufacturing gasoline and oil measuring gauges, pressure indicators, meters and similar motor car equipment, is now operating at from 75 to 80 per cent of capacity, a substantial gain over July 1, when it has reached 60 per cent of capacity. Current orders are of a volume insuring capacity operations by early fall.

**Emerson-Brantingham**, Rockford, Ill., farm implement and tractor manufacturers, have closed for inventory, but Charles S. Brantingham, president, said the reopening in September will not be determined until trade conditions become clarified. The plant has been operating with about 50 per cent force on 60 per cent time.

**Clark-Turner Piston Co.** of Los Angeles, has completed a modern factory building containing approximately 50,000 square feet of floor space. Production of De Luxe pistons has been greatly increased and the business has been developed not only in the United States but in many foreign countries.

**Temme Spring Corp.** recently signed a contract with American Autoparts Co., Detroit, under which the entire output of replacement springs of the Detroit plant will be handled by the Temme Company.

**Fisher Body Co.**, Cleveland, is completing its local plants and machinery has been installed. Production has not started, but the completion of drawings and die plant can be placed in operation within 60 days.

**H. H. Franklin Mfg. Co.**, Syracuse, will operate five days a week during the balance of the summer, instead of five and a half days as at present. Production will be maintained at around 40 cars a day.

**Rolls Royce Co. of America** has closed its plant in East Springfield, Mass., for five weeks. Approximately 800 employees have been at work in the factory, which has been operating on a full-time schedule.

**Jefferson Rubber Co.**, Jefferson, Wis., has purchased approximately \$50,000 worth of new machinery for immediate installation to bring the capacity to the point required by current orders.

**Ford Motor Co.** has begun the erection of a new steel building for the welding department of its Northville, Mich., factory. The output there is averaging 57,000 valves and valve stems daily.

**Greenfield Tap and Dye Corp.** which closed its plant for July is beginning to open up departments and is employing more than 300 hands.

**Franklin Automobile Co.**, retail orders for July to date exceed those received during similar periods of either April, May or June.

**Hartford Scripps-Booth Co.**, has filed a certificate of dissolution.

Reo Returns to Old Home  
Under J. Frank Witwer

**KANSAS CITY, Aug. 3.**—The Reo passenger car and truck wholesale and retail distribution for Kansas City and territory returned Aug. 1 to its original home, The Southwest Motor Company. Reos were sold by this company at 1612 and 1614 Grand Ave. from 1910 to 1919, making the longest continuance representation in one location in Kansas City motor car history.

The company has the same territory for Reos as before, including western Missouri and northern and eastern Kansas. In the interval of two years that Reos have been handled by another company, the Southwest Motor Co. has distributed and retailed Jordan passenger cars. There will be a separate traveling force and sales organization for the Jordan. The company has not handled a truck in the past two years. J. Frank Witwer is president and general manager of the Southwest Motor Co.

Fordney in Favor  
of Graham MeasureResolution Will Be Pushed—  
Dealers Believe Bill Will  
Protect Them

**WASHINGTON, Aug. 3.**—Chairman Fordney of the House Ways and Means committee has indicated that special attention will be given the Graham resolution calling for a levy of 300 per cent on reimported war supplies. It is expected the resolution will be reported out either this week or next, in order that it may be considered in the House before debate begins on internal tax revision. Automobile dealers believe that the Graham resolution will afford better protection against underselling by foreign speculators than the tariff bill pending.

The Graham resolution is more drastic than the provisions carried in the House tariff bill and it levies specific duties which are prohibitory. With the resolution through the House, its passage could be expedited in the Senate and the resolution would become effective several weeks before the tariff bill is enacted, thus putting an immediate check on reimportation activities.

It is known that majority members of the Ways and Means committee are in favor of this proposition as interim legislation. They are receiving numerous complaints to the effect that European and American speculators are selling American war supplies at prices which defy American competition.

Prudden Has Best Day  
Since May a Year Ago

**DETROIT, Aug. 3.**—Production in the Prudden unit of the Metal Wheel Corp. at Lansing on July 26 exceeded any previous 10-hour output. The biggest previous day was in May, 1920. The Prudden and other units of the corporation now are operating 10 hours a day with Saturdays off. The plants will be operated Saturdays this month if shipments are not delayed.

The Michigan Screw Co. at Lansing reports better business in July than was anticipated. Several unexpected orders were received and the output was up to the 50 per cent mark the entire month. Operations are expected to slow up this month but prospects are bright.

## CUT KALAMAZOO TRUCKS

**KALAMAZOO, MICH., Aug. 3.**—Reductions ranging from \$300 to \$425 on all models of its trucks were announced by the Kalamazoo Motors Corp. Two new models also will be added to its line. The model G-1 1½-ton is reduced from \$2,800 to \$2,495; model G-2 1½-ton from \$3,100 to \$2,800; the 2½-ton from \$3,700 to \$3,275; the 3½-ton from \$4,300 to \$4,000; the 5-ton from \$4,800 to \$4,500. A new 3-ton model will sell for \$3,700 and a special road builders 5-ton new model for \$4,800.



# Calendar

## SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair, conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28-Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 5, 1921—Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Auto-

mobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador, Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhib-

its in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

Sept. 14-15-16—Detroit, Credit Convention Motor and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## RACES

Labor Day—Uniontown, Pa., Autumn Classic.

## Milwaukee Firm Plans to Keep All Employed

MILWAUKEE, WIS., Aug. 3—To keep its entire capacity employed to a maximum, the Beaver Mfg. Co. of Milwaukee, a large manufacturer of motors for passenger cars, trucks and tractors, has started a campaign for patronage from garages and private owners for repairs and replacement work. The works cover 100,000 sq. ft. Large newspaper display space is being used to announce the new department, as follows:

"The greatest fear of the passenger or commercial car owner is motor trouble. Too much time and money is lost while repairs are being made. We can save you time and money and insure better performance when you need repair service or parts of any description. Our equipment permits us to take work of any size. Each individual order receives prompt, efficient attention. Over nineteen years of motor building has given us knowledge of materials and workmanship which you can use to advantage.

"We have in stock, for all makes and models of motors: Bearings, either connecting rod or main, of any type; copper asbestos cylinder head gaskets; pistons, piston pins, rings and bushings, either standard, oversize or special; timing and starting gears; valves, etc. We can regrind your cylinders and furnish special light weight pistons. You can get quick, accurate service on any crankshafts to be reground."

As a special offer, the Beaver company makes a price of \$20 for regrinding Ford cylinders, including oversize pistons, complete with rings, pins and bushings.

## Sale of Holton Assets Is Approved by Court

INDIANAPOLIS, Aug. 3—The sale of the Holton Tractor Co. assets was approved by Judge Solon J. Carter in Superior Court, before whom a receivership action by creditors of the company was pending. The tractor com-

pany, while a Delaware corporation, had all its assets in Indianapolis, together with factory equipment, and plans had been made for the manufacture of the tractor on a large scale here. Lack of capital, however, prevented the company from making a success and last December the company was placed in the hands of a receiver.

The tractor company was sold to Elwood Haynes, of Kokomo, president of the Haynes Automobile Co., other Kokomo business men and George J. Marrott of Indianapolis. Mr. Haynes will be president of the new company, Mr. Marrott and A. G. Seiberling, vice-presidents, John Powell, secretary, and Mr. Marrott, Mr. Seiberling, Mr. Powell, Mr. Haynes, J. W. Johnson and Si McQuiston, directors. The new company will be a \$2,000,000 corporation, manufacturing a tractor, another tractor known as the Powell tractor, and other features acquired by the company after months of experimenting. The new product will be known as the Haynes tractor.

The creditors of the Holton company will receive about \$100,000 in 7 per cent cumulative preferred stock in the new corporation, and persons who held common stock in the company will receive part of their holdings in common stock of the new company, common stock aggregating from 25 to 33 per cent being received by these holders of common stock. It is said practically all of the creditors had signed agreements accepting the proposition.

## Jersey Firm Takes Over Chevrolet Branch Plant

CAMDEN, N. J., Aug. 3—The Millwood Motor Car Co. is a new organization which has taken over the distribution and retail sales of Chevrolet cars for the Camden territory. With the change, the factory branch of the Chevrolet Motor Co. here will be discontinued. The Millwood organization takes over the building, stock of parts and organization of the factory branch.

## New Mercury Car Soon to Be Made in Canada

MONTREAL, QUE., Aug. 3—The Canadian Automobile Corporation has started factory operations at Lachine where it has taken over the plant of the Rapid Tool and Machine Co., Limited, pending the erection of a permanent plant in Longueuil parish, a site which was purchased recently. The car to be produced is the Mercury Six.

The actual assembly of parts was started three weeks ago. Those in charge of the factory are G. E. Brennan, and H. Potter, formerly engineer and production expert to Stevens-Duryea. All engineers in charge of the factory, which is expected to give employment to about 150 men, have been connected with motor construction for long periods. The directors of the company are F. W. Stewart, vice-president Cluett, Peabody Co., of Canada, Limited, and an ex-chairman of Montreal section of the Canadian Manufacturers Association, chairman of the board, H. W. Austin, managing director of Perrin Kayser, Ltd., vice-president; J. D. Henderson; D. L. Harrington, president and general manager Rapid Tool and Machine Co., Ltd. M. H. Potter, John MacNaughton, and R. J. M. Cantell, all of Montreal.

The site purchased at Longueuil comprises 163,000 sq. ft., and the company is contemplating erection in the near future. Arrangements have been made with the Grand Trunk for a siding.

## French Air Exposition to Be Held November 12

PARIS, July 20 (By Mail)—The seventh French aeronautical exposition will be held at the Grand Palais in the Champs Elysees Nov. 12-27. No exhibition was held last year. The general classification of exhibits includes aerostats, heavier than air apparatus, engines and propellers, aerial navigation, motor boats, machine tools and raw material, transportation and housing.

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

Vol. XLV  
Number 6

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, AUGUST 11, 1921

Thirty-five cents a copy  
Three dollars a year

## **Champion** Dependable Spark Plugs



### REO

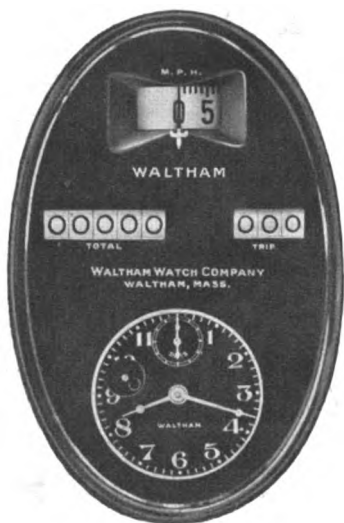
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# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, AUGUST 11, 1921

No. 6

## Why Our Motor Fuel Supply Must Be Conserved

Half of our original domestic reserve is already consumed. Over one-fourth of last year's requirements were imported from Mexico. Economy in the use of remaining supplies is of the utmost importance.

By Herbert Chase

**A** WELL-KNOWN quotation might well be paraphrased to read "in time of plenty prepare for drought." As applied to the motor fuel situation this is no jest. The price of gasoline is down almost to pre-war levels. At the moment this may seem to be a good thing for the automotive industry, but there is good reason to question the apparent benefit if the effect of the future is taken into consideration. Low prices brought about by over-production are apt to encourage careless use, and what is more important, discourage attempts to increase economy or to provide substitutes which in this case would add to the total supply of motor fuel available.

In times of drought there are always some drinkables available. So will there always be motor fuel. During the year 1920 nearly 450 million barrels of crude petroleum were produced in this country. If production could continue at this rate it is estimated that domestic reserves would be exhausted in about thirteen years. That does not mean that there will be no gasoline, or its equivalent, available in this country thirteen years hence. Far from it. Some domestic petroleum wells will no doubt still be yielding oil after the close of the present century and thousands of new wells will yield valuable fuel between that time and this.

Let no one rashly conclude that an industry so basically sound as that which supplies automotive transportation for the great nations of the world will disappear simply for lack of petroleum resources upon which to feed. On the other hand, no competent person who has thoroughly and conscientiously studied the facts can deny that all forms of petroleum will become more scarce and consequently much more expensive well within the next decade.

Having read thus far, someone will doubtless remark, "Old stuff. We have heard this talk of a motor fuel scarcity for several years, and there is still plenty of gasoline to be had. Why worry?" To which we reply, "Don't worry, but give heed to the facts—facts which are even more apparent than they were when they first began to attract attention."

Then what are the facts?

We have endeavored to make some of them clear in the accompanying chart, Fig. 1. It will be seen that on January 1 of this year nearly half of the estimated total original supply of crude petroleum of this country, amounting to about 11.4 billion barrels, had been consumed. Of this amount nearly 15 per cent was used during the calendar years 1919 and 1920 alone.

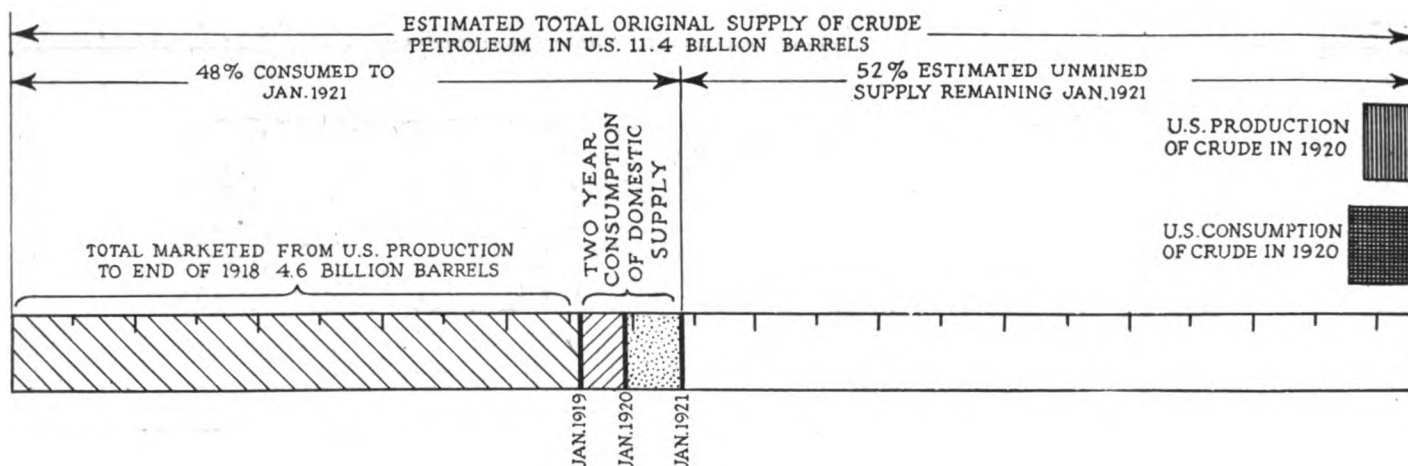


Fig. 1—Chart showing relation between estimated original supply of crude petroleum in U. S., production to date and consumption last year. Compare the white block showing remaining supply with the amount produced last year.

The small block marked "U. S. production of crude in 1920" is drawn to the same scale as the block showing total original reserve. It should be compared with the block representing the unmined supply remaining in January, 1921, which is about thirteen times larger.

If it were possible to maintain last year's rate of production for the next thirteen years our entire supply of crude would be extracted from the earth by the end of that period. It is certain that this will not happen, but it is equally certain that the price of crude will mount and that all petroleum products will also increase in price as the domestic supply approaches exhaustion. This, in turn, will result in strenuous efforts to use all petroleum products to greater advantage. Many such efforts are now being made. It is to be hoped that they will be redoubled.

The second small detached block, marked on the chart "U. S. consumption of crude in 1920," is significant partly because of its size in relation to the block marked "U. S. production in 1920," referred to above.

It is clear that our domestic consumption of petroleum is much in excess of our domestic production, a situation which has now existed for several years. Last year there were consumed in this country 531 million barrels of crude as against a production of 443 million barrels. The difference was made up by imports from Mexico which were more than double the imports of the preceding year. Had there been no Mexican supply or had political conditions interfered with receipt of imports we should already have felt the stringency which is certain to come later. It is evident that a condition in which domestic consumption exceeds domestic supply cannot continue indefinitely without such a stringency unless the widening gap is filled by imports.

It has fortunately happened that large supplies of Mexican crude were available, and that these were relatively close at hand so that the cost delivered at our seaboard was small in comparison, let us say, to the price that would have obtained had we been under the necessity of transporting the oil as far as most

European countries have to carry their imports of oil.

Under these circumstances it is quite apparent why Doctor Pogue, in last week's issue of *AUTOMOTIVE INDUSTRIES*, made the statement that "should the curve of Mexican production turn sharply downward in 1922 or 1923, the effect upon the petroleum situation in the United States will be significant."

This leads us to consider the questions which are inevitably raised when the subject of available supplies of crude petroleum is raised: Who knows the extent of supplies thought to be available, and who can say that there are not great undiscovered supplies which will take the place of supplies now known to be failing? Those who are familiar with the history of oil discovery on this continent are apt to point to the fact that heretofore when failing supplies in some fields have threatened to cause a shortage, the impetus given to wildcatting or search for new fields has always resulted in discoveries of such fields as those in Oklahoma and in Mexico which have forestalled the scarcity predicted. Will not this happen again? These are natural and legitimate questions which demand a reply.

In matters of this kind it is necessary to depend upon the geologist, for intelligent estimates can be made only by a knowledge of petroleum geology and a study of production from pools of known geological character. Figures concerning reserves given in this article are deduced from surveys made by the U. S. Geological Survey. The figures are generally regarded as conservative, but some well-informed persons consider the estimates rather too high than too low. It should not be forgotten that the estimates may prove to be too high rather than too low. They are admittedly only estimates, but they are based upon careful surveys and sound engineering deductions, and consequently are a far better guide than the offhand conclusion that, because we have always succeeded in finding oil when it was needed, we shall always be able to do so.

Oil is known to occur in certain types of geological formations, and conversely, where this type of formation does not exist, there is no reason to expect that oil will be found. The geological character of a given section is determined largely by outcroppings of rock or by the nature of material brought to the

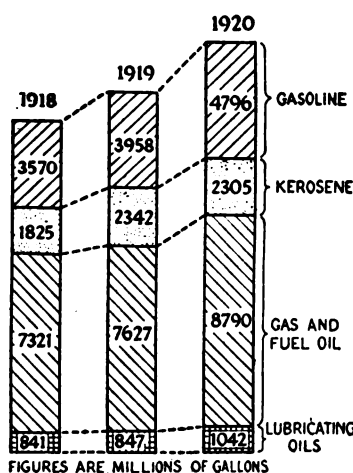


Fig. 2—Chart showing comparative production of petroleum products in U. S. in the last three calendar years. Note the large proportion now used as gas and fuel oil. If this fraction could be used for motor fuel, our potential supply for automotive transportation would be more than doubled



surface in drilling operations. In the great level coastal plains or swamp lands which occur in territory such, for example, as that adjacent to the Gulf of Mexico there is often little to guide the geologist in search of oil. When by so-called wildcat drilling, more or less at random, oil is discovered in territory of this kind, the yield is often very great at first, but decreases rapidly and is soon exhausted, as in the case of some of the Texas and Mexican pools. Geologists anticipate that much oil will yet be discovered along our coastal plains, but the possibility that new fields of the character of those found in Pennsylvania and Oklahoma, for example, will be discovered is, to say the least, extremely doubtful.

For this and other reasons it is conservatively predicted that the curve of petroleum production in

this country will soon reach a peak, if, indeed, it has not already done so, and will thereafter rapidly decline. This, in the face of constantly increasing consumption, is sufficient reason why any industry which is largely dependent upon petroleum products for fuel should sit up and take notice.

So much for the domestic situation. Now as to the possibility of supply from foreign sources. The keen international competition for the control of oil fields wherever they exist is sufficient indication that the great value of petroleum is fully appreciated.

Mexico, next to the United States, has been the second largest producer of petroleum and was not long since producing at about half the rate at which this country was producing. It is estimated that Mexico's proven reserve will have been about half exhausted by the end of this year, and very little, indeed, is being done to locate new supplies there, although in well-informed circles there is expectation that great quantities of oil will still be secured in Mexico. If this possible potential supply is developed in time it will simply postpone the date when a scarcity is felt. It is a doubtful dependency to say the least, especially when it is recollected that the gasoline content of Mexican crude is lower than that of most other crudes.

Fortunately the Mexican supply thus far produced has been close enough at hand to be cheaply transported to this country. Fields yet to be discovered in Mexico may be much less accessible, and the

product consequently much more expensive.

It is quite common to hear the remark that there are ample supplies of petroleum on other continents to meet the world's demand, should the supply in this country and Mexico prove inadequate for our needs. It is said that there is oil in China, in Siberia and in several South American countries. How much, nobody knows. So far as China is concerned, we are told by one prominent engineer who has visited that country in quest of oil lands that the probable supply underground is not promising. Some of the known sources of supply in South America are extremely inaccessible, and even if they were close to the seaboard the cost of transportation to this country would be very great. Much the same applies to Siberia, concerning whose petroleum resources but

little appears to be known.

To sum up the situation, so far as imports are concerned, it may be said that the future supply is, at best, uncertain. Much petroleum will doubtless be imported to supplement our domestic supply, but with the possible exception of imports from Mexico, the cost of importation will be great and the price correspondingly high.

What, then, is to be said of the remarks dropped on occasion by certain persons of standing in the oil industry who blandly state that there are ample reserves of petroleum in this country to meet all demands for several generations to come? Some persons have reached the conclusion that profits made in selling oil securities

are the controlling factor in arriving at this conclusion, rather than a careful weighing of the evidence.

On the whole, it must be said that, while we shall doubtless have an abundant supply of cheap motor fuel for some little time to come, such fuel is certain to become increasingly expensive in the not distant future. This is not a pleasant fact to record, but it is worse than useless to ignore what we know to be true and calmly proceed as if there would always be ample supplies of inexpensive motor fuel.

If we accept this view, and there appears to be no alternative, what is to be done about it? If the industry is willing to think and act far enough in advance of what is now clearly evident, there should be no insurmountable difficulty in adjusting the industry to changed conditions. If, on the other hand, there is a disposition to wait until the forecast stringency is at hand, the

**S**TATEMENTS are current to the effect that the petroleum supply of the United States will be exhausted within a score of years. Such statements are misleading. Decline curves of the older oil-fields indicate that this country will be producing petroleum fifty years hence, perhaps even into the next century, but in greatly diminished volume.

Irrespective of the quantity of recoverable petroleum underground, the output of this country must inevitably decline. This decline, however, may be expected to be a slow recession over a considerable number of years, rather than a sharp and sudden curtailment. The peak of production was possibly reached in June of this year. That this record will be bettered is unlikely, although it can doubtless be surpassed if we are willing to pay the price. But whether the output of petroleum in the United States has actually or almost reached its maximum rate is immaterial. Likewise, the exact size of the unmined reserve is of secondary importance. The point to be emphasized is the coming necessity for increasing the over-all efficiency of petroleum—a problem that concerns not only the producers and refiners of oil but the manufacturers of appliances that consume its products, as well. From now on the tendency will be to use relatively less of the material itself, but to put greater effort into increasing the service value extracted from it.

There is no valid reason why any activity fundamentally dependent upon liquid fuel should meet with permanent restrictions in energy supply. The heat units available in liquid form are practically limitless, so far as present generations are concerned; we properly utilize only a few per cent of those contained in petroleum and almost entirely neglect the content of leaner resources such as oil-coals and oil-shales. Readjustments in our economic practice there must be; restrictions in our economic growth there need not be. A lessened supply of crude petroleum would present an opportunity; not a handicap.

JOSEPH E. POGUE.

industry is certain to feel the effect more severely than it would otherwise.

**There are several courses of action, all of which should receive serious consideration:**

**First**—Every effort should be made to economize in the fuel consumption of cars now in service. There is abundant evidence that these cars use on an average of 20 to 30 per cent more fuel than would be required with properly designed and heated manifolds and properly adjusted carbureters. Manufacturers might, if they would, greatly decrease this waste by providing their service stations with proper instructions and facilities for correcting the faults which result in this waste, and encouraging car owners to avail themselves of these facilities.

**It must be quite evident that the nine million cars now on the road in this country will eat heavily into existing domestic fuel reserves before they are worn out. Much can certainly be done by educating the owner in the need for conserving fuel and assisting him to secure economical operation.**

**Second**—All automotive engines turned out in regular production from now on should be made in such a way as to consume the least possible fuel in the service for which they are intended. Numerous ways in which they can be made more efficient in fuel utilization were summarized in an article entitled "Where Are We Getting in Efforts to Solve the Fuel Problem?" which appeared in the June 16, 1921, issue of AUTOMOTIVE INDUSTRIES, and articles dealing with various phases of this subject are continually being presented in these pages.

**Third**—Intensive research and development work should be undertaken, not only with a view to producing more economical engines, but with the object of developing types of engines which will use economically less volatile fuels than present-day gasoline, preferably those fuels now classed as gas and fuel oil, or a mixture of such oils with gasoline and kerosene. Such engines would preferably adhere as closely as possible to present automotive types, but if a change in type ultimately proves desirable from an economy standpoint, even at the expense of some complication, such a change should be given serious consideration. By reference to Fig. 2, taken from Doctor Pogue's review of the oil industry for 1920 (see AUTOMOTIVE INDUSTRIES for February 17, 1921), it will be seen that over half of our domestic production of crude is consumed as gas and fuel oil.

**If the automotive industry had to-day ready for production engines capable of using gas and fuel oil or a mixture containing all fractions of the crude above those classed as lubricants, the potential supply of motor fuel would be more than doubled. Evidently, then, it is very much worth while to look toward the development of such an engine.**

**Fourth**—Every possible encouragement should be given to the production of gasoline substitutes, even though the promised supply of such fuels as benzol and even alcohol will be very small for many years to come in comparison with the total consumption of motor fuel.

**Fifth**—No stone should be left unturned which will tend to encourage the ultimate production of large quantities of motor fuel from shale oil. It is recognized, of course, that the production of shale oil will never be profitable until crude petroleum advances very considerably in price. There is also great need for investigation to determine what methods of recovering oil, and especially motor fuel, from shale can be used to best advantage. The Bureau of Mines is doing some research in

this direction. Funds should be provided to carry this work forward on a large scale and as expeditiously as possible. Automotive manufacturers should make it their business to see that Congress provides funds for this and other work of similar character (that at the Bureau of Standards, for example) calculated to make available new motor fuel resources or make existing supplies go further. Government bureaus are in an excellent position to undertake work of this kind if allotted sufficient funds, and the great economic importance of the whole matter more than justifies the expense.

It should be understood that the recovery of oil from shale involves extensive mining as well as refining operations which require years for development. One commentator draws attention to the fact that "the development of a shale oil industry on a scale sufficient to furnish large quantities of motor fuel is an undertaking comparable to the creation of the whole coal industry of to-day." It will require much time for development, hence a sound foundation on which to build profitably when the demand comes should be prepared now through research and development work.

**Sixth**—Since increasing quantities of motor fuel are being consumed by commercial vehicles it is important that particular attention be paid to making them as economical of fuel as possible. As the cost of motor fuel increases, the differential in favor of types of vehicles using it, in comparison with other forms of transportation, will decrease. Since the electric vehicle is not in any way dependent upon motor fuel, its future utility may be much increased in comparison with the gasoline-propelled type, and possibilities in this direction should not be overlooked in broad consideration of the fuel problem. Where stops are frequent and fuel is apt to be wasted in engines running idle when the vehicle is not performing useful work, the electric vehicle possesses certain advantages. Generally speaking, the vehicle which is most economical in all-round performance is the one to be advocated for that particular use.

**In conclusion let it be emphasized that the situation is one of grave import to the automotive industry. It is idle to deny this fact and indiscreet, to say the least, not to prepare to face it squarely. The industry should organize its forces in such a way as to accommodate itself with the least possible disturbance and as gradually as the situation permits, but no time should be lost in so doing. Automotive transportation is too firmly fixed in our modern social and industrial system to be displaced or abandoned simply for lack of the same abundant supply of cheap fuel which it has always enjoyed. It is unthinkable that this should occur, but we must certainly prepare for readjustment to meet the coming fuel situation, and should do so without an undue period of speculation as to just when the stringency will actually have to be met.**

**W**ELDING of cast iron is very difficult, inasmuch as a part of the silicon content is lost by evaporation or burning; then the exceptionally hard white specular cast iron is formed that makes it impossible to touch up the welded spot with the file. Furthermore, when the specular iron cools down it easily cracks. These drawbacks are avoided, according to German patent No. 222,690, by using for welding cast iron bars very rich in silicon and carbon, preferably bars of pure hematite, pig iron or charcoal iron. Owing to the high carbon content of the bars "burning off" is prevented. The welding should be performed as rapidly as possible and with a powerful flame, then cooling slowly in hot ashes.

# New Buick Four Similar to Six of Same Make

Some innovations are incorporated. New model has separate cylinder head with valves seating directly in the casting. No cages are employed. Single universal is enclosed in ball joint attached to rear of gearbox and is lubricated from this unit. Wheelbase is 109 in. Weight 2380 lbs.

By J. Edward Schipper

**T**HE Buick Motor Co. has added to its line a four-cylinder chassis upon which are mounted bodies of the roadster, touring car, coupe and sedan type. While this additional model is new throughout, it embodies all the characteristics of Buick practice, including a valve-in-head engine. Conservative body designs are a feature of the new line, the bodies being similar to those of the six-cylinder model. A wheelbase of 109 in. is standard for all body sizes and the whole line is equipped with 31 x 4 in. Royal cord tires, a new straight side size made by the United States Tire Co. for this model.

A detail study of the four-cylinder car shows that all the improvements made during the last few years on the six have been incorporated also in the design of this four. From a performance standpoint, the new model should prove adequate in any part of the country, whether it be hilly or flat. With a brake horsepower of 35 to 40 and a shipping weight for the touring car of 2380 lb., the car weight per horsepower is about 60 lb. The final reduction is 4.6 to 1 for all models. This is the same as the ratio used in the five-passenger, six-cylinder car and less than that used in the seven-passenger touring, which is geared at 4.9 to 1. In this connection, however, account must be taken of the fact that the tires on the four-cylinder are only 31 in. in diameter, while those on the five-passenger six are 33 in., and those on the seven-passenger six 34 in.

Cylinder head, cylinder block and upper half of the crankcase are individual iron castings. The lower half of the crankcase is a pressing forming the oil pan, and above the cylinder head is a stamped cover plate which houses the rocker arms and the remainder of the overhead valve mechanism. The four cylinders are cast in a block and have a bore and stroke of  $3\frac{3}{8}$  by  $4\frac{3}{4}$  in. This gives an S. A. E. rating of 18.23 hp. and a displacement of 170 cu. in. The cylinder block is a remarkably simple casting, consisting only of the cylinder barrels

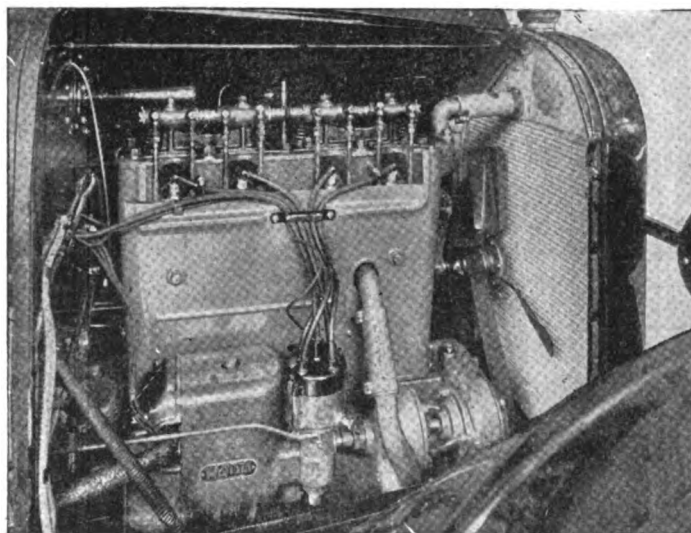
and water jacketing for the upper part of the block. The manifolds are cast in the cylinder head. The valves seat direct in the head casting and operate in pressed-in guides. No cages are employed. The cylinder head casting is cored for water spaces around the spark plugs, valves and manifolds. The piston is cast iron and is of the three-ring type with all three  $\frac{3}{16}$ -in. rings located above the piston pin. Below the bottom ring there is a wiper groove so designed that it will scrape the oil off the wall of the cylinder and lead it to the piston pin bearing. The piston pin bearing is located in the upper end of the connecting rod and the pin is offset  $\frac{3}{32}$  in. toward the camshaft, the

same as in the six-cylinder model. The diameter of the piston pin is  $\frac{3}{4}$  in.

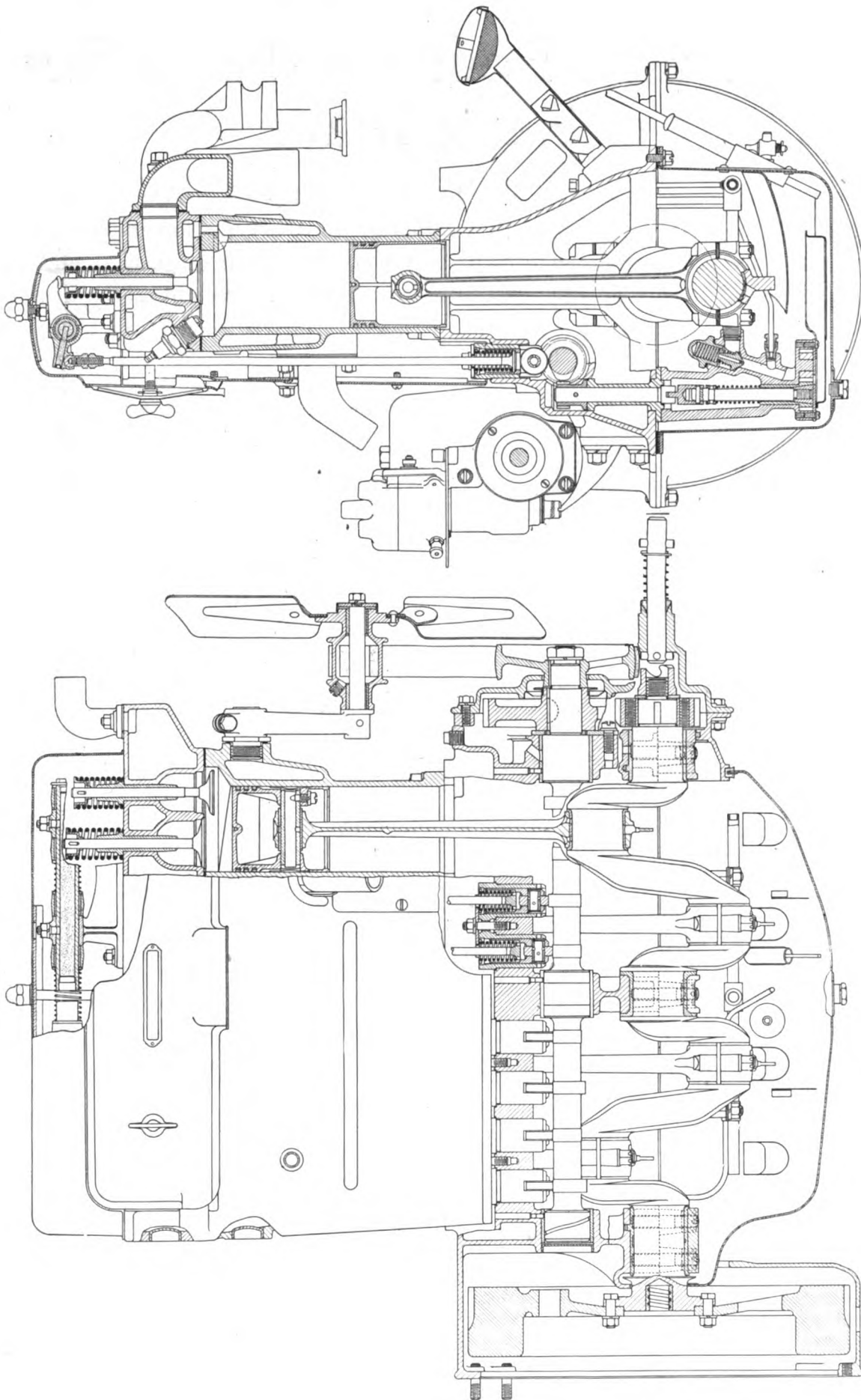
The connecting rod is 12 in. in length, which is exceptional for this size engine. It is a drop-forged I-section rod and carries at its lower end a babbitt-lined bearing 2 in. in diameter by  $1\frac{5}{8}$  in. in length. The crankshaft is of carbon steel, its large diameter rendering it very rigid. The diameters and lengths of the three crankshaft bearings (front to rear) are as follows: 2 by  $2\frac{1}{16}$ ; 2 by  $1\frac{3}{4}$ ; 2 by  $2\frac{23}{32}$  in. The front and intermediate bearings have two bolts each and the rear main bearing has four bolts.

Camshaft drive is by helical gears. The cam followers are of the roller type, the cams acting against push rods which carry a mushroom-shaped spring retainer at the lower end. The tappet guide contains a coiled spring which helps to keep the roller follower in close contact with the cam and acts as an auxiliary to the valve spring. The push rods have a ball and socket connection at the rocker arm or upper end, where the adjusting means are also located. The ball is hardened and ground. The rocker shaft is supported on the cylinder head, the rocker arms being provided with a rocking chair motion on the upper end of the vertical overhead valve stem.

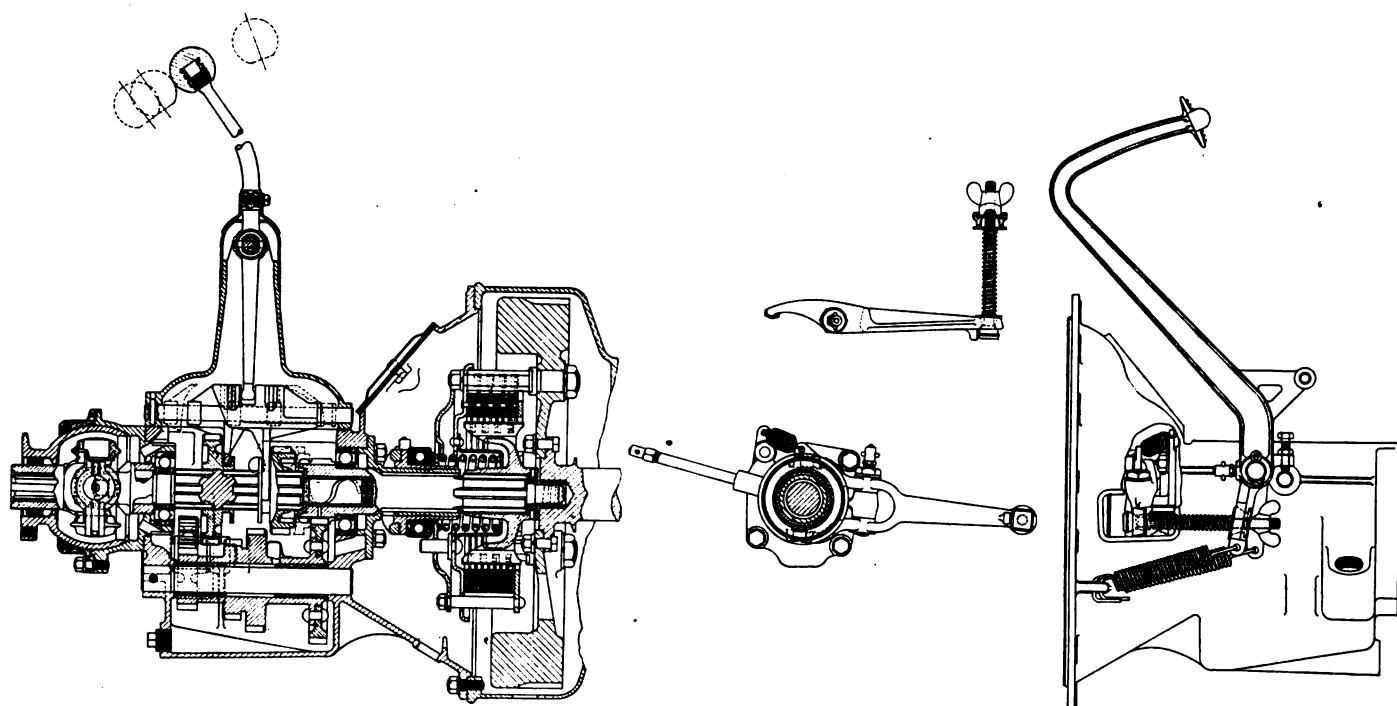
Instead of all valves being interchangeable, the intake valves are larger than the exhaust valves. The



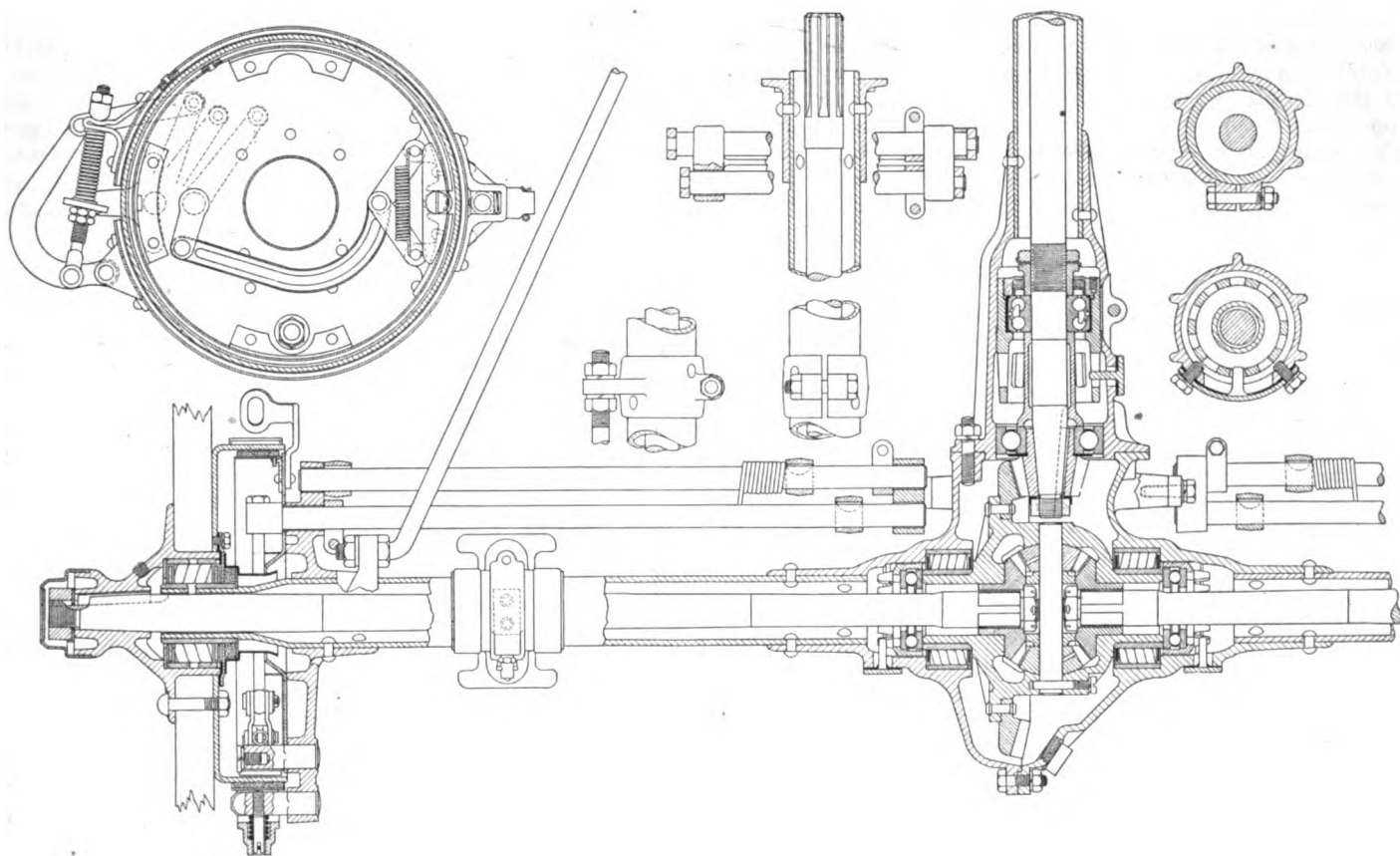
Side view of four cylinder Buick engine, showing pump, generator and ignition unit drive



Sectioned elevations of Buick four-cylinder engine



On left: Buick 3-speed gearset and dry disk clutch. In center: Clutch throw-out lever and clutch pedal adjusting device. On right: Side view of transmission with pedal



Sectional view of rear axle and brake and details of same



clear diameter of the inlet valve is  $1\frac{7}{8}$  in. and that of the exhaust valve  $1\frac{5}{8}$  in. These valves are larger than those of the six-cylinder engine, although the displacement per cylinder is very nearly the same. The valves of the six are  $1\frac{5}{8}$  in. for the inlet and  $1\frac{1}{4}$  in. for the exhaust. On the form the valve lifts are  $21/64$  in. for the inlet and  $5/16$  in. for the exhaust. The stem diameter is the same for both, viz.,  $\frac{3}{8}$  in. The material of the valve head is cast iron and that of the stems carbon steel. A spring pressure of 76 to 85 lb. is employed, the same as on the six-cylinder car. The valve timing is also identical with that of the six, and is as follows:

Inlet opens 22 deg. 10 min. after upper dead center.

Inlet closes 45 deg. 10 min. past lower dead center.

Exhaust opens 53 deg. 50 min. before lower dead center.

Exhaust closes 9 deg. 10 min. after upper dead center.

The firing order is 1-3-4-2. This timing, in conjunction with a 74 lb. per square inch gage compression pressure, indicates that the engine has high-speed characteristics.

Oiling is by the circulating splash system, the gear pump being located in the oil pan and driven directly from the camshaft. The pump is so constructed that it can be taken out from below for cleaning or inspection and is entirely exposed to view when the pan is dropped. The capacity of the oiling system is 4 qt. The crankshaft and main bearings, as well as the timing gears, are supplied directly from the circulating system, while cylinder walls and other internal parts are taken care of by the splash from the scoops on the lower end of the connecting rods.

#### Gasoline System

The gasoline system comprises a 10-gal. cylindrical tank mounted at the rear of the chassis beneath a sheet steel cross-member. From this tank the gasoline is drawn to a vacuum tank on the dash and fed by gravity to the  $1\frac{1}{4}$ -in. Marvel carbureter. The carbureter is a top-outlet type, mounted on a separate intake manifold. The diameter of the intake manifold at the throat is  $1\frac{3}{32}$  in. A damper which controls the exhaust heat utilized is interconnected with the throttle so as to give more heat at low and less heat at high speeds.

The cooling system comprises a square tube cellular radiator having a water capacity of  $3\frac{1}{4}$  gal. and a radiating surface of 304 sq. in. It has a depth of  $2\frac{1}{2}$  in. and is fed by a centrifugal water pump driven off the generator shaft. Cooling is assisted by a 16-in., three-bladed sheet steel fan driven by a  $1\frac{1}{4}$ -in. flat belt.

The clutch is a multiple dry-disk type having eight disks. The facing rings are  $5\frac{7}{8}$ -in. inside and  $7\frac{5}{8}$ -in. outside diameter, giving a total area of 148.4 sq. in. The three-speed selective sliding gear is mounted directly on the engine. It is of the conventional type, with chrome nickel steel gears having a face width of  $\frac{3}{4}$  in. and a 7-9 pitch. The gearcase is of cast iron. The reductions in the gearbox are 2.8 to 1 on first; 1.69 on second, and 3.73 to 1 on reverse. New Departure bearings are used on the main shaft and plain bearings on the countershaft. The span of this shaft is  $6\frac{15}{16}$  in., which is remarkably short.

A  $1\frac{1}{8}$ -in. solid propeller shaft is inclosed in a torque tube which connects the gearset to the rear axle and takes torque on thrust. The single universal joint is inclosed by the ball joint connected to rear end of the gearset and is lubricated from the gearbox. The rear axle is a three-quarter floating type with a malleable iron center housing. The final drive is through spiral bevel gears with nine teeth in the driving pinion and

42 teeth in the ring gear. The bevel pinion shaft is mounted on two New Departure bearings. The differential bearings are Hyatt in connection with a ball thrust. The axle shafts are of chrome nickel steel.

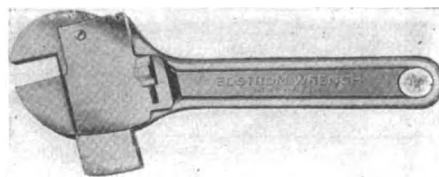
The car is suspended on semi-elliptic springs, the rear springs being  $55\frac{1}{2}$  in. long and 2 in. wide, and the front springs 36 in. long and  $1\frac{3}{4}$  in. wide. The spring eyes are bronze bushed and provided with the Alemite attachment, this lubrication system being used throughout the chassis. The brakes are external and internal, on a common drum located on the rear wheels. The drum diameter is 11 in. and the width of the bands  $1\frac{3}{4}$  in. This provides an area of 111 sq. in. on the foot brake, which is the external, and  $86\frac{1}{2}$  in. on the hand brake, which is the internal set. The internal diameter of the drum is  $10\frac{11}{16}$  in. The steering gear is a Jacox screw and nut design. The steering wheel is 17 in. in diameter and is provided with the usual spark and throttle connection.

All electrical equipment is of Delco make. The distributor is a unit with the generator. The starter reduction is 23.8 to 1, while the generator is geared up from crankshaft in the ratio of 1 to 1.5. The battery provided is an Exide, three-cell type, with a capacity of 80 amp.-hr. at 10-amp. discharge rate. The head lamp candlepower is 21, and dimming is effected by a coil on the switch. A 5-candlepower tonneau lamp and 2-candlepower tail and dash lamps are provided.

All of the bodies are of the low-hung type. The car can be turned in a 36-ft. circle. The standard color is black with a white stripe around the top on the open models. The closed cars are equipped with adjustable windshield visors, a windshield cleaner, dome light, ventilating windshield, adjustable windows and sun-shades for the rear windows. All models are equipped with non-glare headlight lenses and all are provided with a tire carrier and extra rim. The upholstery of the seats on the open models is in leather and on the closed models in worsted material. As an example of the seating allowance on the touring car, the inside width of the rear seat is 46 in. and that of the front seat 39 in. Prices are quoted f.o.b. Flint, Mich., and are as follows: Two-passenger roadster, \$935; five-passenger touring, \$975; three-passenger coupe, \$1,475; five-passenger sedan, \$1,650.

### New Automatic Wrench

THE wrench illustrated herewith, which is being placed on the market by the Edstrom Machinery Co., has several interesting features. It closes tightly on the nut automatically, and it can be operated with one hand for it can be locked in place by the movement



of the thumb of the hand holding the wrench. A positive gripping action is secured by the small teeth on the movable jaw which engage with similar teeth on a sliding lug within the handle. This lug is controlled by the thumb lock, a movement of which forces the lug against the teeth of the sliding jaw, thus holding it securely. The head of the wrench is not excessively large and will fit in many places where a standard open end wrench can be used.

# A New Design of Plain Tube Carbureter

Latest design of Holley is of simple construction and arranged for easy application by universal features. Air bleeding device adjacent to throttle provides for idling and low speed conditions, large venturi for high speed.

**A** NEW carbureter of very simple design and incorporating a number of features of interest is being produced by the Holley Carbureter Co. The new carbureter has been simplified in a great many of its features by the elimination of a number of small parts. There are no moving parts. It is of the plain tube class and has but one master nozzle, which controls the flow of fuel for both idling and running with wide-open throttle.

With this class of carbureter it has been quite easy to make a motor idle or to run with the throttle wide open at full power, but the main difficulty has been in the smooth transfer from idling to the time when the main nozzle commences to contribute its proper proportion of gasoline. The transfer from idle to the full functioning of the main jet should be made smoothly and economically, since about 90 per cent of the driving is done in this range.

The two holes located above and below the throttle plate when the latter is nearly closed give this control. On idling, the upper hole only supplies the mixture, the lower one acting as an air bleeder. As the throttle is opened slightly the bleeder action is reduced, thus maintaining the mixture proportions. On further opening, both holes are exposed to the suction above the throttle. Both act as fuel outlets to supply the extra gasoline made necessary by the larger volume of air passing the throttle.

With this arrangement the Holley engineers state that more freedom is allowed in the manipulation of such other important features as positive acceleration and large breathing capacity for high speed. It is unnecessary to limit the size of the venturi; that is, a large venturi can be used without affecting the smooth and positive operation throughout the driving range. This affords high volumetric efficiency without the compromise otherwise frequently employed to secure good low-speed performance. It should also add to the maximum output of the engine.

A number of interesting details are found on the new instrument. All of the screws are made of nickel steel to resist rust and also to prevent twisting off screws which are depended upon to hold permanent adjustments. No tools are necessary for removing the cover of the

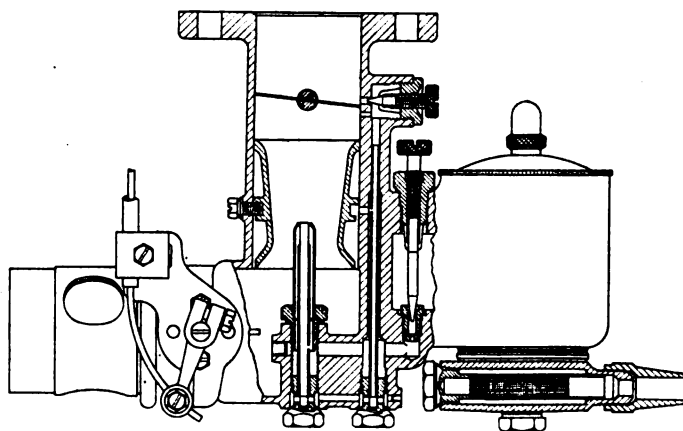
float chamber, which is held in place by a spring lock, acting in very much the same manner as a bayonet lock, except that it is continually under tension. Another feature is the strainer, which can be easily disassembled and cleaned without removing the gasoline connection or in any way disturbing the installation of the carbureter. The strainer is cylindrical in form and pulls out at a point opposite the gasoline intake, as shown in the accompanying sectional view of the carbureter. The dirt is left on the inside of the screen, since the gasoline

passes from the inside to the outside in entering the float chamber. When removing the strainer, therefore, all of the dirt is removed with it, and the gasoline line free of any deposits which may have entered during the course of operation.

The master nozzle is adjusted by means of a needle valve which, in its effect upon wide-open throttle, has a major influence. The idling adjustment is shown directly below the flange. It is used for extreme low speed. When driving at

the lower speeds, with partially closed throttle, there is an accumulation of fuel in the well, and, upon opening the throttle, this accumulation becomes immediately available as a means of enriching the mixture for maximum rate acceleration. It will be noticed that there are no small passages leading to the atmosphere. It has been found that such passages become filled with dust and dirt, and materially interfere with the accurate functioning of the carbureter. All the air enters the carbureter through one entrance, which is always connected to a suitable stove or heater.

The carbureter is universal in that it is possible to swing the strainer and gasoline inlet connection around to any point below the float chamber and to set the choke connection to be controlled from either side, or from any direction. The carbureter can be readily cleaned by removing the nozzle from the bottom. No gasket is required. These features, taken in conjunction with the simple construction of the carbureter, give a very accessible layout and permit installations on any type of engine. The carbureter is at present being manufactured in 1-in., 1¼-in. and 1½-in. sizes, top outlet, and a series of side-outlet carbureters will soon be in production.



Sectional view of new Holley carbureter

# The Design of Wind Screens for the Rear Seat

How an insistent demand for better protection of passengers from the weather is being met in England. The tonneau wind screen is likely to become standard equipment on many British cars in the near future.

By M. W. Bourdon

**A** DEMAND is growing in strength in England for the inclusion of a rear wind screen in the standard equipment of open four and five-passenger cars and, as mentioned in AUTOMOTIVE INDUSTRIES at the time of the last Olympia show, two British makers (Phoenix with a medium-priced car and Lanchester with an expensive one) have already complied. There seems to be more than a possibility that other makers will follow suit and it only requires two or three more well-known firms to adopt this policy to cause this form of protection for the rear passengers to become generally recognized as needful and rule out any car not so equipped as not being considered "ready for the road."

The demand in question applies to medium and high-priced cars at the moment, but obviously it is only a matter of time and example before rear screens are looked for on the lower priced vehicles. Clearly, the inclusion in the standard equipment of this additional item must add somewhat to the price of the car, but it should not do so to anything like the extent of that which now occurs when a buyer—as is very often the case—orders a rear screen as an "extra" or obtains one as an accessory for an existing car.

Rear screens in one form or another, all ostensibly capable of being fitted to almost any car, have been available to and used by a great many British motorists for at least 10 years past, but, as inferred above, these fittings have been relatively costly to install, and it can hardly be said that their design has been without reproach. They have been effective in their main objects, but more or less unsightly encumbrances when out of use.

The point arises, therefore, whether these objections as to cost, design and appearance cannot be overcome when the fitting is provided for in the original design of the body work. As shown hereafter, one British

maker, Lanchester, has gone a long way in the desired direction by making the screen fold up neatly, out of sight, when it is not required. The Phoenix rear screen, however, still has the appearance of being an attachment, or an afterthought.

In view of the foregoing facts and possibilities it is of interest at the present time to survey the various forms of rear wind screen now available to British motorists, and the accompanying sketches of most of the different types now being made have been prepared with that object. The types illustrated may well be grouped into five distinct classes, as follows:

Group A. Single non-folding panel screens, adjustable as to rearward inclination and secured either to the back of the front seat or to a rear cowl.

Group B. Single panel with "wings" supported by hinged or telescopic extension arms secured to the back of the front seat. Can be folded up behind front seat when not required.

Group C. Multiple panel supported by vertical pillars, one at each side, two of the panels forming wings. Can be detached, but not folded completely down below top line of body.

Group D. Flexible panel without wings, readily detachable, on light framework, supported by vertical pillars.

Group E. Single panel with wings; "built into" the body and folding out of sight.

Referring to the illustrations, one example of each of the alternatives in group A is shown. In Fig. 1 the single panel, secured to the rear top edge of the front seat, can hardly be effective except in the case of "close-coupled" bodies. When, as illustrated, it is fitted to a normally dimensioned body, the degree of protection afforded to the rear passengers can hardly be held to justify the cost of the fitting. True, it is better than nothing with a head-on wind—though only slightly bet-

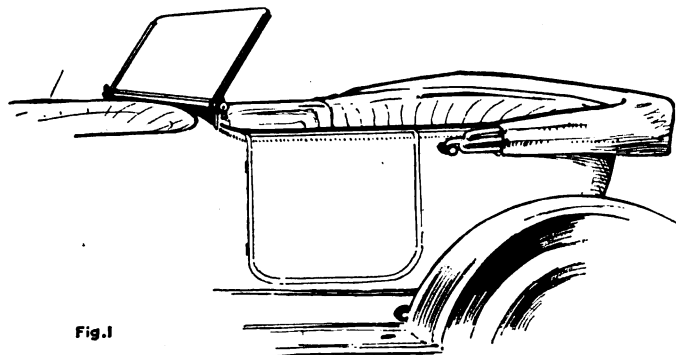


Fig. 1

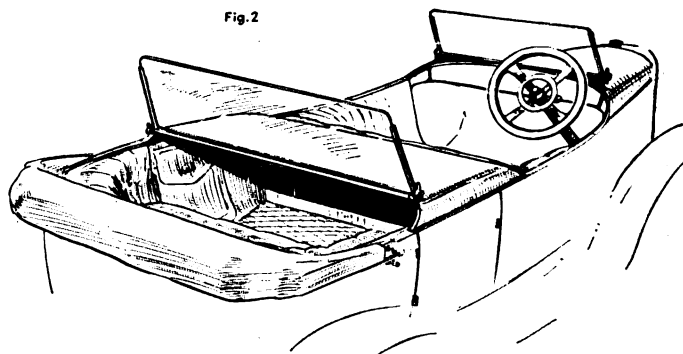
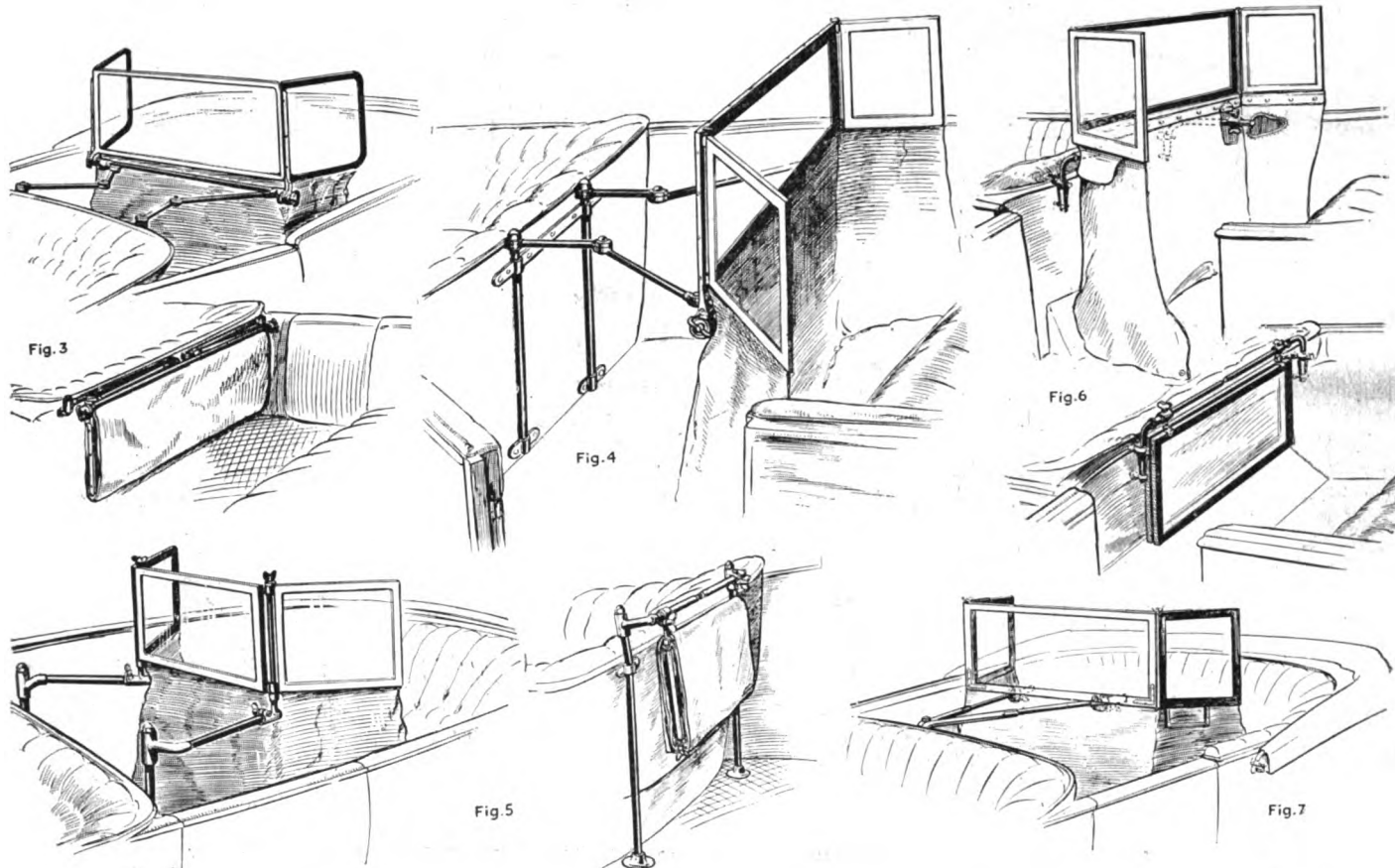


Fig. 2

Group A: Non-folding single panel type



Group B: Single panel with wings, supported by extension arms to back of rear seat.  
 Fig. 3—Auster      Fig. 4—Another method of supporting Auster screen      Fig. 6—Phoenix  
 Fig. 5—Beatson      Fig. 7—Perfecta

ter under that condition, and no better with a side wind. But if a screen of the same simple type be fitted at the back edge of a rear cowl, the latter extending as far rearward as the doors and hinged to the back of the front seat as in Fig. 2, Group A, this type of screen becomes worthy of consideration. The writer had a good deal of experience with two cars thus fitted before the war and found the rear seat occupants were, with the screen raised, as well protected as those at the front. If desired, in warm weather the panel can be hinged forward to lie horizontally over the cowl, and the latter itself with the screen attached can be made easily detachable from the car.

The objection to this arrangement is the slight difficulty and delay experienced by the rear passengers in getting into and out of the car. Obviously the back end of the cowl must be lifted up, and if this be done hurriedly and without care there is risk of damage, either to the heads of the front seat occupants or to the glass of the screen—for if the front seat be vacant the top edge of the screen will make more or less forcible contact with the steering wheel. There is need, therefore—or at any rate it is advisable—to fold the screen forward to a horizontal position over the cowl, and secure it thus, before the cowl is lifted.

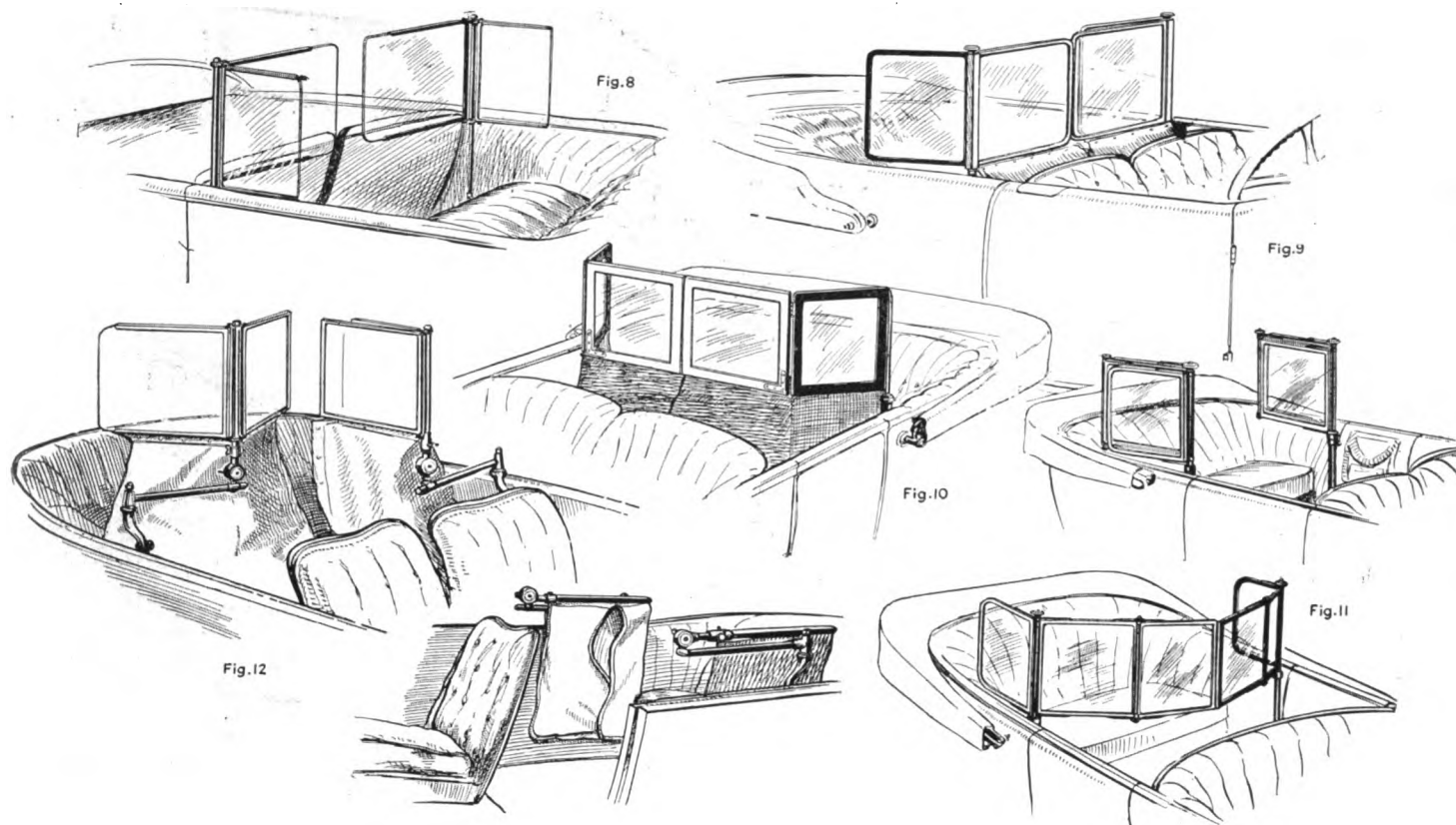
Then, too, unless the cowl is only very slightly above the top edge of the body when it is resting on the doors—that is to say—unless it is nearly flat, its sides encroach more or less upon the doorway when it is raised to a vertical position. This was found to be a serious objection in the cases referred to, but in these days, with higher sides to the body in relation to the seats (on British cars, at all events) this difficulty is almost automatically overcome, for the cowl can be almost flat without making a high screen needful to bring its top edge level with the passengers' heads. This suggests that

there is call for compromise where the body sides are somewhat low, or the seats relatively high, in endeavoring to provide the required height of the top edge. A deep screen is to be avoided—it should be appreciably less in height than the cowl measures in fore and aft length, otherwise the latter cannot be lifted when the screen is horizontal—and the cowl should not be much above the body line for the reason already mentioned.

Despite the drawback referred to and the somewhat permanent nature of the arrangement, which prevents it from being folded right away, this scheme has points of advantage over the alternatives. It should be comparatively low in cost if standardized; it is certainly effective in the case of head winds by reason of the screen panel being near to the passengers, and in side winds it affords quite as much protection as can reasonably be demanded. It does not prevent the passengers from using rugs, and the cowl keeps off those swirling blasts which normally circulate around the passengers' feet.

The cost in low-priced cars (and the weight in all) could be reduced by using non-inflammable celluloid instead of plate glass, though additional framing and a central support would be required. This form of transparent material for the panels is already in use in other types of rear screens and is not objected to by people with limitations on the score of price. The cowl could be made and fitted quite cheaply in quantities if the front seat back were designed and shaped with the addition in view.

Turning now to Group B, Fig. 3 shows an early example of this type, the Auster. The extending arms are supported by brackets secured to the front seat framing under the upholstery or at the top of the rear panelling—usually the former. The central glass panel is adjustable as to inclination and when moved carries



Group C: Multiple panel type, supported by vertical pillars, detachable but folded below top line of body

Fig. 8—Special arrangement made for an Armstrong-Siddeley owner

Fig. 12—Another Auster design

Fig. 10—A new Auster design

Fig. 9—Straker-Squire

Fig. 11—A variation of new Auster design

the wings with it, though the latter can be swung inward or outward without moving the main panel. They are held in position automatically by the teeth of the spring-backed hinge plates. The apron or rug is attached to the screen by turn-buttons and, of course, moves with the panels. Fig. 4 shows a variation in the method of supporting this type of screen, suitable for use when the front seat framing is rather light. Fig. 3 shows metal framing for the glass and Fig. 4 mahogany framing. As regards the prices at which these two types are sold in England, the metal framed pattern is approximately \$75 (at normal exchange) and the other \$50. The former is made with panels of various dimensions, while the latter is supplied in one size only as follows: Center panel 32 in. wide, wings 14 in., arms allow extension of 20 in. from back of front seat.

Another popular "accessory" rear screen (the Beatonson) is shown in Fig. 5. This also is in Group B and differs from the Auster in the method of support. The two illustrations showing the screen in use and folded are practically self explanatory; it need only be said that this design does not allow of the main screen to be used other than vertical and as a means of deflecting the wind over the passengers' heads is not so effective on account of that shortcoming. At the same time the back draughts are not excessive, no more so than those arising from the usual windshield—especially when the permissible length of extension arms is such as to bring the panels close to the passengers.

Fig. 6 shows the standardized rear screen used on Phoenix cars. Except for the bracket supports instead of pillars it closely resembles the Beatonson. It has mahogany framing for glass panels; the waterproof apron is included with the screen in the car's equipment.

Telescopic extension arms are used in the Perfecta (Fig. 7) and the arms are supported by a central bracket

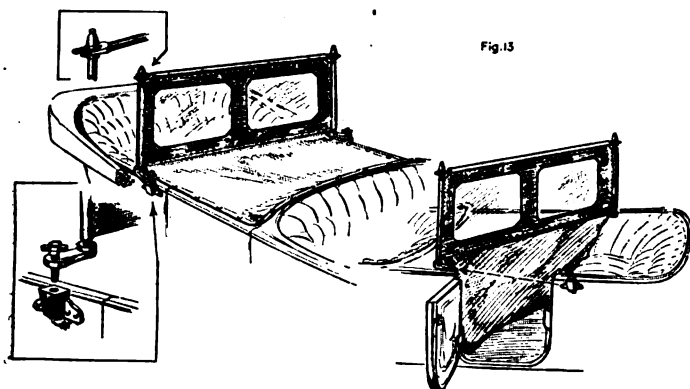
attached to the front seat frame. In this case also there is no provision for inclining the main panel. As might be surmised this screen has to a pronounced extent the great failing of extending rear screens in general, i.e. the lack of rigidity due to the distance of the screen from its point of support. In some cases this weakness is extremely disconcerting to say the least, and the blurring of the view when the glass is other than perfect or spotlessly clean is very trying to the eyes.

This type in general is not sightly; it is, in fact, considered by many people a mere makeshift, an obvious after thought, and they bear with it only because it is more or less effective in meeting a definite requirement. There is no question but that it "spoils the lines" of many an otherwise shapely car outline. It certainly is not to the credit of those who have catered for this class of fitting that for so long they have seemingly made no endeavor, not until recently, to improve upon it.

In Group C the first illustration (Fig. 8) shows an arrangement specially made for the owner of a close-coupled Armstrong-Siddeley four-passenger car with separate sliding front seats and one door on each side at the front. This design, and that shown in Fig. 9, which is quite similar, has the merit of a neat appearance, and is, according to the owner, quite effective, the gap between the center panels in this particular case is said not to permit any draught worthy of mention to pass. The vertical standards of the panels in Fig. 9 are set slightly farther back, which should be of advantage, the gap thus allowed between the screens and the front seats being fitted with short "aprons" secured by snap buttons.

While in both the cases just mentioned this type is fitted to a close-coupled four-seater with front doors only, the principle is applicable to normal body designs, and that it has openings for variation is evident from





Group D: Flexible panel type without wings, supported by vertical pillars. This type is readily detachable

Fig. 13—A single example of this type

Figs. 10 and 11. In the former the four panels are inside the body, the outer ones are clipped together at the back of the framing to prevent rattle and lend additional support. The apron is divided, half attached to each pair of frames. At present the maker (Auster) is providing pillars which can be vertical only, but there is no reason why with slight modification of the supporting brackets they should not be made adjustable so that the screen as a whole could be inclined rearwardly if that were found desirable.

In Fig. 11 there are, as seen, six panels supported by two side pillars. This arrangement is practically the same as in Fig. 10 plus side wings, though the framings are of metal in place of wood. In both cases the pillars are secured to the side framing of the body just behind the door by clips and screws top and bottom.

Another Auster design, Fig. 12, is the same in principle as the last four mentioned screens, but has modifications that hardly make it appeal to the aesthetic sense, whether or not it be considered more effective in practice. And even in the latter respect, in providing universal adjustment, the maker has perforce lost that rigidity, the lack of which is a decided shortcoming in his original and still standard pattern—the extending screen in Fig. 3. The only advantage secured by the decidedly unsightly bracket, levers, etc., in Fig. 12 is that the screens with their individual aprons can be folded down to the body sides as suggested in the lower view; but even when there the screens spoil the appearance of the car and should certainly be capable of being supported at a lower level.

The solitary example of Group D (Fig. 13) is decidedly crude in detail design whatever may be said for the principle involved. But for cheap cars it has possibilities which seem to warrant reference to its constructional features. The lateral strip is of fabric with inset non-flame celluloid panels and is supported by one horizontal and two vertical "irons" which pass easily

through wide hems or pockets at sides and top. The side supports have grooved "acorns" screwed on at the top and cranked lower ends with integral pegs and hand grips or wheels, the pegs being tapered with square tips to fit into sockets attached to the body. Thus the side pillars can be swiveled around a center formed by the peg and located in one of four positions by the squared peg and socket; this arrangement forms a tensioning device for the fabric strip, the top bar having forked ends to allow of this lateral extension.

There are four sockets for attaching to the body, two for normal use and two attached in front of the doors so that the side pillars can be located and the screen held out of the way when passengers are to enter or alight. The second sketch shows this alternative position. When the screen is not required it can be removed and dismantled, the rods being withdrawable so that the fabric strip can be folded and stowed away under the seat cushion or elsewhere.

There is no locking device to hold the tapered pegs in their sockets, the weight and the tension on the fabric sufficing to keep them from jumping out of place on rough roads. At all events the latter is the case when the screen is new and properly dimensioned; but there is a lack of precision and scope in the tensioning arrangement which suggests a state of affairs where the fabric strip is loose or yet cannot be stretched enough for the next position of engagement of the squares to be reached. In this respect there is room for improvement and also in regard to the connections between the ends of the upper bar and the side pillars.

This form of screen is not, of course, to be considered seriously as a fitting for an expensive car, but if there arises a universal demand for rear protection on all cars it has the foundations of a practical form which could be made and fitted at a very low cost.

The last two illustrations showing examples in Group E come into a category at the other end of the scale. Fig. 14 indicates the scheme devised by a coach builder for a custom-built body and is lacking in certain respects, much as it might be commended for its folding-up-and-stowing-out-of-sight feature; it is too cumbersome and heavy, and too far forward. The last mentioned fact results in the disadvantage of all rear screens which are close behind the driver, i.e. the incessant and excessive back draught which they cause the driver.

The Lanchester arrangement (Fig. 15) is a far more desirable fitting from every point of view. When in use it consists of a single panel hinging screen with wings secured to what has the appearance and effect of a rear cowl. But the whole can be instantly shut down and folded away to form the back panel of the front seat, the underside of the cowl portion is covered with cloth and appears quite normal when it serves its secondary purpose. The cowl, it will be seen, is carried by two pairs of pivoted arms of flat section steel; the top pair lie horizontal when the screen is erected and prevent the rear

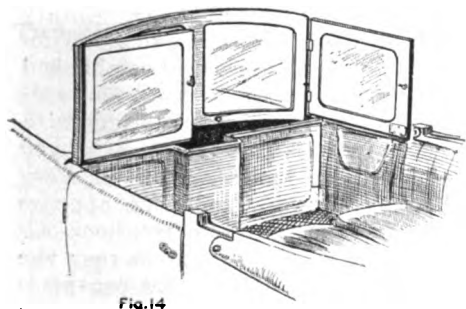


Fig. 14

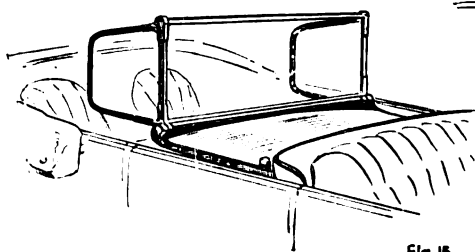


Fig. 15

Group E: Single panel with wings, arranged to fold out of sight in body.

Fig. 15—Lanchester

edge of the cowl from sinking beyond the horizontal, and the front edge from lifting, by reason of their resting upon "stops" formed by the top end of the lower pair of arms. To fold the cowl away the rear edge must be lifted, weight imposed upon it being resisted by the lower pair of arms in tension. Obviously a little care is needed in laying out the design and in fitting to insure that a jamb does not occur in the pivoting of the arms; otherwise the system of supporting the cowl and screen is as simple as it is effective, though it needs a slight measure of side support to prevent lateral sway. This is afforded by the closed doors of the car.

Every benefit of the cowl and screen system of Fig.

2 is provided by this Lanchester system and at the same time it overcomes practically all the objections raised against the other; it is not unsightly in use or out of use, like those rear screens with extending arms and is even more readily collapsed when required. There is nothing in its fundamentals which necessitate its being costly to make and can be easily adapted to quantity manufacture as a standard attachment. As a stock accessory for fitting to existing cars it is not feasible; but that is not what is called for, so the writer takes it, by those firms who are looking out for a simple and satisfactory form of rear screen to adopt and add to the standard equipment of their cars.

## New Standard List of Machine Screws

IN line with the general tendency toward standardization and the elimination of unnecessary parts in the mechanical industries, the Bureau of Standards and the National Screw Thread Commission have been consulting with manufacturers of machine screws for the past several years with a view of standardizing the product of this industry and eliminating unnecessary sizes. A temporary organization of machine screw manufacturers was formed for the purpose at the suggestion of the Bureau of Standards, which was joined by the manufacturers of more than 90 per cent of the product of this industry, and at a meeting held at the Engineering Societies Building on May 18 the recommended list of the National Screw Thread Commission was unanimously adopted.

In the new list, issued on June 15, a considerable number of unnecessary sizes and pitches are done away with. There is a fixed pitch for each diameter in both the coarse and fine thread. The coarse thread pitches are the standard, and screws of these pitches will be carried in stock by manufacturers. The coarse pitches are substantially the same as have been in use for a great many years and no change in shop practice or tools is necessary. Fine thread screws will be made to order only, but as the wire for them will be carried in stock, it will be possible to deliver them on short notice. Sizes in the fine thread series, for which a particularly strong demand develops will later be considered for manufacture on a stock basis.

The most important change from the old list consists in the elimination of numbered sizes above No. 12. All

machine screws above No. 12 in the new list will be in fractional sizes and confined to the coarse and fine thread pitches, which meet all manufacturing requirements. The standard sizes are shown in the accompanying table.

## Ample Supply of Wood Wheel Material

THE "American Lumberman" prints this question from one of its readers and a reply. This is interesting, as it will correct a belief apparently prevalent in the automotive industry:

In talking to an automobile salesman recently about the superior qualities of wooden wheels for automobiles as compared to wire wheels, he rather dolefully said that the public would have to get used to metal wheels soon, for it is now almost impossible to get the hardwood with which to make such wheels. I am wondering if this is correct.—Inquiry No. 206.

[Hickory is one of the best woods for automobile wheels, and there is no immediate danger of the exhaustion of hickory. So far as can be judged from present conditions, it will be one of the last woods of this country to fail in supply. Much is used for handles and vehicles, but it grows rapidly. It is at least as much of a domestic tree in its habits as black walnut, and grows along fences and in old fields where it is at its best. It is peculiar among woods in that the faster it grows, the better it is. Second growth—that is, fast-growing hickory—is preferred for many purposes. The wide rings of spring wood which are found in open ground hickory trees give a strength and toughness, exactly what is desired by makers of vehicle wheels. It will be a long time in the future before automobile makers cannot get wood for wheels if they want it.—Editor.]

STANDARD MACHINE SCREWS  
ROUND HEAD — FLAT HEAD — FILLISTER HEAD

Threads Per In.	56	48	40	40	32	32	24	24	20	18	16	14	13
No.	2	3	4	5	6	8	10	12	1-4	5-16	3-8	7-16	1-2
1/4	*	*	*	*	*	*	*	*	*	*	*	*	*
1/2	*	*	*	*	*	*	*	*	*	*	*	*	*
3/4	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*
1 1/4	*	*	*	*	*	*	*	*	*	*	*	*	*
1 1/2	*	*	*	*	*	*	*	*	*	*	*	*	*
1 3/4	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*
2 1/4	*	*	*	*	*	*	*	*	*	*	*	*	*
2 1/2	*	*	*	*	*	*	*	*	*	*	*	*	*
2 3/4	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*

\*These sizes are made in both steel and brass.  
†These sizes are made in steel only.

THE preliminary work in connection with the opening of aviation routes across the Sahara desert has presented many difficulties, but most of them appear now to have been overcome, and it is announced that a military route is being organized from Dakar to Bamako and Timbuctoo. Every 1000 kiloms, a center is being established where, in addition to stores, there will be every convenience for carrying out repairs, while smaller stations with stores and maintenance facilities are being arranged every 250 kiloms. There will be landing grounds every 50 kiloms. The route from Dakar to Timbuctoo appears to offer far less danger than the one from Southern Algeria, where the efforts to create a service across the desert have so far failed. It is remarked that prospecting work has been carried out over the Dakar route for many months past without a single accident.

# Grinding in the Automotive Industry

## Part I—Abrasives and Grinding Wheels

In this, the first of a series of articles, the author describes the various kinds of grinding wheels, pointing out the difference in material used. Factors governing the selection of wheels, cutting speeds, balancing, truing, and troubles in grinding are among the items covered.

By P. M. Heldt

**G**RINDING has undoubtedly been practiced ever since metallic cutting tools were first used. The original abrasive was sandstone, which was found ready for use in nature, except that it had to be worked into the cylindrical or other shape required. As it is relatively soft stone this was not difficult. Later on other natural abrasives came into use, including emery and corundum. Emery was the basic material of grinding wheels for a long time, and the word "emery wheel" became so firmly established in the vocabulary of the machine shop that even to-day all grinding wheels are commonly being spoken of as emery wheels, although the proportion of wheels now made of emery is very small. The proper term to use is "grinding wheels."

Emery and corundum are minerals containing a fairly large percentage of aluminum oxide ( $\text{Al}_2\text{O}_3$ ). Emery is merely an impure form of corundum. For making grinding wheels, the mineral is ground or crushed, separated into grades of fineness by screening, mixed with a binding material or bond, formed into the shape required and "burned" to impart to it the tenacity needed by a body subjected to high speeds of revolution, and to mechanical pressure and even shock. Emery and corundum are mined in Asia Minor, India, Ceylon and Canada and in the United States in Massachusetts, North Carolina, Georgia and Montana.

About 20 years ago artificial abrasives came into use. The reason for this was that the natural abrasives did not always come in the desired degree of uniformity. Emery contains up to 64 per cent of aluminum oxide, the rest being impurities. Naturally the value of the mineral as an abrasive varies with the nature of these impurities and inversely as the proportion thereof. The chief impurities in emery are amorphous alumina, silica and iron oxide. Moreover, the aluminum oxide itself appears to exist in several allotropic forms, the highest forms being those represented by the ruby and sapphire. Corundum is composed of aluminum oxide to the amount of 92 per cent.

### Two Kinds of Abrasive

Artificial abrasives are a product of the electric furnace. There are two general kinds, one composed chiefly of aluminum oxide and the other of silicon carbide. The former kind, the aluminous artificial abrasive, was first produced by the Norton Company whose trade mark name for it is Alundum, while the silicon carbide abrasive was first produced by the Carborundum Co., whose trade name for the product is included in its corporate name. The basic patents on the processes by which these products are made have now expired, and both classes of abrasive are made by about a dozen different concerns, each using its own trade name.

Aluminous abrasives, of which alundum is the prototype, are made from the mineral bauxite found in large quantities in Arkansas, from which metallic aluminum is also made. The mineral is fused in the electric furnace and cast into pigs, which are then crushed between jaw crushers and rolls and sized by means of screens. The fineness of grain is indicated by a number which denotes the number of meshes to the inch of a screen which will just pass the grains. The mesh or grain size varies from comparatively small numbers up to 120, beyond which there are the abrasive flours, used for polishing. Silicon carbide abrasives are made by heating in a resistance type of electric furnace a mixture of powdered coke, sand, sawdust and salt, the pigs produced being treated in very much the same manner as the pigs of aluminum oxide. Only coke and sand enter the reaction.

By varying the treatment in the electric furnace several different grades of aluminous abrasive can be produced. Thus the Norton Co. at present has three different grades, known respectively as the regular grade and grades 38 and 66. Generally speaking, aluminous abrasives are best suited to grinding high tensile materials like steel, while the silicon carbide abrasives are best suited to the grinding of such materials as cast iron, brass, bronze and aluminum. Silicon carbide is harder and more brittle than aluminum oxide, and its grains therefore break more easily under the strain imposed by the high tensile materials.

### The Bond

In making grinding wheels the abrasive material is mixed with a binding material or bond. There are quite a number of these bonds, but that most commonly used consists of clay formed into a plastic mass by the admixture of water. The material is then poured into molds, dried, shaved to size and burned or vitrified in a kiln. In preparing the mixture, all of the ingredients are weighed, so as to accurately maintain the correct proportions. After burning the wheels are trued, tested for strength and inspected.

Other wheel bonds consist of sodium silicate (water glass), shellac and rubber. Silicate wheels, as they are known, are produced by making a mixture of the abrasive, silicate of soda and certain other ingredients, thoroughly intermixing them, ramming the mixture into a mold, allowing it to dry and then subjecting the wheels to a moderately high temperature. These silicate wheels are light gray in color.

Elastic wheels, made with a bond of shellac, are used mainly in very thin forms. The heated abrasive is mixed with the shellac in the proper proportion, the mixture is allowed to cool and is then forced into molds, either hand

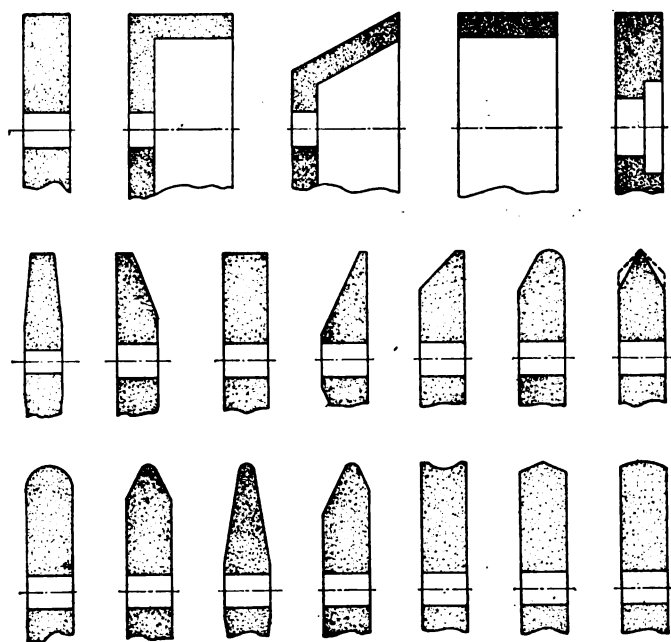


Fig. 1—A collection of grinding wheel sections

pressure or hydraulic pressure being used. The wheels are then baked at a moderate temperature. These wheels are nearly black in color.

The rubber bond sometimes used consists of India rubber mixed with a certain proportion of mineral matter, to which the abrasive is added. By heating the mixture, vulcanization of the rubber is produced and the desired degree of hardness is obtained by varying the composition of the bond. Where very thin wheels are required they are cut out of sheets of the proper thickness, made in calendering machines, while thicker wheels are made by pressing the mixture into molds, the same as with the other compounds.

Each kind of bond has its special properties which render it suitable for certain classes of work or under certain conditions. Vitrified wheels, that is, wheels with a clay bond, constitute approximately 80 per cent of all those manufactured, and it may therefore be concluded that they best meet the conditions in the majority of cases.

The vitrified bond is very porous and therefore permits of a free cutting action. It is easier to obtain uniformity of quality than with some other bonds, and uniformity, of course, is a very important desideratum. Vitrified wheels are immune to the influences of water, acids and temperature changes. Aside from these important advantages there are, however, a number of disadvantages connected with the vitrified bond. The process of making the wheels is a rather slow one, requiring a period of a month. Some authorities assert that the high temperature necessary for burning the bond tends to weaken the grains of the abrasive. This is denied by others. The wheels cannot be made very thin, as they do not offer sufficient resistance to lateral strains. Moreover, in the case of wheels beyond a certain diameter there is danger of breaking in the kiln. This latter difficulty, however, has been mastered by leading wheel makers and the size of wheels is limited only by the handling facilities.

As regards the fields of adaptability of wheels with the different bonds, it will perhaps be best to enumerate the uses to which wheels with non-vitrified bonds are adapted, leaving it to be inferred that vitrified wheels are used for all other work. In the harder grades the silicate wheels are quite dense and therefore not as free cutting as desirable. The moderate baking temperature is an advantage from the production standpoint and the period of

manufacture is only about one-fourth as long as with the clay bond. It is believed by some that the sodium element in the silicate wheels is responsible for the particularly fine cutting qualities in wet grinding, insuring a smooth surface and keeping down the temperature of the work. This, however, may be due to an illusion that a soda solution which is a good cutting compound, is formed. Wet tool grinding and wet surface grinding on hardened steel is the particular field of silicate wheels, and they are specially favored when the wheels must be cup-shaped.

Elastic wheels, that is, wheels with a shellac bond, are used where the wheel must be very thin, as for cutting off stock and where the work must have a fine finish and must not be unduly heated for fear of spoiling the temper, as in ball race grinding. The fine finish is due to the elastic properties of the wheel. Elastic wheels are less porous and therefore less free cutting than vitrified wheels, and they will not stand as much heat; they are also more expensive.

Rubber bond wheels are generally made somewhat harder than elastic wheels and are used where thin wheels are required for hard work, where the pressures required might break elastic wheels. The outstanding feature of the rubber wheel is its strength, and such wheels are used wherever wheels with other bonds would not be sufficiently strong, as in some heavy snagging operations.

It will be understood that each kind of abrasive can be combined with each of the different bonds enumerated. Thus there are vitrified aluminous wheels and vitrified silicon carbide wheels; silicate aluminous wheels and silicate silicon carbide wheels; elastic aluminous wheels and elastic silicon carbide wheels, etc.

#### Abrasive Cutting Action

The bond not only determines the strength and elasticity of the wheel but also its degree of hardness or what is generally referred to as the grade. Before going into the different grades used and the need for a variety of grades, it is well to explain the general theory of grinder cutting action. The grains or particles of abrasive have very sharp edges which, as the wheel revolves in contact with the work, causes them to dig into the metal and take off chips the same as a cutting tool. As this action goes on the edges of the grains gradually become dulled and the pressure to which the grain is subjected increases in proportion. After this has been going on for some time the pressure on the grain becomes so great that the bond lets go of it, and a new grain then comes into action. It is, therefore, exceedingly important that the hold which the bond has on the grains of abrasive be exactly right for the particular working conditions. If the bond is too weak, that is, if the wheel is too soft, the wheel will wear with undue rapidity; on the other hand, if the bond is too strong, that is, if the wheel is too hard, the dulled grains of abrasive will not break away from the wheel and the latter will become glazed. To meet all conditions, grinding wheel makers furnish as many as twenty-five different grades, each grade being designated by a letter or number.

There is a specific formula for each grade, but after the wheels are burned they are subjected to a hardness test by means of a small steel tool. The resistance which the wheel shows to the penetration of this tool indicates its hardness and it is graded accordingly. In making machined parts commercially it is impossible to machine them to the exact nominal size, and it is necessary to allow tolerances. So in the production of grinding wheels no exact degree of hardness can be maintained, and all those between certain limits are classed as of one grade.

There are, therefore, four characteristics of a grinding wheel, namely, the abrasive material, the bond, the grain size and the grade or degree of hardness. It will be

readily seen what an enormous number of combinations of grain, grade, abrasive and bond are possible. For instance, figuring on five different abrasives, four different bonds, 25 grades and 50 grain sizes, the possible number of combinations is

$$5 \times 4 \times 25 \times 50 = 25,000$$

These are what might be called quality combinations. Plain cylindrical wheels are also made in many different diameters and widths and there are many wheels of other than cylindrical form, see Fig. 1, so between quality and size combinations there is an almost endless variety.

### Selection of Wheels

The selection of the proper combination, and especially of the proper grain and grade, is a problem for the grinding expert. Although certain definite rules have been established, the best grain and grade of wheel for a particular job are generally determined experimentally. From the known rules and accumulated experience a first rough choice is made. This wheel, and wheels similar to it in grain and grade, are tried out in actual work, and whichever combination gives the best service is chosen. Each manufacturer of abrasive wheels issues a table of grains and grades to serve as a guide in the selection of the proper wheels. This table, of course, applies only to the wheels of that particular maker.

The grain and grade of the proper wheel depends not only on the material of the part to be ground but also on whether the grinding is cylindrical, internal or surface. The reason for this is not immediately obvious, but may be seen by referring to Fig. 2. It will be observed that in internal grinding the width of the cut is very much greater than in cylindrical grinding, if the dimensions of the work and wheel in the two cases are at all comparable.

### Factors Affecting Grain and Grade

It may be set down as a fixed principle that for each job—the material, form and surface speed being fixed—there is a certain grain and a certain grade which will give the best results. Results, of course, are measured in terms of speed of production, quality of work and wear of wheels. If durability of wheels can be sacrificed to speed of production, a somewhat softer wheel can be used. Coarse grained wheels tend to cut faster and also to wear faster, but the limit of grain size that can be used depends upon the power available, among other things. To a certain extent the finish depends upon the grain, but a fine finish can be obtained with a coarse grained wheel provided it is properly trued. When a wheel cuts freely it does not generate a great deal of heat but runs comparatively cool. Coarse wheels are used where it is desired to remove a good deal of stock in the shortest possible time without regard to finish. With large grains a deep cut can be taken without danger of clogging or glazing the wheel.

In finishing parts made of soft steel and certain other materials extensive use is made of combination wheels, that is, wheels containing more than one grain size of abrasive. Such wheels give a better finish than a wheel containing only the coarser grain and remove metal faster than a wheel containing only the finer grain.

One of the rules followed in the selection of wheels is that the larger the area of contact the softer should be the grade of the wheel. Thus, internal grinding calls for a softer grade of wheel than surface grinding under otherwise similar conditions, and cylindrical grinding for a harder grade. For work of very small diameter a comparatively hard wheel should be used, and a very narrow wheel also should be harder than a wider one. Sometimes, when the wheel is being run at too low a speed, particles of metal will adhere to its surface, and the wheel is then said to be loaded.

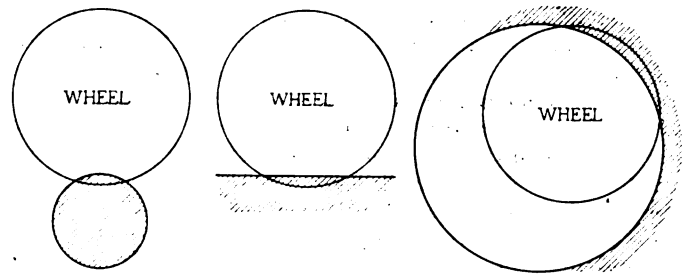


Fig. 2—Showing variation in width of cutting surface in cylindrical surface and internal grinding

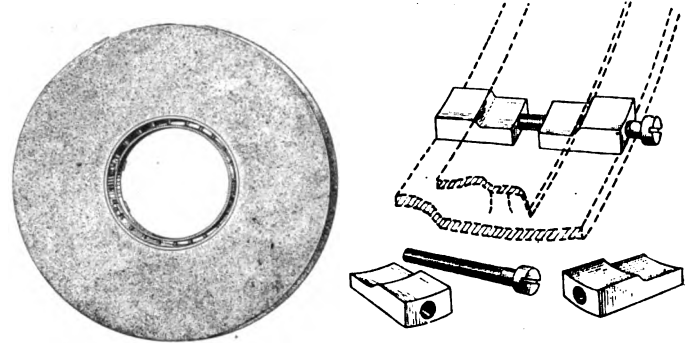


Fig. 3—Norton method of balancing large diameter wheels

### Cutting Speeds

Surface speed is an important factor, and as the wheel wears down and becomes reduced in diameter its speed of revolution is often increased to make up for the reduction in its circumferential speed. In cylindrical grinding a change in work speed has the same effect. Operation at a lower speed gives somewhat the same effect as a softer wheel and often complaints are made that wheels seem to be getting softer toward the center, when the only difference is that the circumferential speed is lessened. The following circumferential speeds are recommended by the Norton Company:

Kind of Grinding	Circumferential Speed in ft.p.m.
Cylindrical grinding .....	5,500 - 6,500
Snagging and general off-hand grinding.....	5,000 - 6,000
Surface grinding .....	4,000 - 5,000
Knife grinding .....	3,500 - 4,000
Wet tool grinders .....	4,000 - 5,000
Vertical spindle surface grinding .....	4,000 - 4,500
Elastic and rubber cut-off wheels .....	9,000-12,000

### Balancing of Wheels

Vibration increases the wear of the wheel and should be kept at a minimum. It depends in part upon the rigidity of the machine and in part upon the balance of the wheel. All grinding wheels are balanced by the manufacturers, usually by chipping holes near the bushing on the light side and filling them with lead. As the wheel wears it becomes unbalanced again and must then be re-balanced by the user. The reason for this is that wheels, as generally made, are not of uniform density throughout. A wheel which is considered out of balance will cause chatter marks on the work. In rebalancing, it has been the custom to either remove some of the original lead counter weight or else, if the plane of unbalance is found to lie at an angle to the original plane of unbalance, to chip a new hole and fill it with lead. This method of rebalancing has not been found entirely satisfactory, and efforts have recently been made, particularly by the Norton Co., to devise an improved method. This development work has not yet been concluded, but one method for balancing wheels with 5 in. holes has been introduced in practice. It consists in the use of a cast bushing securely fastened in the



wheel and provided with detachable lead weights, which can be moved circumferentially around the bushing (See Fig. 3.) Balancing is done on a pair of balancing ways, the wheel being placed on an arbor which is placed on the ways. A chalk mark is made on the side of the wheel which comes to the top, and the lead balancing weights are then secured to the bushing on that side. In no case should less than two balancing weights be used. By moving the two weights farther apart, the balancing effect is reduced. It has been found a very good plan to have all balancing of wheels in a plant done by a single man who will thus acquire considerable skill in the operation. The wheels should be balanced when returned to the tool crib and also when given out again, as they get out of balance when put away wet.

### Truing and Dressing

A lathe tool must be sharpened and reforged occasionally, so also a grinding wheel must be reconditioned periodically. There are two methods of reconditioning grinding wheels, known respectively as truing and dressing. By the former the wheels are given their exact geometrical shape, while the latter method serves merely to give the wheel an approximately cylindrical form, and to roughen the surface and thus improve the cutting properties. Dressing is of little use in connection with wheels for precision grinding but is valuable in reconditioning wheels used for snagging and other rough work.

Corundum, one of the natural abrasives used in grinding wheels, is next to the diamond the hardest mineral known, and, therefore, diamonds are depended upon mainly for truing up the wheels. The diamonds used come from South Africa and Brazil and they come in various grades. Their color varies from pure white to black through all intermediate shades. In the selection of diamonds for the truing of grinding wheels, hardness is not the only factor to be considered; the hardest stones are usually brittle, and are therefore easily ruined by careless use. One maker recommends the use of brown bort stones as possessing the greatest number of desirable qualities. The diamonds are mounted in the holders either by peening, by brazing or by casting the holder around it. It is preferable that the diamond should be completely supported by the metal of the mount, without air spaces at any point, as it will then be best protected against breakage. This can best be effected by the cast mount. Either cast steel or some special metal of somewhat lower melting point is used for the purpose. Peening is a very delicate operation that requires great skill. Some grinders think that the high temperature of the molten steel injures the diamond. Whatever metal is used for a cast mount, it must contract strongly in cooling, so it will get a firm grip of the diamond. Silver solder is sometimes used for this purpose.

When a diamond is worn down to the metal setting it is reset so as to bring a new cutting surface into use. The size of the diamond should depend upon the size of the wheel. When the stone is worn down to too small a size it can be reset and marked for use in the tool room. In dressing a wheel, light cuts must be taken and the stone not jammed into the wheel. Diamonds are very hard and brittle, and for that reason must be handled with extreme care. A copious stream of water should be directed on the diamond at the point of contact with the wheel, except on the smallest sizes of soft wheels which may be trued up dry. For precision grinding the wheels are preferably trued with a diamond.

### Truing for High Finish

In truing the wheel the diamond must always be rigidly held in a tool post which by means of a slide can be

fed across the cutting face or faces of the wheel. By means of a diamond with a rounded point it is possible to true up a wheel in such a way that it will give a very smooth finish. Thus the same wheel may be used to remove metal rapidly and to give a high finish to the piece worked upon. By passing the diamond over the surface slowly, a smooth and true surface is obtained. This surface, however, is more or less unnatural on the coarse wheel, and great care must be exercised in applying the wheel to the work, so as not prematurely to disturb it. If the wheel is to be used for roughing again, all that is necessary is to take a deep cut.

For fine and dense wheels used for cylindrical grinding a sharp diamond is recommended, as this will somewhat roughen the surface, thus improving the cutting action if the wheels have a tendency to be too smooth. A round holder for the diamond is considered preferable to a rectangular one, as the holder may then be reset to a different angle at frequent intervals so as to cause the diamond to present a new cutting surface to the wheel. Silicon carbide wheels wear out a diamond more rapidly than aluminous wheels, because of their greater hardness, causing greater wear.

### Cutting Fluids

In practically all precision grinding a jet of coolant is played on the wheel close to the cutting surface, grinding machines being always provided with the necessary reservoirs, pumps and delivery pipes. The chief object of the fluid is to keep the working surface at a uniform temperature, so there can be no heat distortion of the piece being worked upon. The fluid also keeps the wheel clean and therefore free cutting. While plain water is being used in some instances, it has the disadvantage that it tends to cause the machine and the work to rust. Sal soda and lard oil or grinding compounds are added to the water to prevent rusting. Internal grinding is often done dry, because the fluid would tend to form with the chips a paste which would clog the wheel and impair its cutting action. On bronze a thin oil or kerosene is used as the cutting fluid. When grinding cylindrical work the water spout must almost touch the work and stand away from the wheel about  $\frac{1}{4}$  in., except on work having a spline in it, when it is necessary to move the spout farther away from the wheel.

### Causes of Trouble

When trouble is experienced in grinding it usually comes under one of the following five heads, and the possible reasons of each kind of trouble are those given:

Wheel does not cut—Speed too high; wheel too soft; wheel of too fine grain; wheel is not the right kind as regards abrasive used.

Wheel wears away too fast—Wheel speed too low; wheel too soft; grain too coarse; too much vibration; pressure of wheel on work too great.

Unsatisfactory finish—Grinding surface of wheel not true; surface not sufficiently smooth; machine spindle vibrating; wheel out of balance; wheel too coarse; use of vitrified or silicate instead of elastic wheel.

Wheel loads—Surface speed too low; wheel grain too fine; wheel too hard.

Wheel glazes—Surface speed too high; wheel too hard; wrong kind of abrasive.

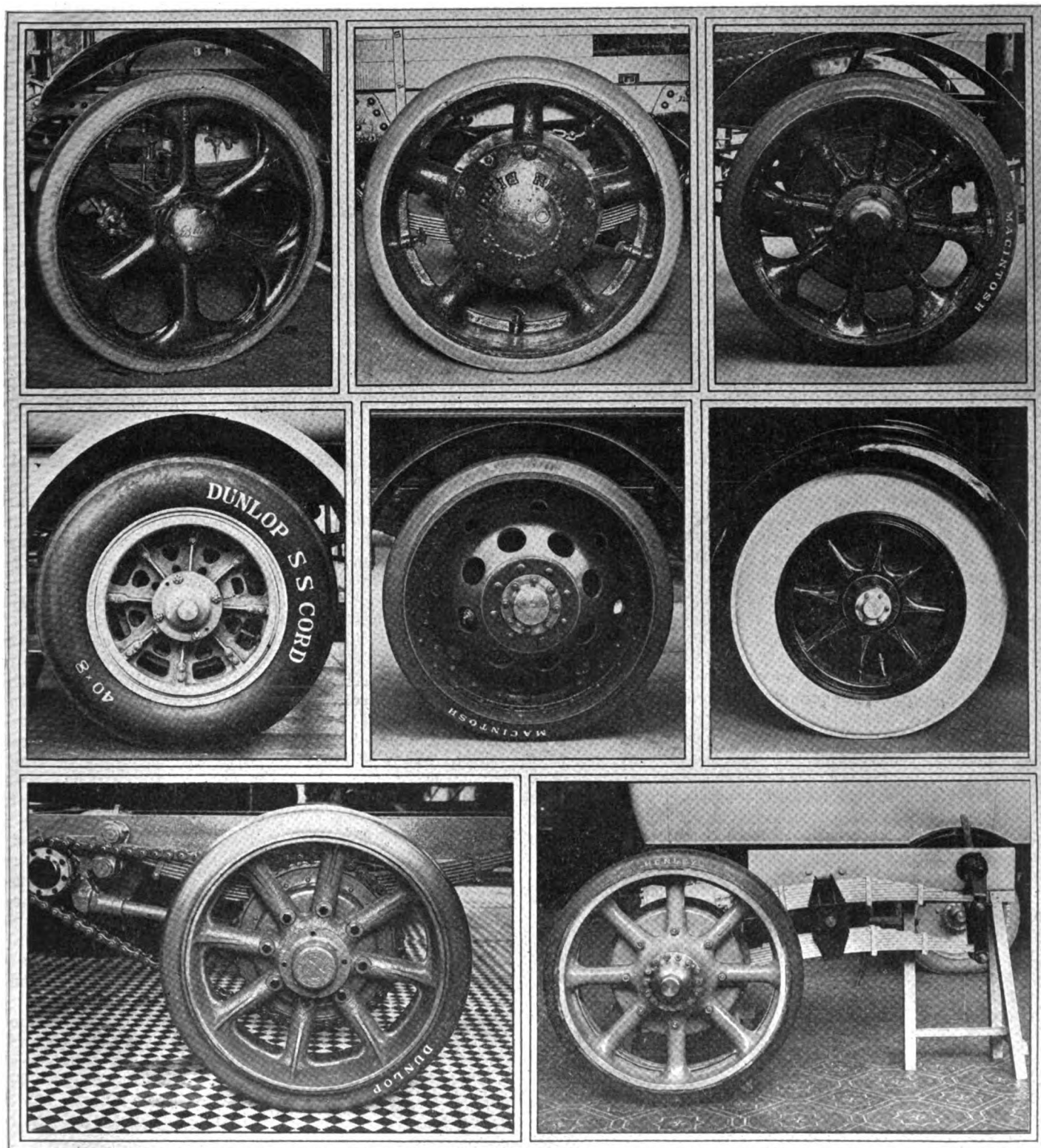
The remedies for all of the above troubles are self-evident.

In all grinding work it is a good plan to take advantage of the expert knowledge of the organizations of the wheel and grinding machine makers in determining the best kind of abrasive grain and grade of wheel, as well as in settling other puzzling problems. In reordering wheels

the greatest care should be taken to give correctly all dimensions of the wheel, giving a sketch of the shape if same is special; the make of machine on which the wheel is to be used, the grade and grain, whether the wheel is

to be of the vitrified, silicate or elastic kind, and the kind of abrasive. It is well to always retain the tag which comes with the wheel, as this will be found a help in re-ordering.

## Eight Types of British Truck Wheels



Top row—(left)—The hollow spoked cast wheel of the Bristol; six spokes in both back and front wheels, with flat flared ends. (Center)—Renault cast steel wheel with hollow spokes and epicyclic final reduction gearing enclosed in hub. (Right)—Straker-Squire hollow spoked cast wheel with "tulip" ends against the rim. Center row—(left)—Web cast wheel of Daimler truck and bus chassis. (Center)—Thornycroft double disk wheel. (Right)—W & G built-up wheel, with hollow pressed spokes, fitted to 2½ ton truck and charabanc chassis. Bottom row—(left)—Hollow spoked wheel of Caledon chain-driven model, with side webs between spokes and rim. (Right)—Palladium hollow spoked cast wheel with circumferential webs uniting the spokes at the rim end. View also shows dual cantilever springs optional with this 4 ton chassis

# Combining Quality with Efficiency in Fender Enameling

Special attention to equipment and methods makes the enameling department described here worth study. Twenty-eight electrical recording instruments maintain accurate control of oven temperatures. Ovens are equipped with conveyors which carry fenders through drying process.

By J. Edward Schipper

**A**N expert enamel man can almost tell the quality of an automobile by looking at its fenders. In no other part of a car is it possible to slight the work and yet produce a passable result which in nine out of ten instances would pass inspection by the casual and uninformed observer. The average man in the automobile business or out of it who is not posted on enameling would be surprised to think that a concern would install 28 recording instruments, costing nearly \$500 apiece, for the sole purpose of maintaining accurate and exact control of the oven temperatures. This represents only one small detail of the expense which has been gone to in the enameling department utilized for the finishing of the Packard radiator shells, bonnets, fenders and a great many of the small parts for its cars.

The enameling department at the Packard factory has been laid out to produce fenders for 100 cars per day. It has been put on the two top floors of the factory; namely, the sixth and seventh, so as to be above the city's dust line. All of the sub-departments are separately inclosed in glass, so there is a minimum chance of dust circulation through the rooms where the work is being carried on, and, at the same time, good light is provided.

Parts which are to be enameled arrive at the enameling department both from the Packard company and from outside sources. It is almost true to say that in a walk through the enameling department not a brush was to be found; as a matter of fact, there are two brushes in the department. One of these is used for putting oil on a certain small part which is subsequently drilled, and the other for a purpose just as far removed from the actual enameling operation.

After the material reaches the enameling department, the first operation is preparing it for the enameling operation. The parts are boiled in potash for 10 minutes. The solution of potash is made up of 35 lb. of potash to each 100 gal. of water. This solution is sufficiently strong to clean the part ready for rinsing. The parts are then put through a Niagara washing machine, first being washed with an Oakite solution to neutralize the potash and then with clean, hot water.

Following the washing operation, the entire surface of each part is emiered off by hand and then polished on regular metal polishing machines operated by electric motors. The wheels used on the polishing machines are the No. 7 Alundum, which take off all the rough spots. This cleaning operation puts the part in condition for the priming coat, consisting of a No. 489 Arco primer, which is sprayed on. The parts are then baked for an hour at a temperature of 400 deg. in electric ovens.

These electric ovens, of which there are 16, are the product of Young Bros. They are all equipped with Palmer-Bee conveyors, so that at no time is it necessary for a man to enter an oven. The conveyors are the endless type and the ovens are double-ended, so that it is possible to load at one end and remove from the other without any waste of time; that is, the conveyor simply carries the material through in one direct line, first starting at the point at which it is loaded, making its first stop at the center position, or in the oven, and its last stop at the unloading position at the opposite side of the oven.

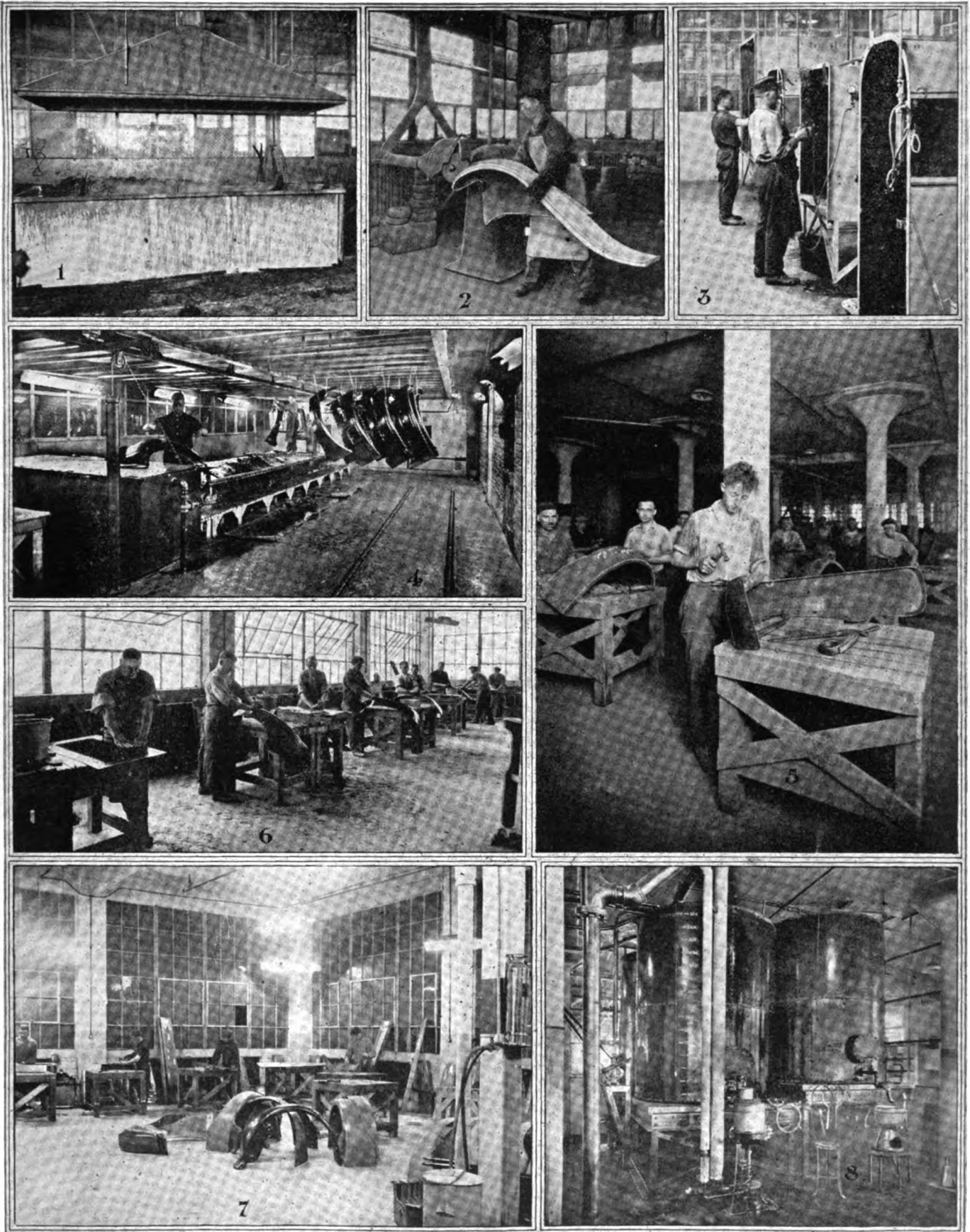
After the priming coat has been baked hard, the parts are sandpapered and taken to the bumping room and then back to the polishing machines. This removes all of the rough spots and irregularities detected after the priming coat is rubbed down.

After the parts have been thoroughly cleaned, dried with an air hose and wiped, they are sprayed with a coat of No. 409 Arco filler, and again baked at a temperature of 400 deg. Fahr. for one hour. They are again sanded smooth with a No. 0 "3 Mite" cloth. After this they are wiped off with what is known as a "tack" rag. This consists of a cheesecloth which has been soaked in ordinary varnish and allowed to dry until it becomes tacky. When wiping the parts with this, the tackiness of the rag causes all of the dust particles to adhere to it, leaving the part perfectly clean. This operation prepares the part for the two coats of enamel, known as first coat enamel, a 28 gravity product. This gravity has been found best for this work. Both these coats are baked at 400 deg. for one hour. They are, of course, given a low heat for a short time before the top heat of 400 deg. is put on. The low heat generally ranges about 250 deg., allowing the enamel to take a secondary flow, as during the time the parts are being hung up on the conveyor before they enter the ovens they become partially dry.

The two coats of first coat enamel are rubbed to a perfectly smooth surface with pumice, felt and water and are then washed off clean and the moisture blown off with an air hose at a pressure from 70 to 80 lb. The parts are again tack-ragged and dipped into the finish enamel. This enamel also is an Akron enamel, being mixed to a gravity of 27½.

In carrying on this work the Packard company has in its equipment 10 spray booths. Both the gravity feed and cup spray are used. The spraying device is the DeVilbiss Spray Aeron. To accurately maintain the heat of the ovens 28 recorders are installed which automatic-





1—Tank in which the parts to be enameled are boiled in a potash solution for 10 min. They then pass to a Niagara washer, which is shown just to the right of the potash tank  
 2—Cleaning fenders to be enameled on electric polishing machines with No. 7 Alundum wheels  
 3—Spray booths used for spraying on priming and finish coats of enamel. No brushes are used in the enameling work  
 4—Parts are hung by hooks on Palmer-Bee conveyors and rolled into the Young Bros. electric ovens shown herewith.  
 5—Going over the surface of the parts to be enameled and perfecting minor irregularities.  
 6—Rubbing stands for hand rubbing the priming coat  
 7—Cleaning and tack ragging enamel parts preparatory to receiving the finishing coat  
 8—Filtering tanks for enamel. Left, De Laval separator for priming coat, and right, tank with Empire separator for finish

ally control the temperature and record it. They are electrical instruments made by Leeds & Northrup of Philadelphia. They are arranged for automatically switching from low to high heat as desired. The mechanism is so arranged that it automatically times the low heat as well as the high heat, starting the oven at the temperature desired and then switching it to the higher temperature, and at the end of the desired period cutting it off.

For the preparation of the enamel there is a filtering plant equipped with a De Laval special separator for the priming coat and an Empire separator for the finish enamel. The enamel as received is pumped from the drums into the mixing tank, where it is mixed to the desired gravity with turpentine. It is then drawn into the filtering tanks, where the separators purify it, and finally it is pumped into tanks from which it is drawn

for use in the enameling operations.

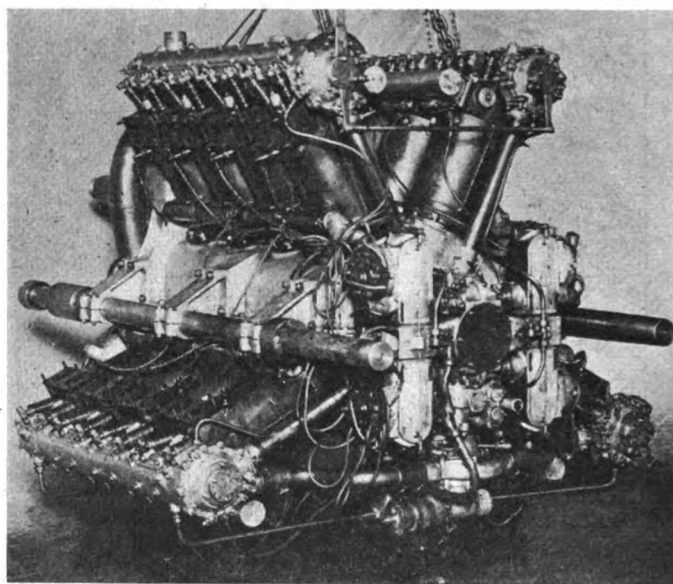
At the present time this department of the Packard company is employing about 130 men and is busy with night and day shifts. This is a department which is called upon very largely for service as well as production work, and consequently is not so much affected by fluctuations in the retail business as other departments of the factory. Running at the 100-per-day schedule, the department employs about 240 to 260 men. It is distinguished by its rigid inspection and the time and care required of the men for the performance of each operation. There has been no attempt to speed up the dipping operations, for instance, as great care is used to eliminate air bubbles. Similarly, in the rubbing down and cleaning operations, no extraordinary effort has been made to shorten the time, as the work is gaged by its thoroughness rather than upon its speed.

## Some European Aircraft Items

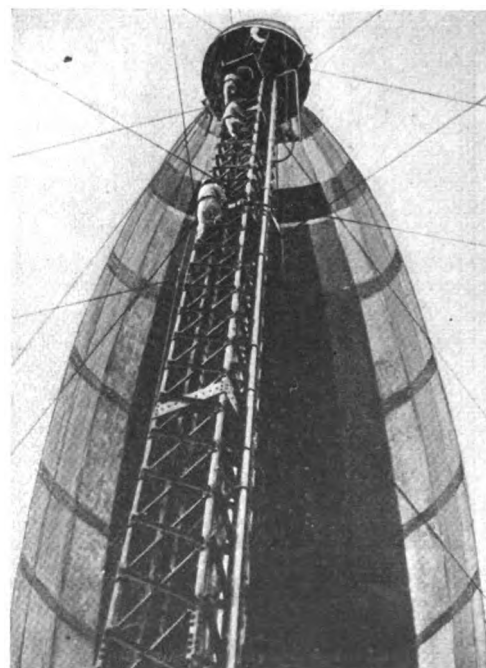
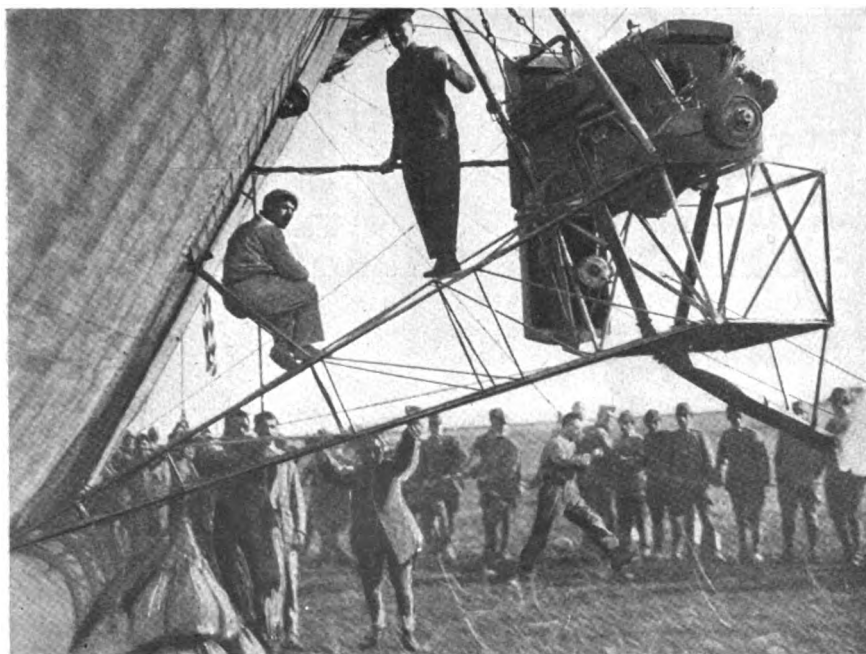
**T**HE engine shown in the accompanying cut is said to be the highest powered single unit aircraft engine ever built. It has sixteen cylinders arranged in four blocks of four each. The angle between the lower blocks is much wider than that between the upper pair. The engine was constructed for the British Air Ministry by D. Napier & Son, Ltd. It is reported to have developed 1,057 hp. and to weigh slightly over two lb. per hp.

Below at the left is shown a view of one of the powerplants used on the Italian dirigible "Roma" purchased not long ago by the United States and turned over to the American Air Service officers sent to Italy to dismantle the ship and bring it to this country. The "Roma" is said to be the second largest semi-rigid airship in existence. It is 410 ft. long and has a cruising radius at full speed of 3,300 miles. It was purchased from the Italian Government for the sum of \$200,000, and it is said that it would cost \$1,250,000 to duplicate this dirigible in this country.

Below at the right is an unusual photograph showing the crew of the British dirigible R-33 boarding the great ship via mooring mast used as an anchorage. The photograph was taken at Pulham Airdrome, England.



1000 hp. Napier aircraft engine



At left, powerplant of the Italian dirigible "Roma" recently purchased by the U. S. Government. At right, Crew boarding the British dirigible R-33, which is tied to the mooring mast.



# Selling American Cars in Spain

Here is a close-up on the automobile situation in Spain. It is written by a man who has just spent several years there selling American cars. He points out defects in past American methods and tells in graphic fashion the difficult conditions met with in selling to the Spanish market.

**H**AVING spent about eight months in Spain, I think I am in a position to review the present status and prospects of American cars in that country. I have made the acquaintance of dealers in all parts of Spain and have discussed their problems with them.

Spain offers one of the best markets in Europe for American cars, since it has comparatively few cars per person. Traveling through the rural districts one seldom meets automobiles, while the density of cars in the cities is similar to that in the United States 15 years ago. There are many more horse driven than motor vehicles. In other words, Spain is still virgin territory as regards the sale of automobiles. Despite the fact that there are still comparatively few cars in Spain rapid strides have been made during the last few years. There are now between 35,000 and 40,000 cars, while the population is about 22,000,000.

It is hard to understand the attitude of the Spanish public toward automobiles. Both rich and poor are antagonistic. Cars are not used primarily as a means of transportation; they are merely playthings of the rich. The poor people still consider them devil cars and throw stones at them. Many a rich man has a feeling against cars, because they scare his horses and because automobiles force more activity in the general Spanish life. To understand this attitude it is necessary to understand something of Spanish character and modes of living.

No real Spaniard is ever in a hurry. Most of them take their daily siesta, while the others at least take several hours for lunch and one or two hours afterward for coffee. Spain, in general, is many, many years behind its neighboring countries in development, and it still resists progress and new ideas. The difference between France and Spain is noticeable as soon as one crosses the frontier. In France one notices many automobiles, trucks, tractors, factories and farmers cultivating every inch of land, while on the Spanish side of the frontier one is immediately impressed by the absence of such activities and by immense areas of uncultivated country, the use of oxen, the Roman wooden plow and general lack of activity and cleanliness.

The Spanish country people do not take to new machinery. As a matter of fact, they resent being disturbed by the active salesman who tries to make them see the advantages of his product. The Spanish purchaser is by nature suspicious. He always believes that one is attempting to cheat him. The salesman who names his lowest price immediately

has made a great mistake, for the Spaniards are inveterate bargainers and always want to pay less than the price first asked. I have seen instances where it took three weeks to adjust a difference of less than 1 per cent in the price asked. We would consider this wasting \$1,000 worth of time to make \$10, but the average Spaniard considers time the cheapest commodity and regards it as worth nothing.

Before one can do satisfactory business with a Spaniard, one must have his confidence. To make one's self liked and to gain this confidence is accomplished only by slow means. It takes many weary hours' talking about the bullfight, the weather or politics before one dares to begin to discuss business with the average Spaniard. Once the Spaniard has confidence, however, one can sell him nearly anything and he will be interested in any proposition one puts up.

To foresee the future of the automobile business in Spain it is necessary to review the past. Up to the outbreak of the European war, French, German and English cars were sold almost exclusively. Very few American cars were used and American products were viewed with suspicion, chiefly because they were too cheap. The few American firms that did enter

the market went about merchandising in the wrong way. The other foreign cars were of the most expensive type, used mainly by the very rich in the cities. The cheap car was practically unknown.

During the war, when it was impossible to import cars from European countries, nearly every automobile agent tried to secure the agency of some American car. Neither the ability of the agent nor the reliability of the factory had anything to do with the establishment of relations; agencies were established everywhere. Every rich father gave his son a few thousand pesetas to set up in business as an automobile agent. Selling cars was considered the proper work of the idle rich, since it allowed the rich young men to run through the streets in their demonstration cars and have a very good time. Such agents, of course, sold a few cars and never thought it necessary to carry spare parts or give service on the few that were sold. Naturally, great harm has been done, and many good American cars now have a bad reputation in Spain.

The real agents, who were established and had service stations, had great difficulty obtaining cars from American factories. Very little attention was paid to these real agents by the Americans. Conse-

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**M**ANY special conditions must be considered in selling cars to Spain. "No real Spaniard," the author says, "is ever in a hurry. The Spanish people do not take to new machinery. The Spanish purchaser always believes someone is attempting to cheat him. The Spaniards are inveterate bargainers."

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quently, many of the agents became disgusted and cancelled their agencies. Others kept on and had all kinds of trouble. Cars were shipped in poor condition and not in accordance with specifications. American companies shipped incomplete cars, and the agent had to wait sometimes three to six months to get the missing parts. Notwithstanding all these difficulties, American cars won out because of their inherent merits; certainly not because of the efforts of American factories.

American cars had self-starters, electric lights, and went up any hill on high—qualities unknown in the European cars. Moreover, American cars were cheaper.

The result is that to-day about 80 per cent of the cars in Spain are American. Especially during 1920 was our business with Spain very large, although it fell off in the fall. During that year the import duty was rather moderate—one peseta per kilogram, payable in gold at a premium of about 40 per cent, while the exchange also was not greatly above normal. During 1920, moreover, the great fortunes made in Spain during the war were being liberally spent. Since then conditions have changed entirely.

In the fall of 1920 a good many of the war profiteers' fortunes had been spent. Most of the people who made this money never had been in business before and lacked the knowledge to continue their operations. Consequently, they began to liquidate their belongings; among the first to go were automobiles and pianos. Thus a great many second-hand cars were thrown on the market.

At the same time credit began to be tight. Banks refused to loan money as readily as they had before. Loans were called, and automobile dealers had difficulty in financing their shipments. The Banco de Barcelona had to close its doors. Catulana, the richest and the only industrial part of Spain, was thereby thrown into a panic. The effect on all business was instantaneous, and depression followed rapidly. To make matters worse, the Spanish Government thought to increase the declining value of the peseta by preventing imports, and on November 28, 1920, after giving 24 hours' notice, increased most of the import duties by 200 per cent.

The effect on the automobile industry was instantaneous. Ford increased the price of its touring car from 4,500 to 8,500 pesetas. The average small American car selling for 13,000 pesetas had to be sold for 18,000 pesetas. There was much confusion; everybody was trying to unload; dealers having stock before the buyers became scarce and scared. Moreover, the government unofficially spread rumors that the new duties were only temporary and would be lowered soon.

The Seville agent of a well-known, popular, low-priced car made in America, for example, sold 80 cars from Sept. 1 to Dec. 1, 1920, and then sold but one chassis and one sedan from then to April 1, 1921. All during the winter business was stopped. Spring brought no buying movement; very few cars have been sold even during the summer.

Ford, who was assembling cars in Cadiz before Nov. 28, 1920, at the rate of 25 daily, closed his factory, although I understand parts for 2600 cars were

in stock on which the duties had not yet been paid. It seemed that every month conditions were worse. All seaports were loaded with cars and trucks and agricultural machinery. Germany dumped its stocks in Barcelona, France in Irun, and England in Bilbao. In Barcelona alone I have seen over 1500 cars and trucks on the docks on which duties had not yet been paid, most of them in bad condition, tires missing, leather rotting, etc. The dealers had no money to take these cars away, the banks refused loans.

The long-awaited duty revision came last May, and, as far as I can find out, is again only provisional until such time as an international conference will establish reciprocal tariffs. The new duties, however, are about three times as much as the previous ones and practically close the Spanish frontiers. The new duties are approximately as follows:

On chassis, until 1000 kilos, 20 per cent of the value.  
On chassis, more than 1000 kilos, 30 per cent of the value.

Open bodies, 20 per cent of the value.

Closed bodies, 35 per cent of the value.

Spare parts, from 25 to 35 per cent.

All these duties are payable in gold, which means about 40 per cent premium. There is also a duty on transportation and expenses which amounts to about 5 per cent.

Small American cars can still be imported when the market opens again. I am investigating the possibility of importing parts and assembling cars in Spain, which seems to be the only chance of doing business there, although it might not be advisable until such time as the

duties have been revised definitely. Should this be possible, it might mean large business.

As regarding the future of consumption of the Spanish automobile markets, I believe that Spain will some day take a large number of American cars. It is doubtful how soon this will be, but the time will come. A good deal, of course, depends upon how strenuously and intelligently the American manufacturer develops this market.

The use of automobiles in any country, however, depends a good deal on the following factors:

1. Conditions of roads.
2. Facilities for the use of cars.
3. Popularity of cars.
4. Financial ability to purchase.

The situation in Spain as regards these factors can be readily analyzed.

#### Roads

The roads in Spain are atrocious. There is one rather good road from Irun, San Sebastian, to Madrid, but woe to the poor motorist who goes anywhere else, especially during the fall, winter and spring, when considerable rain has fallen. The roads are a continuous series of mudholes. I have seen a real lake of mud on the main road from Madrid to Barcelona, 20 miles before entering the latter. In the South the roads are generally bad, very rutty in the rainy season and dusty in summer. In the summer, dust is an inch deep in most Spanish roads, and in the winter one usually has as much mud on the

top as under the mudguards. The Spaniard knows, however, how to make good roads. A few years ago a new road was built over the mountains, near Seville, of which any country might be proud, but usually good roads are the last thing the politicians think about, and, when they do, the coffers are empty. There is absolutely no public demand for good roads; the newspapers never mention them, and the term "good roads" is practically unknown.

The present roads consist mostly of clay. They date back to the time of the Moors, and are very broad and flat. There is no foundation to most of the roads and water will not run off them. New surfaces are made by dumping stones on top and crushing them down with a road roller. Sometimes a roller is not used, and the stones are allowed to lie until they are naturally crushed into the old surface by the traffic. Mule carts, with very large, thin wheels making a wide track, constitute the bulk of traffic on Spanish roads. It is possible to go 500 miles without meeting one automobile, and the passing of a car through any village is an event. So far as I know little road improvement is contemplated by the present government.

### Facilities

The facilities for the use of cars are so poor as to be almost unbelievable to the average American. In the few big cities there are garages and shops, but only in Barcelona and Madrid is one able to get tires of all sizes. In Madrid, as well as in other cities, gasoline is sometimes very difficult to obtain. In the garage where I kept my car, for example, it was frequently necessary to make a daily allotment of two litres per car because of lack of gasoline. This was mainly due to railroad conditions, which are rather deplorable in Spain. Gasoline is always sold in cans of 5 to 18 litres, costing about \$1 per gallon. The quality is poor.

Most of the gasoline is refined in Bilbao and other seaports, and the supply is mainly controlled by the trust, which maintains prices, and cannot yet see that cheap gasoline would increase the use of cars. Most of the small cities never have gasoline at all, while those that do have it sell it by the bottle in drug stores. In Granada, for instance, a city of 100,000 people, I was forced to buy gasoline last spring in a drug store and pay nearly \$2 per gallon. In the villages cars are unknown and garages are, therefore, scarce. There are sometimes distances of over 150 miles without anything in the way of gasoline, oil or supplies, but one gets used to this condition and takes everything along. Accessories in Spain are very antiquated, and even in Madrid I could not find one shop where they were really in a position to repair a generator. Electricity, as far as automobiles are concerned, is still in its infancy. All of this makes motoring rather difficult and expensive in Spain and naturally hinders sales.

### Popularity

As far as popularity of automobiles is concerned, I have already discussed the unpopularity of automobiles in the cities. The average man in the cities, perhaps, has the idea of owning a car sometime, but in the country people don't see why anybody should have one. I believe if a doctor in a small village would purchase a car he would lose his clients, unless he could immediately prove its utility.

Owning a car in Spain means being so wealthy that one can throw the money out of the window. The automobile is not considered as a means of transportation at all. It is still an article of luxury, and I am afraid it will be so for a long time to come.

It is true that Ford has made some inroads on this theory, and, by placing agents throughout Spain in even the smallest cities, has succeeded in at least making the Ford car be used as a transportation medium. In the cities the distances are not very large, and business men have not yet learned how to use a car in their business activities. Furthermore, the use of a car in the big cities is something of a nuisance and rather dangerous. The Spanish people since time immemorial have been used to walk in the middle of the streets. The average Spanish street is narrow, and the people will not change their habits for the automobile. There have been so few real accidents in the big cities that the people do not realize the danger of cars. On the business thoroughfare it is not unusual to see a man cross the street reading his newspaper and no amount of sounding the klaxon will make him budge. It is also rather dangerous to leave one's car outside unattended; usually one finds his tools or spare tire gone. Cars are seldom stolen. There is a special purpose in stealing spare tires. They are sold in the country, where they are cut up in sections the lengths of shoes and used as shoes by lacing the ends together over the foot.

Another thing which makes motoring in the cities unpleasant is the police activity. To explain this, let me first explain the licensing of cars. Inasmuch as all cars are imported, in order to license one it is necessary to have a receipt of the customs house, furthermore a bill of sale, then to make an application to the governor of the state in which one lives. Then after a while the car is inspected by the government engineer. With his certificate, one has to go to another office and wait until they give the number of the license. Then one has to have the plate made. The shortest time on record for accomplishing these formalities is eight days, but usually they take two or three weeks.

The license number has the first letter of the province in the front, so if one goes from Madrid to Barcelona, in order to drive there one has to get a special permit. Of course, the price of all this is high. Dealers have recently obtained the privilege of licensing their own cars without paying the taxes for same and, later on, when the car is sold, transfer the number to the customer, who will pay the tax. The trouble is that the municipal police, probably on instructions from men higher up, do not recognize these licenses and make all kinds of trouble. They told me several times that mine was only good from 6 until 10 in the morning in the park, after that the car had to go to the garage. Once when I had left it in front of a theater at night, they actually paged me and forced me to take it back to the garage.

Life is rather dull in Spain, however, and little things like this make it interesting. After the killing of Sr. Dato by some syndicalists on a motorcycle, the order was given that no car leave Madrid without a special permit. I had a demonstration to give in the country, but with my dealer's license there was no way of getting out. It took everywhere from one to three hours to get the permit, which was only good for that special day. This made it rather hard on people living in the country and coming to Madrid every day. This order has since been revoked, but a new one is in effect, and within a circle of 100 km. from Madrid there are from five to seven police posts, stopping all cars, forcing everybody inside to show passports. The owner must show his license, and the driver his driving permit. This is supposed to be all written down on special blanks, but inasmuch as most policemen do not know how to write their own name, and the blanks

are usually missing, I have seen them write the information down on the edge of a newspaper.

Another point of difficulty is the filling of cars with gasoline; I have seen three pumps in all of Spain. The other places all use cans, an extremely slow method. Tire pumps are practically unknown; free air does not exist. When my cars arrived in Cadiz it was impossible to find a garage that had even a hand-pump which would work.

#### Ability to Buy

An examination of the financial ability of Spain to purchase cars indicates that there will never be as many cars to the population as in the United States. There are three classes in Spain, the rich, the middle class (shopkeepers, etc.) and the working class. The others are mere beggars. The term working class includes the farmers. Farmers very seldom own their own land and, when they do, are not progressive enough to make it produce on a large scale. They produce just sufficient to keep themselves alive. The rich class purchases cars, the middle class very seldom makes enough money to do so and the working class never will. Even when salaries were highest, workmen made about 15 pesetas daily, or \$2, which is not enough to even buy a car on installments, especially considering the large size of the average Spanish family.

At present there is no purchasing power in the country. Credits are curtailed and there is a great crisis in all industries. Textile factories, mines and a great many other industries have no work to offer. Due to the duties and also to monopolies, prices are exceedingly high, and the country is really passing through a severe period.

Notwithstanding all these unfavorable circumstances, I foresee a great future for the American exporter of automobiles in Spain. As soon as exchanges are more normal our prices will be such that no French manufacturer can compete. The French have lost much ground and will lose more. Some day or other the normal trend of business will come back. Spain may have to go through some severe disturbances before this normal period arrives, but it is bound to come, nevertheless.

Spain, in my opinion, is the richest country in Europe. It has every natural advantage—climate, soil, minerals of all kinds, gold, silver, iron, copper, marble, sulphur, etc. It has enough water power to carry on its industries without ever using another ounce of coal. At present, however, it has enough coal to supply its own needs and to export a considerable tonnage, provided the Spaniards would work. Last year, nevertheless, they had to import coal. What Spain needs is to wake up and go to work. This will not occur, though, for many years to come. Spanish capital is not interested in developing its own industries. The average Spaniard with money will buy bonds and live on his own income rather than ever do any work again. Foreigners must bring in their money to develop the country's resources. This is being done on a large scale and very successfully, as in the Rio Tinto copper mines. There are more opportunities in Spain to-day for foreign capital than in any other country in Europe or elsewhere.

American automobile manufacturers, if they desire to sell their products in Spain, must see to it themselves that they have the right kind of agent. Agents should not be appointed by correspondence. Once the manufacturer has such an agent, he should support him in every way.

One great disadvantage in Spain to-day with regards to the development of the automobile business is the more or less antagonistic attitude of the newspapers, the press, which has not yet realized the value of motor cars. Automobile accidents have headlines, with photographs, long descriptions and many sarcastic remarks about the danger of automobiles. But the papers never will make a favorable remark about a dealer's product, regardless of extensive advertising. I did, however, succeed in getting one Madrid paper to issue once a week a special page on automobile activities. American manufacturers should realize that by assisting their agents in this line they would be working for their own prosperity.

#### Foreign Cars in Spain

A detailed list of car registration in the districts of Seville, Spain, from March to June, 1921, presents an interesting side light on the foregoing article. This list is taken from the records of the Royal Automobile Club of Spain. The total of new registrations was 95, of which 40 were American and the remainder of manufacture in European countries. The foreign makes registered were:

Hispano	Renault	Ardic
Peugeot	Berliet	Union
Mercedes	Dixie	Sizaire
Excelsior	B. S. A. M.	Steyr
Citroen	Brennabor	Turcat Mery
Fiat	Rolls Royce	Unic
David	Charron	Itala
O. K. Junior	Stoewer	Rex Simplex
Hansa Loyd	Cormen	Benz
N. A. G.	Dion Bouton	Arbenz
Doby	Dux	
Rochet Schneider	Wolseley	

These thirty-four makes are of interest as showing the competition. The American makes were:

Wichita	Maxwell	Briscoe
Buick	Gardner	Cleveland
Hupmobile	Oakland	Ford
Paige	Studebaker	Overland
Haynes	Hudson	Chandler
Merced	Dodge	King
Essex	Crow-Elkhart	Stutz

The number of American makes was 21—Overland with 7, the N. A. G. with 5, Fiat with 4 and Dodge, Citroen and Peugeot 3 each, were the leaders.

The gasoline price given was .80 pesetas per liter—or 60 cents per gallon at normal rate of exchange.

#### Packing and Crating Automobiles for Foreign Shipment

**M**ETHODS of packing and crating automobiles and trucks for foreign shipment have not yet been standardized, but excellent methods have been developed in the practice of certain concerns with considerable experience in this field. One chapter of a new book entitled "Export Packing" by C. C. Martin takes up the crating of cars and trucks and is illustrated with photographs of the packing used by several companies.

The volume is published by the Johnson Export Publishing Co. and is designed as a general guide for crating for foreign shipment. It is of considerable bulk, but has special reference to automotive work only to a limited degree. The author was assisted in writing several chapters by D. T. Abercrombie, formerly Lieutenant-Colonel of the Quartermaster Corps; H. N. Knowlton, formerly Captain in the Ordnance Department, and M. C. Fitzgerald, Manager of Transportation, General Electric Co.

# Status of American Motor Vehicles in Japan

There are about 9000 automobiles in Japan. 70 per cent of these are American made. High import duties on finished cars have caused large importation of parts. Most bodies are made within the country. Special packing methods and other merchandising factors are discussed.

By Lester Schnare\*

**D**URING 1920 1745 automobiles, valued at \$2,425,518, and automobile parts to the value of \$2,798,141, were imported into Japan. The total value of automobiles imported in 1919 was \$2,757,473 and the value of automobile parts was \$2,866,754. The number of automobiles imported in 1919 was 1579, which indicates that a larger number of medium and low priced cars were imported in 1920 than in 1919.

The value of automobiles and parts imported from the United States was \$5,405,818 in 1919 and \$5,015,130 in 1920. Italy exported automobiles to Japan amounting in value to \$138,041 in 1919 and \$9,889 in 1920. No other country had an important share in the Japanese automobile imports in these years.

In recent years the value of the automobile parts imported into Japan has exceeded the value of the automobiles imported, the excess being relatively much greater in 1920 than it was in 1919. This is explained by the fact that approximately 60 per cent of the motor vehicles imported into Japan are brought here as unassembled parts of cars and not as complete automobiles, a practice which is the result of a discrimination in the tariff in favor of automobile parts, together with the saving in freight charges that can be made by the closer packing. As a rule the chassis and other smaller parts are imported without the body, which is built in Japan.

## Building Bodies in Japan

As a result of the discrimination in the tariff laws of Japan against complete automobiles there has developed a considerable industry in the manufacture of automobile bodies. Almost every dealer in automobiles in Tokio, where this industry has shown the most rapid development, has facilities for building automobile bodies to order and it is estimated that from 150 to 250 automobile bodies can be manufactured in Tokio each month. Many purchasers prefer to have the bodies for their own automobiles built in Japan, because it is possible to manufacture here a body that will accommodate seven Japanese persons, besides the driver, and mount it upon the chassis of a small car, thus effecting a considerable economy.

Automobile bodies constructed in Japan are usually made of wood. A small percentage of them are built of sheet metal, but as there are no dies for pressing sheet-metal bodies, they are made by hand, and the scarcity of skilled sheet-metal workers and the higher wages paid them limits the construction of this type of body.

It has been estimated that there are no more than 9000 automobiles in Japan, of which about 70 per cent are of American manufacture.

There can be no doubt of the popularity of the small car in Japan. Its initial cost is more nearly within reach of the average income and its upkeep is less expensive. Furthermore, a small car can be handled with greater ease and speed on the narrow roads and city streets than can a car with a long wheelbase and heavy body. The high price of gasoline and motor oil and the heavy prefectural and municipal taxes on high-powered cars are also contributing factors toward the desire for low-priced machines.

The outlook for the sale of automobiles in Japan during the present year is generally considered unfavorable. The business always reflects the condition of trade in other lines and the present business depression shows little sign of improvement in the near future. There are on the docks of Yokohama a large number of automobiles, imported last year, which have not been claimed by their importers because of financial circumstances and many importing firms have large stocks of machines which they have held over from last year due to lack of demand.

## Selling Suggestions

An American automobile dealer of considerable experience in Japan suggests the following precautions, which it would be well for American automobile manufacturers to observe in preparing their products for this market.

Care should be taken in packing automobiles intended for export to this country. Too frequently they arrive in a damaged condition as a result of poor or insufficient packing. The dissatisfaction which this causes the importer is not helpful to American trade.

All steel parts of automobiles, as well as of other machinery, should be well greased before packing for shipment to Japan. This should include the interiors of the cylinders of motors. It is a common occurrence for a shipment of imported goods to remain upon the wharves in the customs compound of Yokohama for six weeks or more after being unloaded from the ship on which it arrived, because of delay in getting the goods passed through the customs. During this time the goods are often fully exposed to the weather, and this is particularly likely to happen if they are packed in large cases. The salt, humid air of the water front causes exposed iron or steel to rust very rapidly unless it is well protected by a thick coating of grease.

The fenders of automobiles intended for the Japanese trade should be given an exceptionally heavy coating of paint to keep them from rusting when used in cities and towns along the Japanese coast, where the air seems to be particularly destructive to them and gives the average fender a rusty and unsightly appearance in a comparatively short time.

\*American consul at Yokohama.



# A More Definite Statement of the Highway Research Work

It is an accepted theory that highways and their use are one problem and that this form of transportation is vital to the welfare and prosperity of the nation. Today it is an undeveloped subject. This committee is seeking fundamental information.

**A**T the recent conference of educators and industrial leaders called by the Highway and Highway Transport Education Committee, Prof. W. K. Hatt, director of the Highway Research Committee of the Division of Engineering, National Research Council, read a more definite statement of the work planned by his committee than has heretofore been made public. This report was referred to in the recently printed account of that meeting. The research work undertaken by this committee dovetails completely with the forward plans of the Education Committee, as the research must develop the information necessary for the proper education of the highway and highway transport engineer of the future.

The outline of the work undertaken by Prof. Hatt and his associates is still subject to change. The tentative outline presented at the meeting referred to follows. The committee invites suggestions.

By W. K. Hatt

**I**NDIVIDUALS in industry who have endeavored to state the problem in approximate statistics tell us that there are 10 billions of dollars invested in self propelled vehicles, and that the turnover is three billions annually. That there are ten passenger vehicles to one freight vehicle, and that the problems of speed and safety are most important. That the annual expenditure for operation of vehicles is twelve times the annual expenditure on the roads; therefore the field of research on cost of vehicle operation arising from the road surface and from the vehicle itself, must be kept in the foreground. That transportation by self propelled vehicles is the most expensive of all commercial forms; it will increase. Everyone pays for efficiency.

For the purpose of a coordinated and comprehensive program of Highway Research, the writer has been endeavoring to bring into the picture all the elements of the situation in Highway Transport: Engineering, including vehicle and road; Economics of Transportation; Administration; Finance. Some comprehensive and logical assemblage will be helpful.

It appears that there are many dimly seen figures which should be advanced from the background; there is much that is unknown. We may ask a few questions which cannot be completely answered.

## Fundamental Questions in Highway Transport

### *The Transport Unit*

- (1) What is the economical highway track unit for each of the several situations, e.g., intercity, farm to market?  
What is the cost of transport arising from vehicle and from road?
- (2) What is the relation of this economical unit to other systems of transport, e.g., electric and steam, in a unified system?

- (3) To what extent, as a matter of public policy, should any transport unit be indirectly subsidized?
- (4) What traffic regulations should be imposed on such economical unit over other types of road?  
What fees should be charged for service rendered to vehicle by the road?
- (5) What should be the proportion of the total traffic supplied by such economical unit to justify a special design of road for such unit?
- (6) What prediction can be made of future changes in general traffic and what is the influence of these on the economics of the present situation?
- (7) How should passenger traffic over the highway be evaluated?

### *The Road*

- (1) What type of road paving should be selected for a specified transport unit?
- (2) If the road cannot be economically fitted to the truck transport unit, can the latter be modified in design to fit the road?
- (3) How should the design of the road and paving be modified to meet changing conditions of subgrade, climate, etc.? How shall sub-soils be improved?
- (4) What sum of money is the locating engineer justified in spending to avoid increase in distance, curvature, rise and fall, maximum grade, maximum curve?
- (5) What system of maintenance and organization is best fitted for types of roads, differing in traffic, in materials, and in climate?
- (6) What is capacity of a road of given width for type of vehicle as expressed in vehicles per hour, ton-miles per year, etc.? What is the appropriate unit for expressing traffic for various purposes?
- (7) (In construction many questions arise in selection, production and economical use of materials, standardization and regulation.)
- (8) How can the volumetric changes in roads be overcome?
- (9) What is the economical life of various types of roads—that is, when maintenance charges exceed earning value?

### *Administration*

- (1) What should be the policy in control of truck and bus transportation systems, terminals, routing, etc.?
- (2) What police regulations should control use of roads?
- (3) What is the best administrative and executive organization for administration and operation of roads?
- (4) What principles should govern the selection of a system of roads in its various parts, as influenced by inter-state, intra-state, county, local traffic, etc.?

### *Financing*

- (1) What should be method of financing construction and maintenance of roads? What portions of cost from long term bonds, and what from current funds? What form of bonds should be issued and how create a market for them?
- (2) What should be the relation between life of bonds and economical life of road?
- (3) To what extent do social betterment, military use, i.e., social value, and other imponderables enter into highway policy?
- (4) What should be the distribution of costs as between Federal, State, county, township, property benefited, the user and other units?
- (5) How shall the future maintenance charges on completed road systems be met? Shall the user pay all of these?
- (6) How shall safety be ensured on the roads?

Answers to these questions cannot be made without data that are at present unavailable.

Research is necessary, and a mobilization of the efforts, of research agencies in a comprehensive program. The Highway Research Committee of the Division of Engineering of the National Research Council has undertaken the coordination of such research. The National Research Council will not engage in research directly.

The chart reproduced herewith is devised to indicate the field of research as divided into subfields in which research should be developed, and from which data should come to enable answers to be made to these questions among others.

Some of the studies that should be made are as follows:

- (1) To develop a traffic census blank. Here a traffic classification must be made, the purpose of the census determined, and the various forms and instructions standardized.
- (2) *In order to determine the cost of transport* a statistical table must be made that notes all of the elements of cost; sometimes only a few of these are reported.
- (3) To study the operating costs of elements entering into location of highways, such as distance, grade, curvature.
- (4) To study loads on roads as produced by the vehicle.
- (5) To study design of vehicles with a view to lessening their effects on the road.
- (6) To study supporting power and improvement of subgrades and the relations to design of paving.
- (7) To study resistance of concrete slabs to alternate stresses and to surface loads.

- (8) To study proportioning and use of bituminous materials.
- (9) To study bonding of brick surfaces.
- (10) To study volume changes and the means of meeting them.
- (11) To study operations of concrete mixers.
- (12) To study the organization and economics of construction plants.
- (13) To study sand-clay, top-soil and gravel roads.
- (14) To study cellular and other new types of paving.

There is apparently a widespread activity in highway research throughout the United States on the part of the Bureau of Roads, the U. S. Army, the State Highway Commissions, the universities and of industrial organizations and an earnest desire to put highway construction on a scientific basis.

The economical features are under critical examination by such organizations as the National Chamber of Commerce.

We should be able to express quantitatively the results of a standardized economic survey of a road project, just as in the case of a water-power project for instance, except for those imponderables, which, like social betterment and public policy, influence the conclusions so profoundly.

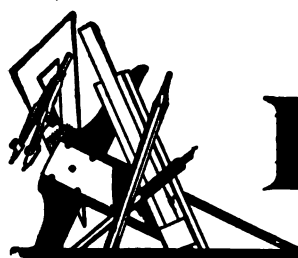
It is not too much to say that the situation is critical and that the sooner those interested come to a basis of fact the more assurance we will have that the public will not interrupt progress in providing for highway transport because of a general feeling of insecurity.

### TENTATIVE CHART TO SHOW DIVISION OF FLOW OF DATA FROM THE FIELD OF HIGHWAY RESEARCH

IMPORTANT ELEMENTS DEMANDING STUDY ARISING IN THE DIVISIONS OF I TO V  
(STRUCTURES OMITTED) (ELEMENTS ARE OFTEN INTER-RELATED)  
STATIC CHART—COMMITTEES ORGANIZED TO OCCUPY FIELD

I ECONOMICS <small>(DATA FOR ECONOMIC SURVEY AND STUDY OF PROJECTS)</small>	II OPERATION	III DESIGN <small>(ROAD)</small>	IV DESIGN <small>(VEHICLES) AS RELATED TO ROAD</small>	V CONSTRUCTION
<b>I. TRAFFIC STUDIES</b> (REGIONAL) A. DISTRIBUTION IN REGION B. CHARACTER <small>TRAFFIC BLANK</small> VEHICLE WEIGHT AND DISTRIBUTION SPEED TIRE (CONDITION) COMMODITY LENGTH HAUL C. METHOD OF EXPRESSING UNIT OF TRAFFIC D. PREDICTED CHANGES E. OTHER TRAFFIC ON STEAM AND ELECTRIC ROADS F. CENTRAL SOURCES OF TRAFFIC  <b>2. COMMUNITY NEEDS</b> SYSTEMS OF ROADS IN CLASSES FOR INDUSTRIES, ETC. INTANGIBLES  <b>3. COST OF TRANSPORT</b> CAPITAL COST ROAD VEHICLE FIXED CHARGES OVERHEAD OPERATION MAINTENANCE ROUTINE REPLACEMENT ON ROAD ON VEHICLE EQUIVALENT UNITS X-AUTO = Y-TON TRUCK, ETC.  <b>4. ECONOMICS OF LOCATION</b> COST OF DISTANCE RISE AND FALL CURVATURE RULING GRADE RULING CURVE  <b>5. FINANCING</b> BONDS TAXES FEES ETC.  <b>6. HIGHWAY VALUATION</b> INCREMENT OF LAND VALUES	<b>I. CONTROL OF TRAFFIC</b> ROUTING TERMINALS FRANCHISES POLICE REGULATIONS  <b>2. ACCIDENT INSURANCE</b>  <b>3. PLANNING SYSTEMS OF TRANSPORT</b> FINANCING ENVIRONMENT RELATION TO OTHER TRANSPORT ORGANIZATION  <b>4. FINANCING (SEE I.)</b> BONDS, TAXES, FEES  <b>5. DISTRIBUTION OF COSTS</b> TRAFFIC PROPERTY POLITICAL UNITS  <b>6. MAINTENANCE SYSTEMS</b>  <b>7. MAINTENANCE MACHINERY</b>  <b>8. MAINTENANCE METHODS</b> ROUTINE REPLACEMENT SNOW REMOVAL, ETC.  <b>9. TRAIL MARKING</b>  <b>10. COST ACCOUNTING</b>  <b>II. SAFETY</b>	<b>I. SUBSOIL STUDIES</b> PROPERTIES PHYSICAL MECHANICAL CHEMICAL DRAINAGE SUPPORTING POWER IMPROVEMENT BY TREATMENT EFFECT OF ROAD DEFORMATIONS EFFECT OF CLIMATE DISTRIBUTION OF PRESSURE  <b>2. BASE COURSE</b> CHARACTER, TYPE THICKNESS MATERIALS CROSS SECTION  <b>3. SURFACE</b> CHARACTER THICKNESS MATERIALS CROSS SECTION WEAR BY TRAFFIC WEAR BY ELEMENTS IMPACT OF TRAFFIC TRACTION RESISTANCE WEAR OF TIRE WEAR OF VEHICLE DUSTING INFLUENCE OF LOCALITY  <b>4. CROSS SECTION</b> WIDTH CROWN SHOULDER DITCHES  <b>5. LOADS</b> STATIC IMPACT SURFACE INTEGRAL AS EFFECTED BY DESIGN OF VEHICLE  <b>6. DESIGN OF INTEGRAL SLAB</b> STRENGTH AND STIFFNESS OF SOLID PRECAST CELLULAR  <b>7. VOLUME CHANGES</b> JOINTS SHOVING  <b>8. REINFORCING</b> THEORY OF AMOUNT KIND DISTRIBUTION DIRECTION	<b>I. DESIGN OF VEHICLE</b> POWER, GEAR RATIO BRAKING ETC. ETC. EFFECT ON LOADS SPRUNG UNSPRUNG DISTRIBUTION  ECONOMY OF OPERATION AND MAINTENANCE. (SEE AUTOMOTIVE INDUSTRY) <small>(ECONOMIC LIMIT OF SLIP OF TIRE IN TURNING SITUATIONS COST OF FUEL, TRANSPORT (SOME OF ELEMENTS) COST OF MAINTENANCE (SOME OF ELEMENTS) COST ACCOUNTING)</small>  <b>3. SURFACE</b> TRACTION EFFORT WEAR ON TIRES LOADS MAINTENANCE OF VEHICLE  <b>4. ALIGNMENT</b> CURVES (SPEED) GRADES  <b>5. CROSS SECTION</b> WIDTH CROWN  <b>6. SAFETY</b>	<b>I. MATERIALS</b> BITUMINOUS NON BITUMINOUS FUNDAMENTAL MECHANICAL PROPERTIES METHODS OF TEST STANDARD TESTS SPECIFICATION PREPARATION AND TREATMENT (SEE SPECIAL LIST) PROPORTIONING  <b>2. MIXING</b> EFFICIENCY OF MIXER CENTRAL MIXING PLANTS  <b>3. PLACING</b>  <b>4. METHODS OF TESTING ROADS</b> INSTRUMENT CORES  <b>5. DESIGN OF EXPERIMENTAL ROADS</b>  <b>6. DRAINAGE (AND DRAINAGE STRUCTURES)</b>  <b>7. IMPACT ON BRIDGES (SEE DESIGN)</b>  <b>8. REINFORCING</b> HANDLING AND PLACING  <b>9. INSPECTION</b>  <b>10. PLANT DESIGN AND CONTROL</b>  <b>11. COST ACCOUNTING</b>  <b>12. CONSTRUCTION CONTRACTS</b>

NOTE.—This list of research studies applies to all classes of roads—brick, concrete, macadam, sand-clay, gravel and bituminous. Special problems arising in special types of roads will appear in a supplementary detailed chart.



# The FORUM



## Truck and Trailer Relations

Editor, AUTOMOTIVE INDUSTRIES:

I have just read with great interest Mr. H. W. Perry's article on "The Trailer's Place in Transportation Merchandising," which appeared in the July 21 and 28 issues of AUTOMOTIVE INDUSTRIES.

Since Mr. Perry has mentioned the apparent previous antagonism of truck manufacturers toward the use of trailers, but, at the same time, has not presented the possible reasons for this attitude toward trailer use, I believe that a brief outline of some of the reasons for this position may be of value, particularly since I have, in many cases, recommended against trailer installations where they were not adaptable.

Up until about two years ago motor trucks in general were not designed for use with trailers. Where it was desired to handle such equipment it was necessary to alter the standard construction by changing the gear ratios, wheelbase, wheel diameter, etc., in order that a satisfactory unit could be secured. Since that time the demand for motor truck ability to negotiate severe road conditions and steep gradients has greatly increased, so that the standard modern motor truck is far more adaptable to use with trailers than previous designs. This increased ability, basically provided for another purpose (that of better general performance), has made most trucks now capable of satisfactorily pulling trailers—at least where road conditions are good and other operating requirements normal. However, it does not mean that trailers are always to be recommended.

Many trailer installations have been unsuccessful due to lack of understanding of the vital conditions so essential to satisfactory performance. These conditions include a knowledge of the tractive ability of the truck and the exact road surface conditions over which the installation is to be driven. In fact, the writer knows of a recent case where trailers have been abandoned and the trucks changed back to standard, due to a previous lack of knowledge of conditions involved in operating with trailers. Such a condition would not have resulted if an unbiased or comprehensive study of the conditions had been made by the trailer maker or his salesman.

It is indeed true that the trailer has its definite field of operation, just as has the motor truck, and the growing feeling of co-operation between truck manufacturers and trailer makers is as it should be. In fact, a closer co-operation will undoubtedly result in benefit to both parties.

In conclusion, I would like to mention the following points, which must be considered before recommending trailer equipment:

First: The trailer salesman must learn and admit the limitations of trailer equipment, and must thoroughly understand those installations where this equipment can be satisfactorily used. An installation which proves unsatisfactory not only reflects against the trailer maker, but the truck maker as well, and often causes dissatisfaction which requires great effort to overcome.

Second: A thorough study of operating conditions, including road, load, grades, etc., must be made before

recommending trailers. This is done by the truck maker, or his salesman, before determining the type or size of truck, and applies as well to the use of trailer equipment. A thorough understanding of the engineering principles involved relative to drawbar pull and performance ability must be had. I have seen many trailers discarded due to lack of appreciation of the engineering requirements.

Third: The purchaser of the truck and trailer must be properly instructed as to their use and must understand that if the conditions of operation are altered, the ability of the installation to perform satisfactorily may change. It seems that there has been a greater desire to make a sale on the part of the truck as well as the trailer maker than should be the case, particularly since it often is evident that the proper sized units have not been installed.

Fourth: Many statements made by trailer makers are misleading, and in some cases really reflect upon the truck maker. For instance, to quote from Mr. Perry's article: "The attachment of a pintle hitch hook as standard equipment on the rear of the truck indicates that that particular make of truck has drawbar pull and that the makers are selling transportation as well as motor trucks." The converse of this statement would be that a truck which did not have a pintle hitch hook could not well be used with trailers. The ability to haul trailers, as mentioned before, is based upon definitely understood values of weight, gear ratios, etc., and whether or not a pintle hook is mounted, the performance ability is in no way changed.

I believe that a more thorough co-operation between manufacturers of both types of equipment will result in discontinuing many similar misleading statements, and that the trailer makers, and particularly their salesmen, will enter their field of operation with a full understanding of all of the principles involved. The trailer has its legitimate field, and as a result I see no reason why it should attempt to encroach upon the field where motor trucks without trailers can be used, any more than either the truck or trailer can be expected to solve all transportation problems.

E. B. NEIL,  
Mechanical Engineer, Sales Engineering Division, The  
Pierce-Arrow Motor Car Company.

## The Life of Storage Batteries

Editor, AUTOMOTIVE INDUSTRIES:

We thoroughly approve of your recent articles and editorial dealing with the policy of certain car manufacturers of installing storage batteries of inadequate capacity. Our own experience of the past eight years thoroughly corroborates your conclusions.

We have had several cars which were equipped with a certain make of battery, and in no case have we been able to obtain one year of service without expensive repairs. On the other hand, our experience with another make of battery has been extremely satisfactory. We have had cars for over three years which were equipped with the latter battery which involved no expense whatever. We know of several Cadillacs purchased in 1915 or 1916 which still carry the original battery.

Our own experience is perhaps slightly better than the average since, as chemical engineers, we realize the necessity of giving a battery appropriate care. At any rate, the failure of certain batteries on our cars has never been charged by the local branch of this maker to be due to anything but natural wear. These people have told us on several occasions that one year is the maximum which anyone should expect from a battery.

We think the car manufacturers should realize that these are times of fiercest competition, and that the public, while slow to crystallize its judgments, is firm in conclusions when reached and that a reputation for equipping with a poor storage battery may readily create serious sales resistance.

E. L. CONWELL, President,  
E. L. Conwell & Co., Inc.

## Performance of Air-Cooled Aircraft Engines

Editor, AUTOMOTIVE INDUSTRIES:

Colonel Vincent's assumption that I referred to the RAF-4-A 12-cylinder Vee air-cooled engine in my remarks regarding air-cooled Vee engines is incorrect.

My remarks referred to the RAF-4-D and 4-E 12-cylinder Vee engines, these being RAF-4-A engines fitted

with overhead valve aluminum cylinders and having a very different performance from that of the RAF-4-A engine quoted by Colonel Vincent.

The performance of the RAF-4-D engine was as follows:

220-b.h.p. at 2000 r.p.m.  
Fuel consumption .52 lbs.  
Weight complete with cowling 650 lbs.  
Bore—100 mm. (3.94 in.).  
Stroke—140 mm. (5.51 in.)

At the time of design (1916-1917) this performance did not compare very unfavorably with the best water-cooled engines, especially when considering that the balance of the engine apart from the cylinders was practically all of pre-war design.

Colonel Vincent's opinion that the radial form was adopted for cooling reasons, if based on the performance of such engines of the RAF-4-A and similar types, would no doubt be correct, had air-cooled cylinder design remained stagnant since 1914.

When criticising the air-cooled Vee engine it is well to consider the wonderful performances put up by the early Renault engines, the latter on account of its pioneer work is really the father of modern air-cooled aircraft engine.

S. D. HERON, Power Plant Section,  
McCook Field.

## U. S. Leads in New Zealand Imports

DURING the first four months of 1921 the Islands of New Zealand imported a grand total of 2891 motor vehicles, made up of passenger cars and chassis, motor trucks and chassis, and electric passenger cars and electric trucks. Of this total, the U. S. A. and Canada furnished the major amount, the U. S. A. leading with a total of 1258, followed by Canada 1111, and the United Kingdom 361. France, Italy, Belgium and Australia supplied the remainder. The following tabulation shows the classification and origin:

NEW ZEALAND IMPORTS, JANUARY, FEBRUARY, MARCH, APRIL, 1921

	U. S. A.	United Kingdom	Canada	France	Italy	Belgium	Australia
Passenger cars	1,082	207	779	18	24	13	3
Passenger car chassis	27	6	13	44	13	4	..
Motor trucks	120	113	99	3	..	..	..
Motor truck chassis	29	35	220	33	..	..	..
Total	1,258	361	1,111	98	37	17	3

Ford importations come from the Canadian factory which accounts for the total of 1111 cars and chassis as compared with a total of 1258 from the U. S. A.

In the importation of motor trucks and chassis Canada leads with 319, compared with 149 from the U. S. A. and 148 from the United Kingdom. Here again unquestionably the Ford figures are largely responsible for the Canadian total.

During the 4 months there were only six electrically-driven motor vehicles imported, these all coming from the U. S. A. in the form of motor truck chassis.

Total figures on imports of cars and trucks into New Zealand during 1919 and 1920 were recently published by The Radiator, the organ of the New Zealand dealers association, known as The Motor Garage Proprietors' and Cycle Traders' Association of New Zealand, Inc. These totals are:

	1919	1920
Passenger cars	5,270	10,541
Trucks	804	1,431
Tires (pounds sterling)	860,048	1,803,959
Spares and parts (pounds sterling)	118,724	240,997

An analysis of the imports during the calendar year of 1920 shows a total of 7447 cars and trucks from the U. S. A. Canada was second with 3852 and the United Kingdom third with 615. The following tabulation shows the origin of imports:

	Passenger Cars	Passenger Chassis	Trucks	Truck Chassis	Electric Passenger Cars	Trucks, Electric	Total
U. S. A.	6,977	89	204	163	1	13	7,447
Canada	2,850	178	258	566	..	..	3,852
United Kingdom	352	21	168	68	..	6	615
France	20	4	..	..	..	..	24
Italy	11	33	1	4	..	..	49
Australia	6	..	..	..	..	..	6
Total	10,216	325	631	801	1	19	11,993

In the importation of tires the greatest volume came from U. S. A. with Australia second, France third, United Kingdom fourth, Canada fifth and Italy sixth. The following figures in pounds sterling show the volume of business for tires and tubes and also for parts for vehicles:

	Tires and Tubes	Parts and Materials
U. S. A.	131,143	48,079
Australia	79,484	1,764
France	51,748	435
United Kingdom	43,189	20,503
Canada	37,835	30,359
Italy	36,766	806
Belgium	437	..

When the imports of tires and parts for the calendar year of 1920 are considered the following figures show the U. S. A. to lead in tires, followed by Australia, Italy, Canada, United Kingdom and France. The figures are:

	Tires and Tubes	Parts and Materials
U. S. A.	709,591	147,751
Australia	321,382	6,872
Italy	226,963	17
Canada	220,362	46,585
United Kingdom	168,930	35,263
France	154,137	388
Belgium	1,730	120
Japan	864	1

# Human Factors Largely Responsible for Waste in Metal Trades

A recent report indicates that waste in the metal trades runs to one thousand million dollars annually. Much of this is due to lack of understanding of the relation which human beings bear to efficiency of operation. The report is summarized and discussed here by Mr. Tipper.

By Harry Tipper

**T**HE report of the Committee on Elimination of Waste in Industry appointed by the American Engineering Council has been issued in respect to the metal trades and this report has been noted by the newspapers and other general publications.

The report itself should be of interest to the automotive manufacturer, because it covers a line of industry similar to that in which he is engaged and in a large measure relates to products or material which he must buy in considerable quantities during the year. Any waste to be found in the general metal trades affects the cost of the automotive manufacturer in a number of directions. It is possible that the manufacturer of automotive apparatus might find interesting material for an analysis of his own plant from the suggestions of the report.

It is evident from this report that the causes of the waste are in a large measure human.

The waste itself is reported to run to one thousand million dollars a year in this industry. The figure is a very impressive one, but in view of the size of the metal trades industry, it is not likely to be overestimated. If all the waste could be computed, it is probable that it would reach a total much larger than the one indicated by the committee and that it would cover items not considered by the committee.

The executives in production will not be inclined to agree with the statement on paragraph four of the report:

**"It is estimated that at present about 80 per cent of the responsibility for waste or non-production rests with the management—that is, with the managers and executives in the plant."**

There is no way of checking this percentage so that its accuracy can be determined. Except for the percentage itself, the statement is correct in essence, and until the executives and managers of industry fully understand the extent of their responsibility, a large part of the waste will continue to go on.

The centralized systems of industry usually operating to-day do not encourage the continual alert analysis of the operations and human possibilities, so that the value of the present methods can be determined. The precedents, rules and regulations of the present systems have become so much a part of the attitude of the younger executives that their judgment is almost limited to these and does not exercise itself outside of the rules or in questioning the systems themselves. The older executives, who received their training when industry was much younger and very different in its methods, are usual-

ly so far away from the present system in its detailed operation as to be unequipped to analyze it and to deal with its inefficiencies.

The replies received from the manufacturers in the thirty-two plants visited indicated this lack of understanding on the part of the managing executives and the way in which the elements of the systems themselves are neglected.

These statements are quoted so that their diversity and ineffectuality may be properly noted.

Being asked their (the managing executives) opinion as to the main cause of waste or inefficiency, their answers were as follows:

In eight plants the answer referred particularly to present business conditions and was to the effect that "the most important cause is the uneven volume of business or the fluctuation in the demand for the product; lack of enough business to keep going at normal capacity."

In four plants the cause given concerned the railroad situation and the functioning of the Railroad Adjustment Board.

In three plants the cause given was "lack of standardization of design of products."

In two plants the cause given was "labor turnover and strikes," one executive saying that these had been caused by wartime conditions.

In four plants the cause given was "lack of planning"—the exact words being "lack of proper planning and routing;" one "lack of correct planning and material control;" one "unscientific planning and management;" and one "lack of efficient planning and management methods."

In six plants the cause given was "lack of co-operation between management and labor."

Other causes given in various plants were as follows: "Lack of intensive study of methods;" "cost control systems needed;" "daily cost reports needed;" "lack of scientific management applied to all phases of the business;" "inefficiency of labor and excessive overhead."

In other plants special causes in the machine-tool business were given as follows:

"The failure of machine-tool builders to supply what the public wants."

"Most of the metal trades shops are very small and require personal handling by the manager of such important problems as are handled by our system of production control."

Insufficient capital to develop sales and to improve facilities.

Purchasing in small quantities, by the small plants, which places them at a disadvantage as to favorable prices and as to transportation and handling expense.

All the causes noted in the statements of the managing executives of the plants are subsidiary causes arising



ing out of the failure in other directions and not fundamental or primary causes in themselves.

A little thought will show that these causes are due—all of them—to a lack of analysis, particularly the absence of the analysis of the human side and the relation which labor bears to the efficiency of the operation.

This is the case not only with the labor in the shop, but with the supervisors and departmental executives who require a greater degree of understanding and who should be chosen with greater analytical care.

Lack of standardization, labor turnover, lack of proper planning, lack of intensive study, excessive overhead, failure to supply what the market requires, insufficient capital, and so forth, are all questions of management.

It is the distinct and definite responsibility of management to see that proper systems are adopted and that these systems are economical and not wasteful. It is the responsibility of management to see that there is co-operation between the supervisor and the worker. There is no escape in any of the cases from the responsibility imposed upon the manager to know what systems, what measures and what studies are required in his own shop, for his own purposes and to see that these are planned and adopted.

There is no escape from the responsibility placed upon the manager to understand those who work in the shop, to study them so that he will thoroughly understand them, to work with them, and to see that the matter is so arranged that there is an incentive for the worker to put forth his full power. Neither is there any escape from the responsibility resting upon the management to see that each man is given the amount of responsibility in harmony with his operations and that the system is sufficiently flexible

to encourage him to exercise his judgment in meeting this responsibility.

Of course, this responsibility of the management is only beginning to be recognized. A few years ago the only responsibility understood or accepted by management was the responsibility of making a profit. The responsibility of making a profit does not lead to an intensive analysis of the probable wastes, unless those wastes interfere with the profit itself. In an era of extensive business such as we have passed through, the prices which can be secured for the products will permit the profit, even with a large amount of waste entering into the costs of their production.

The whole of the many pages of this report can be summarized in the statement that the wastes are wastes of human capacity and energy, of human analysis and understanding arising out of the ignorance of human reactions and the elements governing human efficiency.

No better illustration could be offered of the necessity for the study of humanity in industry than the statement of a billion dollar waste, of which at least eight hundred millions are admitted to be the waste of human ignorance in regard to human necessities.

Without regard to the accuracy of the report in many respects, the report itself should give plenty of food for thought to the average manufacturer.

In the near future the manufacturer will be required to produce with much less waste in order to meet the competitive conditions and still retain the profit he has been accustomed to make. This reduction in the cost of production cannot be met merely by changing the rates of wages, it must be met very largely by increasing the efficiency of production.

## Truck Wheel Standardization in Germany

**I**N Der Motorwagen the suggestion to standardize cast steel motor truck wheels is made by Engineer Kienzle, who is evidently a member of the Standards Committee of the German Association of Automobile Manufacturers. Outside diameters and widths of tires, as well as inside diameters of rims, have been standardized already. It is estimated that complete standardization would result in a reduction of 50 per cent in the cost of production. Two general designs of front wheel hub are illustrated, both adapted to the use of either ball bearings or floating bushes. In the first the hub has a smooth bore and receives a sleeve, whether plain or ball bearings are used. In the second the outer races of the ball bearings are mounted directly in the hub, and as the outboard bearing is of much smaller diameter than the inner bearing, the wheel hub must be bored out to two different diameters. The elimination of the sleeve, of course, saves the cost of its manufacture, but it is difficult to turn ball bearing seats directly in the wheel (which is handled in a vertical turret lathe) with the accuracy required for the purpose. The sleeve would be bored in a precision lathe in which the required degree of accuracy is easily attained. Another advantage of the sleeve construction is that when wheels are interchanged the ball bearings need not be disturbed, and as the replacement usually takes place outside the factory, it is believed that this would obviate much trouble, as incorrect replacement of the ball bearings or the admission of grit would lead to their rapid destruction.

If plain bearings are used the cost of construction of the two designs would be about the same, as the slight extra cost of the sleeve with two diameters would be bal-

anced by the reduction of materials cost for the whole wheel and the saving on the smaller hub cap thread.

It is also stated in the article that steel foundries figure that wheels with cruciform spokes can be manufactured at about 75 per cent of the cost of wheels with hollow spokes, partly owing to reduced wastage, which in the case of hollow-spoked wheels is mainly due to incorrect placing of the cores. The core work in itself is quite an item of expense.

## The Aircraft Year Book

**T**HE third edition of the Aircraft Year Book is being distributed. This volume continues the same effort put forth in the previous Aircraft Year Books—a presentation of the air transportation development of the previous year. These volumes are a commendable effort in preserving a continuous history of the development of this new phase of transportation. The present volume is technical in only a slight degree, but chiefly presents a story of practical development. The text includes a list of the commercial companies operating in 1920, with a report of operation mileage, which report has been printed in AUTOMOTIVE INDUSTRIES. Chapters are devoted to the operation of the Air Mail Service, Aerial Forest Patrol, the Marine Uses of Aircraft, Aerial Photography, News Gathering, the Need for Federal Control, Air Ports, Military Uses and similar live topics. The appendix gives many facts concerning the industry. In the technical section the design of present aircraft is traced from the Wright Bros. machine in a series of drawings. The volume is published by Small, Maynard & Co.



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## Petroleum, Iron and Coal

HOW important a factor petroleum has become in the world's commerce during the past several years is well brought out by some statistics contained in a paper on The Effect of the War on Mineral Supplies, presented at a recent meeting of the (British) Institution of Civil Engineers. It is shown that whereas most lines of mineral production fell off heavily in the course of the war, the production of petroleum increased more than 75 per cent. The output of coal dropped from 1,320,000,000 tons in 1913 to 1,130,000,000 tons in 1919, and the output of iron ore from 175,000,000 tons in 1913 to 145,000,000 tons in 1917, but the output of petroleum increased from 55,000,000 tons in 1913 to 98,000,000 tons in 1920.

The decrease in the production of coal and iron ore was certainly not due to any lack in demand for these products; the enormous increase in the price of coal, particularly in European countries, indicates a very heavy demand, and the sole reason for the drop in production was the lack of sufficient labor. Petro-

leum producers had to meet this same difficulty of scarcity of labor, but they found the labor necessary to nearly double their output, while other industries devoted to prime necessities fell back. The conclusion to be drawn is that during the world war petroleum was a more important factor than either coal or iron; or, more precisely, that an increase in the output of petroleum was more urgent than an increase in the production of the other two basic materials.

## "New and Useful"

THE patent law of the United States provides that, in order that a patent may be secured on an application, the device on which the application is based must be new and useful. Undoubtedly the patent laws of other countries make similar requirements, though the efforts made to look up records and determine novelty vary to a considerable extent. Up to not so very long ago the United States and Germany were the only countries whose patent departments made a search for possible anticipations. The search in any case is limited, and the Government does not guarantee the validity of the patent which it grants; if it is contested it remains for the courts to decide the matter.

Recently there has been some discussion in England as to the extent of the search made by the British patent office to determine the novelty of applications, and it has been brought out that this is limited to the British patent records for fifty years back. That under these circumstances many applications are allowed that would seem unpatentable is obvious. We were reminded of this discussion on seeing in a British engineering paper an abstract of a patent recently granted to the Daimler Motor Co. and A. E. Berriman on Improvements in Electric Lighting Systems for Motor Vehicles. A switch in the lighting circuit connects a resistance in one of the battery leads for the purpose of dimming the lights momentarily, thereby avoiding danger and discomfort to the drivers of oncoming vehicles.

We had thought that the use of a resistance in series for the purpose of dimming lights was known to everybody having to do with electrical work, as it is common practice in the electric lighting of motor vehicles in this country. It is easily believable that no patent was issued on the system in Great Britain during the fifty years preceding this application. Every electrician is familiar with the effect of including a resistance coil in a constant potential lighting circuit, and the thing is so obvious that hardly anyone would have the temerity of applying for a patent on it.

## Concerning Detonation

IT seems to be agreed that detonation with its accompanying knock which occurs during the combustion of fuel in an engine cylinder is a factor of prime importance in relation to the value of internal combustion engine fuels. The cause of detonation is thought by some to be due to an extremely rapid combustion or liberation of energy. In any case the

accompanying pressure rise is known to be very great and exceedingly rapid. The results are certainly injurious to the engine and are most unpleasant so far as the engine operator is concerned.

There appears to be but little doubt that if the effects of detonation could be avoided, higher compression or expansion ratios could be employed and higher thermal efficiencies obtained. This fact alone is sufficient reason for strenuous efforts to overcome or control detonation, but there is considerable doubt as to how this can be accomplished. The use of certain diluents or dopes in the fuel appear to be promising, but it remains to be seen how generally they will be employed, and many question whether they will after all prove to be an answer to the problem. It is well, however, that their utility is being investigated, for the fuel problem is so important that it is well to prosecute every possible line of attack upon it which appears at all promising.

One so-called fuel "dope" tried recently at the Bureau of Standards was found to overcome the knock when used in a fairly large proportion, about 10 per cent, but the maximum power output of the engine was also reduced. Precisely the same result was attained, however, by making provision whereby the spark could be retarded further than is possible with most retard mechanisms. Dopes are supposed to slow down the rate of burning of the fuel and a late spark is thought to accomplish the same result. This raises the question as to whether the relation of spark advance to the detonation phenomena has been adequately considered and investigated. There is, of course, no point in using doped fuel if the same effect upon performance can be obtained by simply changing the ignition timing. Our present knowledge is too limited to draw any general conclusions in this regard, but it is a matter worthy of further careful research work.

## Confidence Cuts Expenses

THE chief executive of a large unit parts firm said the other day: "If our customers would so far take us into their confidence as to tell us with some degree of frankness what are their plans for the next three months, we would be able to save thousands of dollars in production expense—and a fair share of the saving would accrue to the automobile factories in the long run." The loss incident to the cancelation of a contract to purchase parts must of necessity be added in the end to the purchase price. Hence the purchaser ultimately stands the loss.

While it is doubtless true that many manufacturers are somewhat hazy as regards their plans for the next three months, every firm has, or should have, more or less accurate ideas as to the immediate future. From every part of the various industries contributing to the automobile industry has come the complaint that the parts maker is not sufficiently taken into the confidence of the manufacturer as regards future plans. It is not possible in every case, of course, to consult freely with supply sources, yet it is probable that a greater measure of co-operation would greatly benefit both parties.

Modern industrial organization is composed of

units so closely inter-dependent that only through sincere co-operation and a recognition of a moral as well as a legal obligation in doing business can permanent progress be made. The conviction is growing that to give more is to get more. That this is a practical business doctrine is being evidenced more frequently in all industrial relationships, between employer and employee, between manufacturer and consumer, and between manufacturer and manufacturer.

## Nomenclature for Isolated Electric Plants

THERE has been considerable discussion concerning the best nomenclature for the electric units formerly called farm lights. Such lights are now being used extensively in motion picture theaters, business plants, and other establishments, however, so that there appears to be a need for a more inclusive name.

Some time ago AUTOMOTIVE INDUSTRIES dropped the name farm light plants. It has used instead the term "isolated electric plant." Believing that it would be highly desirable for the industry represented in the manufacture of these units to agree as nearly as possible on a proper designation of these plants, AUTOMOTIVE INDUSTRIES recently sent a questionnaire on the subject to the chief manufacturers. The questionnaire asked these questions:

1. What is your idea of the proper designation?
2. In your opinion, whose task should it be to establish a nomenclature for this rapidly developing industry?

The replies received to these queries indicate that there is a rather general agreement on the isolated electric plant terminology. Several manufacturers, while they do not use this term exclusively at present, believe it to be the best available. The National Gas Engine and Farm Power Association is frequently mentioned as the organization whose task it should be to establish the nomenclature for this industry. One maker suggested the Society of Automotive Engineers in this connection.

Only one reply definitely opposed the term isolated electric plant, on the ground that the term isolated does not have a pleasing sound to the prospective purchaser. This company writes, "In our advertising we have featured these plants as electric light and power plants, leaving out the word farm entirely. It is possible that some better designation than has yet been suggested can be thought of."

There were numerous suggestions that the business papers should be active in attempting to establish a standard nomenclature. It is evident from the replies that considerable discussion along this line has already occurred in the Gas Engine and Farm Power Association. One reply states that "each time the matter is brought up in a meeting of the manufacturers of these plants there are as many suggestions as to the proper designation as there are members present."

A survey of all the replies, however, indicate a very general agreement as to the advisability of using the term isolated electric plant.

## Industry Suffering from Short Credit, Avers W. C. Durant

Thinks Much of Present Distress  
Due to Extortionate Interest  
—Flays Bankers

NEW YORK, Aug. 9—Recovery of the automotive industry, which is suffering from the same causes as all other industries, will be surprisingly rapid and will take the lead in industrial activity, is the opinion of W. C. Durant. The automotive industry is, and will continue to be, an essential factor in the development of civilization, he contends. It has gone through its period of reconstruction, has organized its methods to meet the new order of things and is better prepared to-day for a running start than almost any other branch of industry.

The solution of the gravest of the problems which confront the business men of the country rests upon adequate credit, Durant asserts. In this connection he says:

"When cheaper money is available for business men who need it, when credit is extended in generous measure to business men who are entitled to it, when Government securities have been put on a 100% basis, we will hear less about 'frozen credits,' courage will be restored and the usual American action, which we all so much admire, in place of indifference and apathy, will be in evidence and we will quickly get back to normalcy."

The views of Durant, long a real captain of industry, are contained in a statement prepared by him for the current issue of Commerce and Finance. In this statement he arraigns mercilessly the attitude of big bankers and charges them with exploiting the needs of legitimate business for selfish purposes. In this connection he says:

"I contend that much of our present distress is due to extortionate interest rates and restricted credits. In this financial crisis the bankers have not met the situation and are largely responsible for the chaotic condition now existing."

"Never in the history of this country was there greater need for low interest rates and more elastic credits."

"Instead of helping to relieve the situation and restore order, the bankers and those in control of the money supply and credits have been taking advantage of a situation. For months, call money rates have been outrageously high, with time money almost impossible at any rate—and this condition existing with our natural and accumulated wealth, with nearly one-half the gold of the world in our possession and with a great Federal Reserve Bank created for the purpose of doing a real service to commerce and industry in an emergency."

"If money and credit are available only for certain preferred purposes and at certain rates, business is bound to suffer. The Sherman Law and Clayton Act

are intended to prevent monopoly and control, but no good plan has yet been worked out which gives to a perfectly solvent concern the ability to obtain a line of credit to which it is entitled at terms that are just and legal.

"At a time when business in every industry and commercial line is suffering and business men in all lines are carrying tremendous burdens, the bankers are exacting the highest rates ever known and forcing liquidation beyond all reason. Word went forth some time ago: 'Liquidate and pay.' And liquidation has been going on at a fearful rate and at a terrific sacrifice."

"The Federal Reserve Bank was created for the purpose of meeting emergencies. How did it meet this present emergency? By establishing unattractive and prohibitive rates, making last year the enormous profit of 200%. By advocating and encouraging liquidation in the face of a business and industrial crisis such as this country has never before known. Result—business paralysis, with industry, the life of our country, so weakened and enfeebled as to make recovery slow and painful."

"I recall recently having heard of many of our well established and well managed concerns in industrial pursuits reducing or passing dividends, but I have yet to hear of a single well established or well managed bank reducing or passing dividends or showing any falling off of earnings."

"And what have you to suggest? you ask. My answer: Give the business men of this country 1% call money? Let the Federal Reserve Bank establish a discount rate of 3%. Let our banks stop forcing liquidation. Let our banks extend rather than curtail credit."

"Let the big bankers of this country, who control the money situation, do the right, fair, honest, decent, unselfish thing just this once, and for their own good and safety and the benefit and safety of this country and our people, do it now."

## A. A. A. Will Seek Cheaper Insurance for Members

WASHINGTON, Aug. 9—The executive board of the American Automobile Association has decided to widen the scope of the association's activities. One of the subjects which will be taken up is that of automobile insurance. The question has been placed in the hands of a committee which has formulated plans for cheaper insurance for A.A.A. members. Retention of counsel familiar with automobile law to provide free legal advice to members will be given immediate consideration.

A new method of protecting members' cars from automobile thieves is being evolved and will be tried out in the near future in Washington.

The A.A.A. will renew at once its efforts to obtain the passage of a national reciprocity law which would mean that motorists could travel anywhere in the United States for unlimited periods with their home state license tag.

## Durant Motors Takes Over Sheridan Plant

Production of New "Durant Six"  
Will Start in Month or More  
at Muncie

NEW YORK, Aug. 9—The plant of the Sheridan Motor Car Co. at Muncie, Ind., was taken over on Aug. 1 by the Durant Motors Co. of Indiana, a \$3,000,000 corporation of which D. A. Burke is president and general manager. Only the plant itself was purchased and the new owners did not acquire the inventory which had been assembled by the General Motors Corp. for the Sheridan car.

Production of the Sheridan, which will be rechristened the Durant Six, will not begin for a month or more under the new ownership. The models are being redesigned and rebuilt at the Long Island City plant. They will retain practically nothing of the old Sheridan. The Durant engine will be used and all the principles of design embodied in the Durant Four will be included in the Six. One of the main features will be the accessibility of the various parts and another will be the strength of the chassis.

The general body lines designed by Burke will be retained except that the hood will be lengthened eight inches. When Burke designed the Sheridan he worked out ideas he long had cherished of building a luxurious car which would sell at a moderate price with many of the refinements found in those of the higher price classes. He sold this idea to Durant and the result was the establishment of the Sheridan division of General Motors. This idea will be retained by the new company but the car which will be turned out will be much more powerful than the one which was built up to Aug. 1.

The prices of the various models of the Durant Six will be: Roadster, \$1600; touring car, \$1650; coupe, \$2250, and the sedan, \$2400.

The sedan model of the Durant four now is ready for production and will sell at \$1365. The coupe will sell at the same price but a few changes are to be made in the body lines.

## Severin to Move Plant; to Employ 500 Workers

OAKLAND, CAL., Aug. 10—The Severin Motor Co. of Kansas City will move its factory from that place to Oakland, according to J. R. Elrod, local representative of the company, with offices in the Henshaw Building here. The decision to locate here was made after H. T. Severin, president of the company, had inspected sites in several Pacific Coast cities, Elrod said. The new plant will cover four acres, and the first unit, 60 x 450 feet in size will be started immediately, according to the local representative, who placed the cost of the first building at \$300,000, but admitted that the land for the plant had not yet been purchased.

## Capitalists to Get Engineers' Report Favoring Dirigibles

**Benedict Crowell Will Sign Recommendation for New York-Chicago Air Line**

WASHINGTON, Aug. 9—Marked progress has been made in the development of dirigible transportation in this country. On Friday of this week a report favoring the establishment of air lines between New York and Chicago, and ultimately between New York and San Francisco, will be submitted to a powerful group of financiers assembled in New York. The recommendations will bear the signature of Benedict Crowell, formerly Assistant Secretary of War, and Edward Shiladar, a noted consulting engineer who assisted General Goethals in building the Panama Canal. After nearly two years of intensive study in Holland, Germany, France, England and Italy, these engineers are convinced that aerial transportation by dirigibles is the safest, fastest, most profitable and economical method of travel at present, and, in addition, has infinite possibilities for development.

It is believed that when the bankers are told that the investigation discloses commercial advantages, they will decide that the plan should be put into effect immediately. It also is expected to give impetus to research by American engineers in this field of industrial activity and ultimately result in the establishment of factories in this country for the construction of dirigibles.

There are no plants of this kind in America to-day and American bankers are desirous that the country should be independent of foreign manufactures. Plans have practically been completed for undertaking this gigantic enterprise with a capitalization of \$50,000,000. Powerful industrial and financial groups are co-operating in this work. A heavy investment will be required if the aerial line is operated without governmental assistance.

### Propose "Blimp" Hangars

Proposals have been made to use navy "blimp" hangars on Long Island, St. Louis and elsewhere, but the engineers feel that it would be best to construct private terminals. It is estimated that these terminals would cost approximately \$6,000,000 each, while the first set of dirigibles would cost about \$2,000,000 each.

Negotiations have been conducted with the Schutte-Lanz Co. in Holland and with German and Italian construction firms, but the deal has not been closed. Crowell and Shiladar devoted particular attention to the patents and the engineering features. It may be possible to bring engineers from Holland and Germany to this country to build up an industry here but this is not the con-

trolling feature in the arrangements.

According to the engineers' estimates, it will be possible to use three ships about the same size or slightly larger than the R-34 which flew from England to this country. The tentative plans call for a carrying capacity of 100 passengers to cover the flying distance from New York to Chicago in ten to twelve hours, with a possible guaranteed 12-hour trip.

The Dutch and German ships are luxuriously equipped but the plans of the engineers call for the elimination of many non-essentials in upholstery and furnishings in order that the weight may be lessened and the cost of the craft reduced. A study of trans-continental, trans-Atlantic and trans-Pacific aerial routes shows that Chicago would be the logical aerial center of the world.

Further details regarding the mechanical features of the dirigibles will undoubtedly be given to the public at an early date, when the financial arrangements are actually completed. Officials of the investigating body stated that sentiment among the financial interests favors the establishment of this form of transportation and that many manufacturers of heavier-than-air machines had manifested a friendly interest.

## File Bankruptcy Suit Against Shuler Axle

LOUISVILLE, KY., Aug. 8—Alleging that certain creditors of the Shuler Axle Mfg. Co. have been preferred over them, other creditors have filed an involuntary petition in bankruptcy against the company in United States District Court. It is alleged that the company has liabilities of \$385,000 with assets of \$250,000.

The Shuler Axle Mfg. Co. is a Michigan corporation and was organized in Detroit about four years ago. It manufactures front axles for automobiles.

According to the officers of the company it was forced into bankruptcy because its assets were tied up in securities and materials which could not be liquidated. The officers of the company are: J. J. Kean, president; R. P. Noud, vice-president, and F. A. Shuler, secretary-treasurer.

## Ford Sales Show Gains in South and Mid-West

DETROIT, Aug. 10—While Ford business in all parts of the country is continuing at record heights, the company is particularly elated with improvement in the South and Mid-West, where for a long time things were at a standstill.

In an analysis of the changed situation in the South the company expresses the belief that the elimination of the one-crop plan in favor of diversified crops is responsible for the new order of things. Prosperity will be no longer dependent upon the market price for cotton or sugar or rice, Southern dealers assert to officials, but will be a permanent and welcome guest in the land.

## Creditors Ask Sale of Standard Parts

**Ask Federal Judge for Order—  
Figures Receiver Submits  
Questioned**

CLEVELAND, Aug. 9—Creditors of the Standard Parts Co. met here to-day and voted to ask Federal Judge D. C. Westenhaver to grant an order for the immediate sale of the property of the \$20,000,000 corporation which is engaged in making automobile accessories and parts. Judge Westenhaver appointed receivers for the corporation last September upon application of the stockholders.

An all day discussion preceded the action of the creditors and at times the debate grew stormy. P. A. Connelly, secretary of the company, testified that when the Standard Parts Co. was formed the capital of the corporations entering the combine was written up to the extent of \$5,156,000. Since the merger was formed, he said, it had lost \$8,094,000. He also attacked the inventory filed with the court, the figures in which were prepared by expert accountants.

Connelly said that the inventory should be reduced and he contended that the assets were in reality but \$1,000,000 in excess of debts. Attorney A. V. Cannon, who represents the receiver, Frank Scott, asserted that the inventory was correct and that the assets of the company amounted to approximately \$18,000,000. He said that after paying all debts the preferred stockholders would have left 100 per cent equity in the company.

The creditors have a plan for the sale of the property under which they would bid in the plant, form a new company and offer stock in it to the stockholders of the present corporation. Those not purchasing would lose all they had invested. The creditors would have control of the new corporation.

Judge Westenhaver took under advisement the appeal of the creditors and he did not give his opinion on the petition of the receiver for an order to pay creditors a dividend of 10 per cent on their claims.

### Court Action Put Off

Action likewise was postponed by the court of the request of the stockholders that the receiver be continued for the present. Clevelanders who have been following the corporation's affairs see a hard fight being made for control by a certain group. A majority of the stockholders profess to be satisfied with the showing of the receivers who have been making money for them in the last few months. They hold that if the corporation is dissolved and the plants are sold they stand to lose. They are fighting hard to convince the court that if the present management continues, with good fall business ahead, the company will be strengthened very materially financially.



## 7266 Workers Added to Payrolls in July

### U. S. Survey Shows 4.2 Increase in Employment in Automotive Industry

WASHINGTON, Aug. 10—Slight increase in employment in July has been reported for the automobile industry, after a survey by the special agents of the United States Employment Service. Under the classification of "Vehicles for Land Transportation," the industry is reported to have added 7266 to the payroll, representing an increase of 4.2 per cent.

#### Much Part Time Work

In Michigan the official agents found that part-time employment was prevalent, but strenuous efforts were being made to stimulate business by increased advertising, additions to the sales forces, more attention to efficiency of operation, and by reducing costs and labor turnover. In Flint it is reported that the automobile plants are active, although not working on full time. A gradual return to normalcy is expected in other automobile centers through the district. However, the analysis of returns would seem to indicate that in the majority of instances where there has been improvement in the employment situation it is primarily traceable directly or indirectly to the harvest and other seasonal agricultural activities. Secondly, and to some extent as a natural corollary, there have been material gains in railroad occupations, principally in those which have to do with repairs to rolling stock and roadbeds.

Despite an obscured outlook there is manifest a very general optimism which everywhere agrees as to the certainty of an approaching business revival and varies only in the predicted time it is destined to arrive.

Widespread unemployment and part-time continues in practically all lines, particularly in the metal and building trades and transportation circles. While certain textiles show a marked improvement, frequently reaching normal and even exceeding it, and orders for shoes are being taken, the general employment situation throughout the district has not improved.

## Net Sales of Franklin \$14,393,858 in 6 Months

SYRACUSE, Aug. 6—H. H. Franklin Manufacturing Co. in its mid-year statement to stockholders dated June 30 reports net sales for the first six months of 1921 of \$14,393,858 with a net profit of \$735,826. The net income for that period was \$786,561. Sales for the six months equalled 82 per cent of sales for the same period of 1920 and June sales of 1046 cars were the largest for that month in the history of the company.

Cash on hand June 30 was \$850,386,

compared with \$1,748,294 on Dec. 31. Sight drafts and Government bonds were \$293,853 as compared with \$986,558, accounts and notes receivable had increased to \$715,154 from \$591,202. The merchandise inventory had been cut down to \$5,990,701 from \$7,614,695. Total current assets were \$7,850,096 as compared with \$10,940,752 six months earlier.

There was a very large reduction in current liabilities for the first half of this year, the total being \$2,528,360 as compared with \$7,368,180 on Dec. 31. Bank loans of \$4,510,000 were wiped out completely. Current accounts payable and miscellaneous liabilities were \$2,528,360 as compared with \$2,858,180. The company reserved \$2,209,421 for depreciation of fixed assets.

## Milwaukee Factories Still Taking on Men

MILWAUKEE, WIS., Aug. 10—While manufacturers of motor cars and trucks, motors, frames and other parts are still adding men to payrolls, the rate of increase reached during the early part of July is not generally being exceeded, since operations now are commensurate with current demand and expectations of the call from distributors and dealers for the remainder of the summer. It is believed unlikely that any considerable enlargement of production will be necessary until the fall demand becomes apparent, for manufacturers are not inclined to make up cars for stock and keep output closely related to current orders.

The most hopeful sign of the week is the reopening of railroad locomotive and car shops in Wisconsin and elsewhere, giving employment to a great many men who have been out of work since February or March, or who have been employed half-time or less by the rotation system. As a class, railroad men were an important factor in the sale of passenger cars during the period of high wages and general employment, and it is regarded as being favorable to car sales in the coming months that conditions should take a decided change for the better in their situation. The main plant of Nash Motors Co. at Kenosha has virtually reached the 3000 mark in number of employees at work on full time. The Milwaukee plant is back at normal capacity of 1000 men. The Waukesha Motor Co. at Waukesha, Wis., is adding 200 men, giving a total of 400.

#### HAYNES TRACTOR DENIAL

INDIANAPOLIS, Aug. 10—Officials of the newly organized Haynes Tractor Co. and allied interests denied the rumor that they were contemplating taking over the Mid West Engine Co. of this city in a statement. Both Elwood Haynes and A. G. Seiberling declared the report was untrue. The new Haynes company took over the Tractor Co. of Indianapolis, and the Powell Tractor Co. of Elwood, and was incorporated at Indianapolis a couple of days ago.

## Many Tire Plants Offered Seiberling

### Former Goodyear Head May Operate Chain of Factories— Plans Developing

AKRON, Aug. 10—Although Frank Seiberling, founder and former president of the Goodyear Tire & Rubber Co., has issued through his secretary, R. C. Ellsworth, a formal denial of his rumored acquisition of the Republic Rubber Co. plant at Youngstown, his recent conferences with trustees of the Republic company and his inspection of other small rubber plants have given rise to the firm belief that Seiberling plans to stage his "comeback" in the tire industry by establishing and operating a chain of small tire plants scattered throughout the country.

#### Heads Many Companies

Seiberling virtually is in control of the Lehigh Rubber Co. of New Castle, Pa., which he purchased some time ago at receiver's sale. He is one of the controlling heads of the Star Rubber Co. of Akron. His secretary, R. C. Ellsworth, is heavily interested in the Marion Rubber Co. of Marion, Ohio, while W. E. Palmer, former Goodyear treasurer, now is trustee of the Marion company. Bargain offers for sale of the Republic plant at Youngstown are known to have been made to Seiberling.

In addition many small rubber plants throughout the country which now are in the throes of financial difficulty have been offered to Seiberling across the bargain counter. Seiberling is expected to make some formal announcement shortly relative to the scope of his renewed activity in the tire industry and the number of small plants which he expects to control and to operate.

#### In Touch with Officials

Soon after Seiberling retired from Goodyear, A. G. Partridge, former vice-president and sales manager of the Firestone company, became sales manager of the Star Rubber Co., in which Seiberling is heavily interested. This move, it is claimed, is the first step toward Partridge becoming general sales manager for the controlling company, with headquarters in Akron, which will operate the chain of small rubber companies.

Many former Goodyear officials who retired with Seiberling, and several who have since resigned from Goodyear, now are under negotiations with him, it is reported, and will be lined up for the new organization.

It is also believed that Seiberling is working on new types of tires in his New Castle plant. E. L. Davies, one of the Goodyear compounders and expert rubber chemists, has resigned and has been made development manager of the New Castle plant.

Seiberling has opened offices in the Akron business district and is in daily conference with men of the tire industry.

## Bill to Ban Truck Reimports Revised

### Graham Reduces Proposed Tariff Impost to 90%—Favored in House

WASHINGTON, Aug. 8—Favorable action is expected in the House on the revised Graham resolution, which has been reported by the House Committee on Ways and Means. The new measure provides for the imposition of a 90 per cent tax on all surplus war materials which have been sold abroad and reimported into this country. The bill is designed to check the flood of army motor trucks into the markets of this country.

The original bill as introduced by Congressman Graham, of Illinois, provided a 300 per cent assessment at customs, but he changed the rate to 90 per cent after consultation with members of the committee. The new bill is expected to prove as effective as the original, inasmuch as a tax of 90 per cent is sufficient to prohibit unfair competition by underselling of American motor truck dealers. The bill has a privileged status and will undoubtedly be passed this week. The committee's action is based upon the knowledge that some ad interim legislation was necessary at this time to stop the increase in reimportations of war supplies.

The Fordney bill which recently passed the House, carried a specific provision levying heavy rates on reimported material, but owing to the fact that the tariff bill will be delayed in the Senate, Congressman Graham offered the resolution. If this measure is passed by the Senate and signed by the President, it will bring to an end several months of consistent agitation in behalf of motor dealers. The original protests were filed from Los Angeles dealers' organizations where rebuilt cars were offered for sale at prices which could not be met by regular dealers.

## North Carolina Raises Insurance Theft Rates

CHARLOTTE, N. C., Aug. 10—The alarming increase in automobile thefts in North Carolina has caused insurance companies to place additional restrictions upon the insurance of cars against theft and to increase the rates an average of 35 per cent. A statewide investigation into activities of reported gangs of automobile thieves has been instituted.

While no estimate is obtainable as to the number of machines stolen monthly in the Carolinas, insurance men state that the increase in thefts within the last three or four months has been alarming, and that organized gangs have gotten rich through the theft of machines and their sale in distant cities and countries. It was said that one "company," with headquarters probably in Columbia, exported stolen machines to South Amer-

ican countries until the men engaged in the traffic were apprehended.

Virtually all the larger insurance companies have instituted the system of making a thorough investigation of the character and standing of the applicant before insuring machines. This is due to the numerous cases where the automobile owner has destroyed his own car for the purpose of collecting the insurance. The "moral risk" is receiving careful consideration by the companies.

## Cadwell Incorporates as Monarch Tractors

WATERTOWN, WIS., Aug. 8—E. D. Cadwell of New York, who recently purchased the assets of the bankrupt Monarch Tractor Co. of Watertown, Wis., for \$44,000, has incorporated the Monarch Tractors, Inc., under the laws of Delaware, with a capitalization of \$500,000 preferred and 5000 shares of common stock without par value. A Wisconsin charter has been granted. The application states that \$100,000 is represented by the investment at Watertown.

Cadwell, W. H. Foster and James A. Bell appear as incorporators of the new Monarch company. Cadwell was a principal stockholder and one of the principal creditors of the old Monarch company and its parent concern, General Tractors, Inc., of Paulsboro, N. J., which was petitioned into bankruptcy at the same time that the Monarch company was declared insolvent. The Watertown works have been in continuous operation on a limited scale since the financial difficulties came on, and since Cadwell took over the plant production has been materially increased.

## Creditors Get \$17,000 from Ferris Company

CLEVELAND, Aug. 10—William A. Ferris, one of the receivers of the Ohio Motor Vehicle Co., manufacturers of the Ferris automobile and trailer, states that practically all of the preferred creditors have been paid during the six weeks the receivers have been in charge. Approximately \$17,000 has been distributed to these creditors. The accounts payable now amount to \$158,000, while the assets total \$500,000. The receivership petition was a friendly action brought to relieve the company from suits threatened by small creditors. The application was filed by the Continental Motors Corp., which had a claim for \$32,000. It was filed after consultation with the company's management. Business has increased steadily since the receivers took charge.

## COAST TIRE TO EMPLOY MORE

OAKLAND, CAL., Aug. 10—The Coast Tire & Rubber Co. will increase its working staff to 500 persons Oct. 1. The company is now producing 125 tires a day, but, according to F. W. Neubach, special representative of the firm, will increase production to 750 tires.

## Ford's Tractor Plan Aids Salesmanship

### Sales Campaign Will Stimulate Better Business, Factory State- ment Declares

DETROIT, Aug. 8—Henry Ford's plan of pushing tractor sales through all dealers of the Ford Motor Co., regardless of whether located in the heart of an industrial district or in the center of a farming community, finds defense at the factory in the statement that the plan helps to develop salesmanship among the company's dealers.

No effort is required to sell Ford cars, is the factory view. Selling of tractors, however, particularly in some eastern cities where tractors have scarcely ever been seen in operation is considered another question. Of course it will require effort to sell them, admits the factory, but dealers and salesmen are supposed to exert themselves.

There is plenty of opportunity for tractor sales outside of actual farming districts, holds the company. All sorts of pamphlets showing sales opportunities are constantly being mailed to dealers setting forth work in which tractors can be used advantageously aside from farm work. In the opinion of the company, tractors could be far more serviceable in many forms of general contracting and road construction work than horses.

It was further declared that while company experts were constantly at work developing new fields in which tractors might be used, it was part of the dealer's work to discover a few outlets for himself and put sales over. Practically every inch of the United States has been carefully analyzed, the company declares, and no tractors are being shipped where there are no sales possibilities. This holds just as good for New York City as for Jones Crossing.

Notwithstanding the contentions of the factory, there is much discontent among Ford dealers because of arbitrary shipments of tractors which the dealers do not want and which they insist they cannot sell. It is understood that in some cases where the tractors have been refused, car shipments have been withheld. In a few cases, at least, Ford agencies have been given up because of the tractor plan.

## Ford Dealers Evolve Plan to Sell Tractors

NEW YORK, Aug. 9—Metropolitan distributors of Ford cars who have been compelled by the company to accept shipments of Fordson tractors in order to get the automobiles, have evolved the plan of fitting the tractors with rubber tires and other special equipment with the idea of promoting their use on docks, in warehouses and for other industrial purposes. Considerable work also has been done in adapting the machines for snow removal and other municipal work.

## May Have Truck Lines for Coast Terminal

### Consider Motor Transportation for Proposed San Francisco Bay Port

SAN FRANCISCO, Aug. 8—A combination of municipal and private enterprises has completed surveys, plans, engineering estimates and reports, with the approval and consent of the Federal Government, for the construction of a port terminal on the eastern shore of San Francisco Bay.

This deep water improvement, which has been incorporated as the Pacific Port Terminal, Inc., will cost several millions of dollars. It is intended to furnish adequate facilities for the handling of a large part of the foreign trade of the United States, a commerce valued in 1920 at more than \$2,000,000,000 and which, it is estimated, will be doubled within the next 5 years.

One of the most prominent features of this terminal—which will have 140,000 lineal feet of berthing space, with 30 feet of water at mean low tide—is the serious consideration which has been given to equipment and facilities for the accommodation of motor truck lines throughout the terminal and on the 6000 acres of manufacturing and industrial sites on the mainland directly back of the terminal.

#### Five Main Highways

Five main highways, leading through Berkeley, Emeryville, Oakland and Alameda, averaging 80 feet in width, lead to the site of the terminal. Each will be continued in loop form through the industrial section on the mainland, and from this loop provision is made for paved streets equally wide to every wharf shed in the 3,000,000 square feet of wharf shed space on the filled-in bulkhead of each unit and to every warehouse on the 3,500,000 square feet of warehouse space on the filled front of the mainland just back of the projecting quay of each unit.

There will be two wide paved ways running out each quay to the head of the bulkhead, for the use of automotive vehicles, so that motor truck lines may deliver their freight direct to the shipside in exactly the same manner as continental freight cars. Special loading and unloading machinery for motor trucks is included in the plans for the equipment of each quay, and motor trucks will be handled in the same manner as freight cars, with clearance kept for them throughout the wharf sheds and in the warehouses. While classification yards will not be necessary for motor trucks, large space has been provided alongside the car yards for motor truck use.

#### Establish "Free Port"

It has been considered necessary to establish a foreign trade zone (free port) on this terminal. There being no inland shipments from this zone, railroad tracks

will not be necessary and motor truck distributors are expecting that all this large traffic will create a considerable demand for trucks.

Motor truck lines operating out of San Francisco Bay into northern California and Nevada will have direct connection with trans-Pacific steamers instead of having to ferry across the bay for their cargoes. This will mean a big saving in operation and will probably increase the number of fleets operating.

Plans for the equipment on the quays include ramps on which motor trucks can be driven directly onto any deck of a berth freighter, loaded and driven off again, in case there are any difficulties in the way of loading or unloading a cargo shipside. This will also mean a reduction in operating costs.

Approximately 10,000 miles of highways suitable for the operation of motor trucks and on which motor trucks are now operating will be given direct connection with deep-sea commerce by the construction of the first unit of the new Port Terminal at Berkeley. Connection will also be made between motor truck lines and inland waterways and navigable streams entering San Francisco Bay, as well as with all towns on the 116 miles of water front of that bay.

## May Merge Two Western Automotive Associations

SPOKANE, WASH., Aug. 8—Negotiations contemplating a consolidation of the Washington Automobile Chamber of Commerce and the Washington Automotive Trades Association was the most important subject discussed at the annual meeting of the latter association. The consolidation is expected to create a body of greater power.

Discussion of the margin of profit and contracts occupied a liberal share of the attention of the delegates to the annual convention. Several speakers declared that the dealers need a larger margin on their goods and if they hope to get the backing from the banks that they expect the margin must be increased. It also was argued that most of the contracts under which dealers operate at present are unwarrantably unfavorable to them. The association members want a contract that cannot be taken from them if they live up to its provisions. Crystallization of sentiment on these questions was urged.

#### OLIVER-BARTH MERGER

MILWAUKEE, Aug. 8—The recent change of corporate style of the Oliver Mfg. Co., Milwaukee, to Oliver-Barth Jack Co., marks the formal consolidation of the Oliver company with the Barth Mfg. Co., both specializing in the manufacture of lifting jacks and similar automotive equipment. The Oliver company, originally established in Chicago, was acquired by Milwaukee interests identified with the Northwestern Malleable Iron Co. of this city about a year ago and the plant was moved to Milwaukee. Now the Barth company has been purchased by the same interests.

## Electric Railways After Motor Trucks

### Association Opens Nation-wide Propaganda Campaign on Tax Question

NEW YORK, Aug. 10—A nation-wide propaganda campaign in opposition to the widespread use of motor trucks is being conducted by the American Electric Railway Association.

The slogan of the campaign is: "Use the trolleys—Save the highways."

The chief argument advanced against trucks is that they wear out the highways and do not pay a fair proportion of taxes. The campaign is being conducted by a committee of 100, representing traction companies in all parts of the country. This committee, acting through local electric railway companies, supplies the newspapers with "canned" editorials and other material which purports to show why the trolley companies are not being treated fairly because they are compelled to pay taxes and the motor bus freight and passenger car companies have no obligations of this character beyond their license fee.

#### Make Vigorous Efforts

The efforts of this committee probably are responsible for the vigorous efforts which are being made in many sections of the country, particularly in Connecticut, to curb the operations of motor bus lines which have cut deeply into the profits of street car companies by offering lower rates of fare as well as more convenient and efficient service.

A similar campaign against the use of motor trucks and tractors has been instituted by the Horse Association of America, which contends that farm work as well as the hauling of merchandise can be done more economically and expeditiously by the use of horses.

The latter campaign is just getting under way but it is understood it will attain vigorous proportions.

## Immel Stockholders Name New Directors

COLUMBUS, OHIO, Aug. 10—The stockholders of the Immel Co., which recently purchased the large automobile body plant as well as a large amount of materials from the receiver of the company, met Aug. 3 and named the following board of directors for the new company: A. G. Gilmour, G. P. Hickie, John W. Dinsmore, J. C. Goeller, F. E. Kocher, C. W. McFarland and V. W. Moss.

A name will soon be selected and incorporation papers filed with the Secretary of State. Some question as to the name of the new company has arisen. With the filing of incorporation papers, steps will be taken to put the plant in active operation. It is likely that J. D. Potter, formerly with the Kilbourn & Jacobs Co. of Columbus and later with the American Motor Truck Co., of Newark, will be made general manager.

## Rickenbacker to Take Over Everit Plant

New Car Will Be Exhibited at New York and Chicago Shows

DETROIT, Aug. 10—Rickenbacker Motor Car Co., the latest entrant into the Detroit automotive field, will take over the Everit Bros. plant in from sixty to ninety days and will at once tool up for production the first of the year. The first Rickenbacker cars will be exhibited at the New York and Chicago shows and at all leading shows of the season.

The Everit plant, which is owned outright by Byron F. (Barney) Everit, is turned over by him to the Rickenbacker company, of which he is president, for a consideration of \$2,000,000. One million of this is paid in stock of the new company and he has subscribed for \$1,500,000 more. In the incorporation of the company, as filed here, Everit is shown as practically sole owner of the company's stock but this later will be apportioned to the other men associated in the company, with Everit retaining control.

The automobile painting and trimming business of Everit Bros. will be removed to another plant in Detroit, for the purchase of which Everit is now negotiating. Three plants are under consideration, he said, one of which will be selected in the near future.

### Sufficient Working Space

Present buildings of the Everit plant on Harper Avenue will afford the Rickenbacker company sufficient working space for the production of 20,000 to 25,000 cars a year. There is also unoccupied acreage included in the purchase to permit of tripling or quadrupling present capacity should it be required.

When the removal of the equipment of the Everitt plant is started the installation of the Rickenbacker machinery will follow at once. This will be done rapidly, for the company has economized on time by having patterns made for the equipment required, as the development of the car progressed. This has covered two years and ten months and the company is ready to-day with all its patterns for machinery and machine tools.

Every bit of the equipment will be specialized to the last degree, according to the company's plans. Contracts for everything it will require are now being placed. It will start off the first of the year with an absolutely clean slate, with all equipment and material bought at what Everit regards as absolutely bottom prices. In his opinion material prices are now as low as they will get and may show slight advances from this time on.

Details as to prices and specifications of the new car will not be released until the cars are placed on exhibition at the shows. It will be a medium priced car,

Everit said, and will be up to the minute in every particular. He regards the outlook for the company as especially bright and declares that its formation now, with material prices at their lowest, will prove particularly helpful in making the car a big factor in the trade.

## Bakelite Wins Ruling in Suit Over Patents

NEW YORK, Aug. 8—Judge Chatfield in the United States District Court has handed down a decision sustaining the contentions of the General Bakelite Co. of this city in its suit against the General Insulate Co. of Brooklyn for alleged infringement of patents. The decision is in favor of the plaintiff and declares that the three patents in question, known as the heat and pressure patent, the indurated product patent and the molding patent, all have been infringed by the defendant. The General Insulate Co. used products manufactured by the Redmanol Chemical Products Co. of Chicago but in his decision sustaining the validity of the Bakelite patents, Judge Chatfield said:

"The record shows that in fact the Redmanol company has stood behind the defendant in the trial of this action, and in so far as investigation of the prior art and discussions of questions of patentability are concerned, the Redmanol company has as freely and fully presented its evidence as if the action had been against the Redmanol company for infringement of the plaintiff's patents in the manufacture of the synthetic gum itself."

## General Motors Adds to List of Stockholders

NEW YORK, Aug. 8—The increase in the number of General Motors stockholders, which has been in progress for the past year, continues. At present there are approximately 66,000 stockholders of all classes, compared with 59,000 three months ago and 31,000 a year ago. The detail of the number of stockholders follows:

Classes of Stock:	Number of Stockholders	
	August, 1921	May, 1921
6% Preferred.....	3,170	3,164
6% Debenture.....	10,107	9,934
7% Debenture.....	9,046	7,847
Common .....	43,001	37,922
	65,324	58,867

### TIRE MAKERS WILL MEET

NEW YORK, Aug. 5—The first of the quarterly meetings of the tire manufacturers' division of the Rubber Association of America will be held Sept. 22. The executive committee will hold its regular monthly meeting the previous day and such recommendations as may be formulated then will be considered at the division meeting. Two important questions under consideration are mileage adjustment and protection against price decline.

## Pennsylvania Opens Big A.E.A. Campaign

Jobbers Dine and Hear "Pep" Addresses—Plan Week of Activity

PHILADELPHIA, Aug. 10—Jobbers of the eastern Pennsylvania district successfully launched their part in the national sales promotion movement of the Automotive Equipment Association at a dinner to-night. Upward of 150 proprietors, executives and salesmen of nine jobbing houses met at the rooms of the Automobile Trade Association and after their repast listened to four inspirational and informative addresses on the opportunities offered jobbers and their salesmen to increase their own profits and those of manufacturers and retailers by aggressive participation in the sales promotion campaign.

One of the speakers was Harry C. Spillman of the Remington Typewriter Co.'s educational department, who in the main repeated the brilliant talk on development of personality which he made at the Mackinac Island convention of the Automotive Equipment Association. E. J. Cattell, city statistician of Philadelphia, talked on the mental and moral qualities necessary to successful salesmanship.

T. F. Cullen, managing editor of the *Automobile Trade Journal*, spoke of the need for a campaign of education throughout the trade and suggested methods of participation in it by jobbers and their salesmen.

Neal G. Adair, editor *Motor World*, basing his talk on observations recently made in trips with jobber salesmen and in investigations of accessory selling activities of dealers and garagemen, outlined a program of activity which would enable jobber organizations to attain momentum in the sales promotion movement prior to issuance of detailed instructions for the work from association headquarters.

Jobbers participating in the meeting were: Gaul, Derr & Shearer Co., J. H. McCullough & Son, George W. Nock Co., Cahall Motor Supply Co., Berrodin Rubber Co., Manufacturers Supplies Co., Roberts Electric Supply Co., Standard Supply & Equipment Co., all of Philadelphia, and General Auto Supply Co. of Lancaster.

### EDITORS SEE NEW DURANT

NEW YORK, Aug. 10—At a luncheon served at the Long Island City assembling plant of the Durant Motors Corp. about one hundred automobile editors from New York, Brooklyn, Newark and other nearby cities inspected the new Durant car previous to its public presentation on Broadway at the showrooms of the Poertner Motor Car Co. W. C. Durant, the president of the company, made a short address in which he told briefly his own connection with the automobile business, and engineering and other officials spoke.

## Wisconsin Opens War on Federal Motor Tax

**Manufacturers, Dealers and Owners Band in Opposition to Measure as Added Burden**

MILWAUKEE, Aug. 10—The storm of opposition and protest that has arisen in the automotive industries and among users against the proposed national tax on passenger and commercial cars has taken organized form in Wisconsin under the leadership of associations of manufacturers, dealers and owners. Jesse A. Smith, Hudson and Essex distributor, who is president of the National Automobile Dealers Association, said:

"While both the National Automobile Dealers Association and the National Automobile Chamber of Commerce have representatives at Washington fighting to defeat this proposition, we need the united protest of owners added to ours if this tax is to be defeated. While Congress is reported to be lukewarm on the proposal of Secretary of the Treasury Mellon, which is reported to have the support of the President, we are apprehensive, for it is a fond idea of legislators to regard the motor car as a 'luxury,' that owners are wealthy persons, and thus may be taxed at will. Owners now pay a 5 per cent tax on new cars, are required to pay State and sometimes local license fees, personal property taxes, and State and local road taxes. Seventy-five per cent of the passenger cars in this country are used for business, and trucks certainly are business cars. We believe the motor vehicle already is overtaxed, and no additional burden should be imposed."

Bart J. Ruddle, executive secretary and manager of the Milwaukee Automotive Dealers Association, said: "We are maintaining good roads in Wisconsin and paying heavily for them. Why should we also be called on to help some undeveloped State build its roads? We have repeatedly made our case known to members of Congress and we will not halt our efforts in opposition to the proposed Federal tax until it is definitely killed. Vigorous protests also have been made from other parts of the country. There are 9,260,000 owners in the United States and I doubt if Congress will dare to antagonize them further. In addition to all other taxes, motor trucks are compelled to pay an 8 per cent transportation tax and it is not right and proper that the great national transportation system being built up with commercial vehicles should be penalized more than it already is."

### DETROIT EMPLOYS MORE MEN

DETROIT, Aug. 10—Reports by the 79 members of the Employers' Association for the week ended July 26 showed 117,572 men on the payrolls as compared with 115,397 for the previous week. The number of part time workers was practically the same as the week before.

### LORD NORTHCLIFFE PRAISES BRITISH MOTOR BUS; CALLS U. S. SLOW

WASHINGTON, Aug. 10—Lord Northcliffe, the eminent British publisher, who is now on a tour of the world, is a warm friend of the motor bus. In an interview while he was in this city he declared he could not understand why Americans had been so slow to grasp the possibilities of this form of transportation. He stated that in this respect American cities were lagging far behind those of Europe where motor bus transportation had been brought up to a high standard. He pointed out that in London, during the rush hours, motor buses provide practically incessant and ideal service.

### Palmerton to Manage Foreign Trade Bureau

NEW YORK, Aug. 10.—As a part of its plan to co-operate with the Department of Commerce, the Rubber Association of America has granted a leave of absence to P. L. Palmerton, manager of the Foreign Trade Bureau of the association, so that he can accept the position of chief of the rubber industrial division of the Bureau of Foreign and Domestic Commerce.

The Bureau of Foreign and Domestic Commerce proposes to establish from 12 to 15 sub-divisions, each of which will maintain and strengthen the contact between some particular industry and the bureau. The absence of Palmerton will not mean any lessening of foreign trade activities by the Rubber Association. He intends to carry on much of this work in Washington, and if he finds later that this plan is impracticable the work will be handled here.

### Anderson August Sales Will Run Ahead of 1920

DETROIT, Aug. 10—Business in high-class custom built cars promises well for fall and winter months, declares General Sales Manager C. B. Shanks of the Anderson Motor Co., Rock Hill, S. C., who was in Detroit this week. August business with the Anderson company will run ahead of sales in August, 1920, he said, after falling slightly under the 1920 totals in July. New territories are being opened by the company in many sections of the country, through the appointment of distributors.

### HUNT QUILTS NEW YORK REO

NEW YORK, Aug. 8—James J. Hunt, vice-president and general manager of the Reo Motor Car Co. of New York has tendered his resignation effective Sept. 1. Hunt has not been in the best of health lately. He has been with Reo in the New York territory since 1915.

## 'Midget' Car Appears on Japanese Roads

**Built to Meet Peculiar Conditions—De Luxe Engine Used Made in U. S.**

SEATTLE, Aug. 10—A new automobile of Japanese production known as the "Midget" was recently placed on the market in Japan. The car was built to meet the peculiar conditions of Japan, taking into consideration local conditions, such as poor roads, narrow streets, high price of fuel and limited buying power of public. The car, which is very small, as its name implies, with a wheel-base of only 84 inches, is manufactured at the Shibaura works of the Far Eastern Automobile Co.

The total weight of the car is only about 850 pounds. The top of the door is 37½ inches from the ground. The engine is a "De Luxe" air-cooled V-twin, developing 12 horsepower, and is made in Indianapolis. Cooling is aided by a belt-driven fan, placed directly in front of the engine behind the false radiator. Ignition is by Bosch high-tension magneto, and lubrication by automatic gear pump, assisted by a hand-operated oil pump. The transmission is selective, with three forward speeds and one reverse. The transmission case is mounted far enough behind the engine to allow for a transmission brake between the two units. The drive is taken from the transmission by a propeller shaft to a live rear axle. Drive is taken through radius rods arranged on the three-point system, somewhat similar to that employed by the Ford.

The body design follows the French practice. The front seat is large enough for the driver only, but the rear seat accommodates two with comfort.

The makers state that the car will average from 25 to 35 miles per gallon, and that its maximum road speed is about 30 miles an hour.

### Zee-Zee Rubber Files Bankruptcy Petition

TRENTON, Aug. 10—The Zee-Zee Rubber Co., manufacturers of automobile tires and tubes and doing business through a chain of stores in New York, the New England states, New Jersey and Pennsylvania, to-day filed a petition in bankruptcy in the United States court here. The liabilities are scheduled at \$293,552 and the assets at \$434,964.

The general business depression is responsible for the failure, according to Herbert P. Backes, attorney for the corporation, who filed the petition. More than one thousand creditors are listed. The plant of the company, at Yardville, a few miles south of Trenton, was built a few years ago and is valued at \$392,000, according to the petition. The concern ceased operating the plant the first of this month, throwing many men out of work.



## Lesson Is Forced Home by Tax Plan

### Mellon Proposal Teaches Congress Owners Consider Cars Essential

WASHINGTON, Aug. 9—One of the outstanding developments of the proposal of the Secretary of the Treasury for a flat levy of \$10 on automobiles and trucks is the realization that has come to Congress that 10,000,000 automobile owners regard their machines as essential to their welfare and prosperity. There has been an unmistakable reaction against the Treasury plan and Congressional leaders were quick to voice the sentiment. It now appears that if the automobile is assessed as a means of additional revenue it will be graduated according to horsepower. It is significant to note that nowhere in the tax discussions has the repeal of the excise taxes been favorably mentioned.

The latest tax proposal has awakened the automobile owner to the fact that there is reasonable ground for the claim of the National Automobile Chamber of Commerce that the industry has been singled out for so-called "stigma taxes."

Heretofore, the average automobile owner paid little attention to the fact that he paid a large sum in taxes when the car was purchased. Now that the Treasury wants another assessment, the car owner has figured the total taxes and discovered that national, State, municipal and road taxes placed him in a distinct class in that the total exceeded any other group. The net result is that the industry has gained an ally in fighting discriminatory taxation.

The Secretary of the Treasury has quite unwittingly made the country cognizant of the true position of the automotive industry as it relates to taxation and strengthened it accordingly.

## Myers Spark Plug Will Move Plant to Detroit

DETROIT, Aug. 9—The plant of the Myers Spark Plug Co. will be moved from Toledo to this city, following arrangements for the financing of the new Detroit Ignition Co., which has taken over the Myers company. The new company will have a capitalization of \$300,000, part of this having been paid over to stockholders in the original company.

It is expected that manufacturing will begin in Detroit soon after the first of the year. Equipment will be installed to permit of a 5,000,000 annual production. It is planned to make intensive sales efforts in leading cities of the country, one city to be taken at a time beginning with Detroit. Advertising will feature the self-cleaning patented mechanism of the plug.

Officers of the company are: C. F. LaFond, president; C. C. Starkweather, vice-president; Clarence E. Lehr, secretary, and Louis H. Turrell, treasurer.

### "PRESENT AND FUTURE" THEME OF M. A. M. A. MEETING SEPT. 14-16

NEW YORK, Aug. 8—The central theme of most of the papers and discussions at the credit convention of the Motor and Accessory Manufacturers Association, which will be held at Detroit, Sept. 14, 15 and 16, will be, "Business conditions in the automotive industry and prospects for the future." This subject will be taken up in an open forum discussion from the standpoints of the raw material producer, the parts manufacturer, unit and equipment makers, vehicle manufacturer and dealer. Prominent executives in various branches of the industry will lead the discussion.

Another stimulating feature of the convention will be a symposium on "Selling strategy to bring the automotive industry back to normal." This topic will be discussed by sales and advertising executives.

## Receiver Is Named for Kelly Tire and Rubber

NORWALK, CONN., Aug. 8—Former Congressman Augustine Lonergan of Hartford has been named by Judge Edwin S. Thomas of the United States District Court as receiver for the Kelly Tire & Rubber Co. of New Haven. The appointment was made on petition of Attorney Benedict M. Holden of Hartford, representing the stockholders' protective committee, consisting of Vice-President Nathan D. Prince of the Hartford-Connecticut Trust Co. of Hartford, President C. L. Holmes of the Waterbury Trust Co. and President John T. Manson of the First National Bank of New Haven.

Lonergan displaces the Bridgeport Trust Co., Attorney A. H. Barclay of New Haven and Moses Ullman of New York, as joint receivers of the company, under appointment of the Superior Court. The petition for Congressman Lonergan's appointment was granted on the ground that the directors of the tire company committed an act of bankruptcy in having the receivers appointed in the State court and, being a bankruptcy case, it became a matter for the Federal court.

### FISK ACTION DEFERRED

CHICOPEE FALLS, MASS., Aug. 9—Special meetings of stockholders of the Fisk Rubber Co. and the Federal Rubber Co. were held here to-day to consider refinancing proposals but adjournment was taken without definite action. The plan calls for the purchase by the Fisk company of all the assets of the Federal company as well as the Ninigret Co. The number of proxies received from stockholders since the proposal was submitted is said to have been encouraging.

## Truck Industry Asks Repeal of Burke Law

### Committee Appeals to Governor to Amend Measure Limiting Weights

CLEVELAND, AUG. 9—A committee of five that represents every phase of the motor truck industry in Ohio went to Columbus to-day and asked Governor Harry L. Davis to provide means for permitting the Burke law limiting the weight of motor trucks to be amended at the special session of the general assembly, which will be held next January.

The committee also discussed with Governor Davis plans for the filing in court of a friendly suit to test the constitutionality of the law, which becomes effective Sept. 5. The Governor was told that the Ohio truck industry and users of trucks were done a great injustice when the bill was passed and they hope to work out a plan of action with him whereby an early amendment to the law may be made and operation of the law deferred until it is changed.

### All-Round Committee

Members of the committee are P. A. Lewis, Springfield, of the Kelly-Springfield Truck Co.; W. W. Williams, Columbus, representing dealers; W. C. Free-lock, of the Liberty Cartage Co., Cleveland, representing users of trucks; H. A. Waddle of the Goodrich Tire & Rubber Co., representing tire manufacturers, and J. S. Schindle of Cleveland, representing business users of trucks.

Lewis is chairman of the committee, which was named by T. R. Dahl, secretary of the White Co., at a recent meeting in this city.

The committee informed the Governor that if the bill becomes a law these things will happen to the truck industry, users of the vehicles and consumers:

Approximately 15,000 five and seven-ton trucks will be eliminated as a transportation medium; \$2,000,000 worth of trucks will have to be scrapped; transportation costs will be increased \$5,000,000 because of the larger number of trucks required to haul traffic now handled and the increased number of employees; milk companies will have to pay one cent a gallon more for transporting that product to the cities and consumers and producers generally will have a new load put on their shoulders.

### What Measure Means

Under the Burke bill loads allowed on highways are reduced to 20,000 pounds including the truck; weight per inch of tire width is reduced from 850 pounds to 650 for pneumatic tires. Steel tired vehicles are allowed to carry 24,000 pounds and the truck people say this is ridiculous as the steel tired vehicle is harder on improved roads than is the other class of vehicles. When the Governor issues his call for the special session of the Legislature, the committee asked him to set forth amendment of the Burke bill as an order of business.

## No Dearth of Sales in Atlanta Field

### August Business Holds Up with Other Months—Registration Is Heavy

ATLANTA, GA., Aug. 9—If registration figures at the State Capitol are any kind of barometer of sales conditions, the August total of retail sales in Atlanta will be up to that of any previous month this year. The first week of August there was an average of about 70 licenses issued daily, this including new and used passenger cars and trucks. The trucks are greatly in the minority, while about half of the motor car sales are of new cars. No re-registration is required in Georgia and therefore all of these are bonafide sales, this report covering retail trade in Atlanta only.

As many of these sales were made during July, the buyers waiting until after July 31 to secure their licenses, total sales for the past five weeks have been in the neighborhood of 700 new and used motor cars and trucks.

#### Cotton Price Rises

There has been a sudden and substantial increase in the price of cotton because of the Government's report on the low condition of this year's crop, and as a result automotive sales in the rural districts and smaller communities are expected to experience considerable stimulus within the next few weeks. Cotton went up about two cents per pound the first week of August.

Optimism as regards the future outlook for the industry in this section was the keynote of the annual sales convention of southeastern Buick dealers held at the Capital City Club in Atlanta. About 150 Buick dealers from Georgia, Florida and Alabama attended the three group meetings, virtually all of them stating they have noted a steady improvement in their business since June 1, with every promise that conditions will continue to improve gradually from now on.

Official announcement of sales by the Buick dealers in the three States since June 1 was made by Byron H. King, manager of the southeastern branch in Atlanta, who gave the number of new cars sold since that date as approximately 1000.

### Passenger Car Sales Improve in New York

NEW YORK, Aug. 10—Passenger car sales in the Metropolitan district have been a little better so far this month than was expected by dealers who had carefully reviewed their books for August in pre-war years. Turnover of course is of smaller volume than in July but the decline has not attained the importance of a slump by any means. Buick, Studebaker and Dodge are still selling far ahead of supply as they were

in June and July and several other cars are still running strongly.

Every week dealers have been added to the list of those who have all but stopped trading. Buying in the used car market is so close that quite a number of dealers have been taught a sharp lesson on the subject on over-allowance. A few are still taking in owners' cars at figures plainly above what they can get for them but the practice is far less widespread than it was two or three months ago. Several dealers are frankly telling new car prospects to go out and sell their used cars themselves unless they are willing to take a reasonably low price for them.

The question of operating costs is troubling several of the largest distributors who are facing renewals of sales-room leases at rental figures anywhere from 50 to 100 per cent above what they were when they signed their present contracts five years ago. It is probable that there will be several removals this fall and one or two dealers may go around the corner in one of the side streets off Broadway.

### Philadelphia Looks for Good August Business

PHILADELPHIA, Aug. 8—A few leading automobile dealers and distributors have asserted that July, particularly toward the end, proved one of the best months in the year for new cars, but for the majority of agencies the period was below June. All agree, however, that August sales, because of an extra spurt of energy, particularly noticeable among nearly all organizations, promise well.

Truck sales are so flat that several dealers talk of dropping them and concentrating on something else.

Repair parts are not selling well, except in rather isolated instances, where special efforts have been made to push them.

### Business Conditions Are Satisfactory in Washington

SEATTLE, Aug. 10—While there has been a slump in the movement of cars in several sections of the State during July as compared with the previous month, business conditions as affecting the automotive trade in Washington are satisfactory. Conservative optimism over the outlook for the immediate future and confidence in the consistent improvement of business conditions was expressed both at the annual meeting of the Washington Automotive Chamber of Commerce recently held in Spokane, the annual convention of the Washington State Automotive Trades Association which followed at Tacoma, and the Northwest Buyers Week at Seattle.

The volume of orders booked by merchants generally at the Buyers Week at Seattle far eclipsed expectations and may well serve as an indication of the improving conditions in the State of Washington.

## Columbus Business Continues Upgrade

### Medium Price Cars Selling Best —Rumor of New Model Hurts Ford

COLUMBUS, OHIO, Aug. 10—A continued improvement in the demand for passenger cars is reported from practically all of the agencies and distributors of Columbus. The business is now definitely on the upgrade. The only exception to the general improvement is the demand for Fords, which has fallen off materially since the newspaper publication of reports, since denied, of the coming of a new model with a possibility of new prices. With the publication of these stories business fell off with a thud and efforts of the salesmen of the various Ford agencies have not succeeded in securing normal business.

In other makes trade is stimulated by the recent price reductions and agencies generally are fairly busy. This applies to cars ranging in price from \$800 to \$3,500 and in some instances higher-priced cars. But the usual run of business is now for the medium-priced lines and these are showing the best improvement.

The unemployment situation in Columbus is better than was the case several weeks ago. This is an encouraging factor and presages a continuation of the improved demand. It is believed that the worst of the slump is now over and dealers and distributors are making plans accordingly.

#### Rural Districts Slow

In the country districts trade is still slow, although some improvement is reported. The crop prospects are slightly better with recent heavy rains and the farmers are showing some disposition to come into the market. But little trade is anticipated in the rural sections for some time, as the farmers are not having a prosperous season.

Truck business is still slow with the exception of the demand for light delivery wagons. The heavy truck business is at a standstill and little hope of immediate revival is seen. Heavy haulers have a good supply of trucks and they are not coming into the market as a result.

#### SHOW MANAGERS NAME ADAIR

CHICAGO, Aug. 10—The board of directors of the National Association of Automobile Show and Association Managers has unanimously chosen Neal G. Adair, editor of Motor World, secretary and treasurer. He succeeds Ray W. Sherman, who resigned when he left the executive editorship of the Class Journal Co. to become merchandising director of the Automotive Equipment Association. E. E. Peake, secretary of the Kansas City Motor Car Dealers Association, is president of the Show Managers and Secretaries organization.

## Coast Sales for July 20% More Than June

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**Generally Favorable Condition in  
Northern California—Rural  
Prospects Are Good**

SAN FRANCISCO, CAL., Aug. 10—A rather unusual, yet generally favorable condition developed in the merchandising of automotive vehicles, particularly passenger cars, during July in northern California. While retailers reported sales about 20 per cent above those of June, distributors announced that the ratio of country sales to city sales, usually about three and one-half to four to one in favor of the country sales, had fallen to three to two.

To counterbalance this apparent decrease in country sales, however, distributors said they had reports from dealers throughout the rural districts, indicating that prospects were more numerous than they had been in eight or ten months. The condition these outside dealers reported is that the farmers and others engaged in handling products of the soil, are waiting until the money begins to come in for this year's crops before buying passenger cars.

Both country dealers and distributors interpret this as meaning that sales will be considerably better in the latter part of August and throughout September than they have been for some time. The people are going to buy cars, according to these distributors, but they are planning to pay cash for them, and they have to wait until they have the cash to pay. The surprising factor is that so many people are buying, for, in general, sales are considerably above the June record, and are better than they were in July a year ago.

The dealers' associations throughout northern California are highly pleased with general merchandising conditions, and expect improvement ranging all the way from 100 per cent in the centers of distribution in the agricultural sections of the State, to 50 per cent in the largest city—San Francisco. The best feature of the whole situation, however, is that the dealers are not "living on hopes," but are going right along selling cars in sufficient numbers to show good figures on the right side of the ledger. Cash sales are more numerous than they usually are at this time of year, and more prevalent than they have been at any season within the past eighteen or twenty months.

### SEVERNS KNOX RECEIVER

MT. VERNON, OHIO, Aug. 10—F. W. Severns, former county treasurer, has been appointed receiver for the Knox Tire & Rubber Co. The petition for a receivership was filed by Edward Elford, who claimed to have a mechanics lien on the property for \$6,754. Severns will continue operation of the plant under the direction of the court.

### AUTOMOBILE "SAFETY-FIRSTS" WILL FEATURE TRAFFIC CONVENTION

OAKLAND, CAL., Aug. 10—Equipment and "safety-first" men in the automotive industry will have their innings at the annual convention of the International Traffic Officers Association here, Oct. 24 to 29. An exhibition of safety devices, automobile equipment intended to make driving safer and easier, fire-prevention outfits for automotive vehicles, and all manner of safeguards for machinery will be open to the public in the Municipal Auditorium of Oakland, in which the convention will be held. The fire departments of all the cities around San Francisco Bay will demonstrate fire-fighting with the latest automotive equipment; truck fleets will be shown in operation; the handling of heavy traffic on improved highways with minimum damage to paving and other surface will be discussed, and all in all, the automotive industry will play a very large part in the convention.

## Cleveland Employing 3.6 Per Cent Less Men

CLEVELAND, Aug. 10—Cleveland automobile and accessory manufacturing establishments were on July 30 employing 3.6 per cent fewer persons than on June 30, according to a survey made by the Committee on Labor Relations of the Chamber of Commerce.

Twelve manufacturing establishments reported in the survey of the automobile industry and on July 31 they were employing 7463 as compared to 7742 on June 30.

Employment figures in all industries show that pay rolls on the average remained about stationary during the month of July. There were 54,165 employed June 30, in the 99 establishments that reported in the survey, while at the close of July there were 54,161.

In the metal and metal products other than iron and steel there was no loss; in the iron and steel industry the loss was 1.3 per cent; a gain of 10.4 in the food and kindred products; a gain of 1.1 per cent in textiles and their products; a gain of 7.3 per cent in lumber and its manufacture; a gain of 5.9 per cent in paper and printing and a gain of 5.2 per cent in chemicals and allied products.

### WEIGEL LEHIGH MANAGER

NEW CASTLE, PA., Aug. 5—D. W. Weigel has assumed the management of the Lehigh Tire & Rubber Co., formerly the New Castle Rubber Co., recently purchased at receiver's sale by F. A. Seiberling. It is understood Seiberling will come here personally in a few days to supervise the resumption of operation. It is proposed to make about 500 tubes a day.

## Unit Parts Orders Preface Sales Gain

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**General Business Spurt Declared  
Certain to Follow Turn of  
the Year**

DETROIT, Aug. 10—General improvement in passenger car business in September and October, with gains for each month over the month before, is indicated in orders now being placed with some of the leading unit part makers. November and December are expected to show a falling off, but a general sales spurt all along the line is declared certain to follow the turn of the year and the opening of the show season.

Many of the car manufacturers are already planning a manufacturing schedule in anticipation of spring business, which they will get under way in December. Some of the others are known to be outlining a schedule which will start off promptly the first of the year, while the remainder will await the opening of the actual selling season and trust to ability to speed up quickly, to meet demands.

All of these arrangements depend to a large extent upon the financial position of the different companies. The stronger companies will start to stock up first and will build a little higher than the others. There has been much conjecture on just what the attitudes of the companies would be toward preparing for spring sales, and apparently the first impression that little stocking would be done is proving wrong. The spring of 1922 will find, however, many thousands less cars piled up than was the case in '21.

Passenger car production in all Detroit factories to-day is being held strictly to sales levels, and there will be little accumulation of cars before December. This is far different from the situation last year which resulted in the storing up of so many cars over the fall and winter months.

There is little sign of parts business from truck manufacturers.

### WESTCOTT MAKES CUTS

SPRINGFIELD, OHIO, Aug. 10—The Westcott Motor Car Co. announces reductions in its various models effective Sept. 2. In the "lighter six" line the roadster and touring car will be reduced from \$2,290 to \$1,890; the sport model from \$2,390 to \$1,990; the coupé and sedan from \$3,390 to \$2,890. In the "larger six" line the seven passenger touring car will be reduced from \$2,990 to \$2,090; the sedan from \$4,590 to \$3,490 and the limousine sedan from \$4,690 to \$3,690.

### FORD MAY GET SHIPYARD

BOSTON, Aug. 10—The Ford Motor Co. may buy the Victory plant at Squantum, an emergency shipyard, if Mayor Bradford of Quincy is successful in completing negotiations on behalf of the Government.

## Pierce-Arrow Trucks and Cars Reduced

**Commercial Bodies Already Down  
and Passenger Cars to Be  
Cut Sept. 1**

BUFFALO, Aug. 10—The Pierce-Arrow Motor Car Co. has made sharp reductions in the prices of its trucks. The prices follow:

	New Price	Old Price
2 ton.....	\$3200	\$3750
3½ ton.....	4350	4950
5 ton.....	4850	5700

Prices of various models of Pierce-Arrow passenger cars will be reduced Sept. 1. George M. Graham, vice-president of the company, said to-day this would be the first drop in prices since rising costs forced them up. Graham declined to state what the new prices would be, but added that they would be announced next Monday. It is learned, however, that the touring car will be reduced \$1,000 from \$7,500 and the closed models from \$500 to \$750.

### COLUMBIA MOTORS CUT

DETROIT, Aug. 8—The Columbia Motors Co., will reduce the prices of both the regular and Challenger lines, effective Aug. 15. Following are the old and new prices:

De Luxe touring, 5 pass., \$1,475, was \$1,795; sport model, 4 pass., \$1,475; roadster, 2 pass., \$1,475, was \$1,795; coupé, 4 pass., \$2,295, was \$2,495; sedan, 5 pass., \$2,350, was \$2,595; Challenger touring, 5 pass., \$1,195, was \$1,495; Challenger coupé, 4 pass., \$1,995; Challenger sedan, 5 pass., \$1,995.

The general specifications and standard manufactured units remain exactly as before in both the models, but refinements and changes in general appearance have been made in the bodies and the equipment has been changed slightly.

### WILLS CARS REDUCED

MARYSVILLE, MICH., Aug. 10—Having attained a sufficient volume of production, C. Harold Wills and associates have made a readjustment in retail prices effective Aug. 5 as follows: Roadster, \$2,785, was \$3,275; touring car, \$2,875, was \$3,275; coupé, \$3,750; sedan, \$4,100. No prices had been previously set on the enclosed models, as none have been in production. Work is well under way on these now, however, and deliveries are expected by September 1.

### RUBBER COMPANIES MERGE

ATLANTA, GA., Aug. 9—The Victory Rubber Mfg. Co. has been completely reorganized here, the organization including consolidation with the Cotton States Rubber Mfg. Co., and a general enlargement of the production of rubber products. G. J. Reuter is president of the new company, and also general manager. Other officers are S. S. Shepard, treasurer; Dr. W. P. Glover, A. L. Waldo and W. J. Burks, directors. The Victory company manufactures Seal-type tubes.

### DUESENBERG INFRINGES ON PATENTS IS CLAIM IN FRANCE

PARIS, July 28—Claiming an infringement of their patents on hydraulic 4-wheel brake systems, the Rolland-Pilain Co. of Tours made a descriptive seizure of one of the Duesenberg cars at Le Mans to-day. This action was taken, declared the Rolland-Pilain Co., in order to protect its legal rights in this system of braking. The seizure was merely of a technical character and does not tie up the cars or interfere with any of the arrangements made for shipping them back to America. Rolland-Pilain exhibited a hydraulic braking system at the Paris show in 1910, and although never having been in production intends to put his brakes on the market next year. The Duesenberg brakes are built under license obtained from an American company.

## Martin Parry to Open Seven New Branches

NEW YORK, Aug. 8—Seven new assembling and distributing branches will be opened in the near future by the Martin Parry Corp. They will be located in Philadelphia, Cleveland, Pittsburgh, Detroit, St. Louis, Kansas City and Newark. The same number of branches now are in operation. The purpose of opening the new stations is to carry a complete line of commercial bodies, relieving dealers from the necessity of tying up money in body stocks and to satisfy growing demands for sectional bodies. The plant of the company at York, Pa., is running at capacity and the Indianapolis plant on a 50 per cent basis. Sales for the first six months of the year were about \$2,300,000.

### FORD CUTS IN FRANCE

PARIS, Aug. 1 (By Mail)—Ford announces another cut in price for the French market. The touring model with electric lighting and starting is now sold at 12,150 francs, or without electric equipment 10,950 francs. These prices are for delivery at the Bordeaux assembly plant, and include the French luxury tax. Price of the chassis only is 8100 francs without electric equipment and 9350 francs with lighting and starting. The 1-ton Ford truck is listed at 10,375 francs, the 2-seater sedan at 17,275 francs, and the 3-seater sedan at 19,850 francs.

### MOLINE HAS FUNDING PLAN

CHICAGO, Aug. 10—The creditors' committee of the Moline Plow Co. reports that approximately 100 per cent of all outstanding obligations have been filed with it and that plans for funding the company's floating debt and the issuance of new securities to general creditors are assured of success.

## Expect Ternstedt to Produce at Capacity

**Body Hardware Makers Look for  
Busy Period After Taking  
Over New Plant**

DETROIT, Aug. 10—The Ternstedt Mfg. Co., through the acquisition of the England Mfg. Co. and the body hardware plants of the Fisher Body Co., now the largest manufacturer of automobile body hardware in the world, is going into production on a scale which it is estimated will carry it practically at capacity for the balance of the year. The company has been operating at capacity for 60 days, and President Paul W. Seiler declares orders on hand will carry it at full speed indefinitely.

Present business is running at 80 per cent closed body business, and Seiler looks for an increased closed body trade as the season advances. There is a decided trend, he said, toward the inclosed type of car for all-season use.

The company has just completed its new plant No. 2 and has finished moving in all equipment purchased from Fisher. The England factory will be continued as plant No. 3. The original Ternstedt plant continues as plant No. 1. With the completion of its factory arrangements the company is devoting its attention to standardizing body hardware.

Officers of the new organization are: Paul W. Seiler, former Ternstedt company general manager, president and general manager; C. P. Parsons, formerly president of the England company, vice-president; M. T. Boden, formerly auditor of Ternstedt, treasurer; C. R. Bitting, secretary; T. P. Archer, formerly superintendent of Ternstedt, factory manager; David Humphrey, sales manager, and F. M. Wardle, advertising manager.

## Hopes to Push Through Highway Legislation

WASHINGTON, Aug. 9—Senator Townsend, of Michigan, Chairman of the Senate Committee on Postoffice and Post-roads, is making a determined effort to dispose of highway legislation before the Congress votes a recess or adjournment. The committee will probably report by unanimous agreement a highway bill embodying the distinctive features of the so-called Townsend bill and a modified form of the Phipps-Dowell bill.

The Senate intends to provide for the establishment of a Federal Highway Commission—a principle which has the indorsement of the President and is advocated by the National Automobile Chamber of Commerce and affiliated organizations. While it is expected that some opposition will develop to the commission plan, belief is expressed that sufficient votes will be mustered to pass it.

## Franklin Company Has Pension Plan

Syracuse Manufacturers Decide  
on \$250 a Year as Minimum  
—Follows Much Study

SYRACUSE, Aug. 10—A pension plan whereby a minimum of \$250 a year will be paid employees as a reward of long and faithful service has been announced by the H. H. Franklin Mfg. Co., effective at once. The maximum is based on average earnings over a period of years.

The decision follows more than a year of study and investigation by H. C. Blagbrough, head of the industrial relations department, and George S. Dutcher, employment manager, during which they visited several large factories in the East which have adopted similar plans.

The plan is to be administered by a board of directors consisting of four company executives and the president of the mutual benefit society, which will be known as the annuities committee. It will run the plan absolutely, save that all decisions granting special annuities shall be subject to the approval of the executive committee of the company.

The plan provides for retirement on regular allowance after 20 years' service of male employees who have reached the age of 70, or women employees who have reached the age of 55, at their request; at 65 and 55, respectively, at their own request or without, at discretion of the annuities committee; after 10 years, if physical examination shows the employee to be totally incapacitated and incapacity is not covered by workmen's compensation laws, or whose retirement because of advancing years is deemed advisable.

Payments which may be authorized are 1½ per cent of the average pay for 10 years preceding retirement, but not less than \$250. Annuities will be paid monthly by check and their grant does not militate against a beneficiary entering other employment not prejudicial to the interests of the company.

## Grant Longer Credit to Midwest Engine

INDIANAPOLIS, Aug. 9—A two years' extension of credits, dating from June 27, which was asked the creditors of the Midwest Engine Co. because of the industrial depression which has made it difficult for the company to liquidate its inventory, has been granted, this representing more than 90 per cent of the face value of the claims. No change in the personnel of officers of the company is contemplated by this plan, but the creditors' committee, which is to be appointed and will consist of five men either creditors or representing creditors, is to co-operate in the company's management.

## Motor Cars New Rival for U. S. Railways, But— Trade Paid \$100,000,000 for Freight in 1920

NEW YORK, AUG. 8—The New York Times prints an editorial headed "Railways and Automobiles," which says:—

"It is announced that the Boston & Maine Railroad has abandoned two branch lines on account of automobile competition. So many preferred to ride in motor cars that the trains averaged only two or three passengers. The total freight revenue of one of the lines in 1920 was \$88. The other collected in 1920 \$1,713, with operating expenses of \$12,940. It was a case of short lines for summer travel. They never will be missed.

"The railways have no need of jealousy or fear of their rival, amazing though its growth has been. The automobile trade paid the railways \$100,000,000 for the year last reported. The automobiles of the farmers are feeders of the railways. They have expanded the area capable of economic cultivation, so that the railways get quantities of freight which never would have come into existence if the farmers still depended upon horses. It is difficult to place a limit on the growth of the industry which already has produced 11,000,000 machines. At the beginning of this year there was one car for each twelve of the population. The productive capacity of the country is a million cars more than enough to maintain the present total in operation."

## Result of Grand Prix Discussed in England

LONDON, July 29 (By Mail)—The sweeping victory of the Duesenberg cars in the French Grand Prix has caused considerable comment here. The outstanding facts are these:

(1) While Britain officially retired from the race, it is stated for lack of time to prepare and test the cars and the route, America took the risk and triumphed.

(2) The British cars which were raced as a private entry by the drivers, all credit to them, cut a sorry figure, due mostly to tire troubles, finishing at the tail of the list, whereas the American cars, though of single make and identical in detail, scored together closely.

(3) The press-men have not failed to note that the Duesenbergs are production, or commercially possible cars and not special cars impossible to build at the price the public will pay.

(4) The result of this victory effectively disposes of the delusion that American cars are inefficient from lack of European experience in design, etc. It now only remains for the Duesenberg Co. to disclose its European price for this car.

It should be added that many British spectators of the race have agreed that four wheel brakes were a big, if not the chief factor in helping the Duesenberg win, and it is agreed that such brakes will be indispensable in motor races. Other competitors were held back by the longer period taken for retarding and accelerating to the required pace.

### GUYOT'S TIME UNDECIDED

PARIS, Aug. 1 (By Mail)—In issuing the officially accepted times for the French Grand Prix race, the Contest Board reserves its decision regarding Albert Guyot's Duesenberg, placed sixth. On bursting a tire Guyot slipped into soft ground, and the claim is made that spectators helped to push him out. The rules of the race are that no outside assistance of any kind must be given the competitors.

## Say Trade Publicity Is Needed in Britain

LONDON, July 29 (By Mail)—A correspondent of *The Times Trade Supplement* this week discusses last week's overseas trade conference here. Points emphasized by this writer are:

Need for more effective trade propaganda abroad.

Need for a range of "comparatively rough" accessories of British make on standard lines.

Need for low and high powered motorcycles, large single cylinder engines excepted.

Need for air tired 3000 lb. capacity trucks, at lower prices than at present.

Need for vehicle makers to co-operate more with traders and parts-makers and to take more concern in such items as tires and other parts not made by themselves but essential to their products.

Need for larger and stouter tires on average British vehicles.

Reform in British auto taxation so as to enable a large cylinder bore to become normal for cars.

Virtually these recommendations and suggestions point to American ideals as to design, lay-out and mode of selling. The *Times* writer, however, seems to overlook the all essential fact that capital and co-operation among automobile makers are indispensable to any scheme involving a standardized product and adequate propaganda overseas, and it is just this factor which, while for years advocated and enlarged upon by competent critics, seems little nearer realization than ever.

Just now the main problem is finance which faces most British manufacturers.

### THIRD IN RACE MUST BE FRENCH

NEW YORK, Aug. 10—A cable dispatch from France says that as a result of American made automobiles winning the Grand Prix, the sporting committee of the Automobile Club of France has decided that in the race next year entries will be open to the world but that unless one-third of the cars entered are French, as well as one-third of the manufacturers represented, the club reserves the right to call off the race. The club feels that this puts the question squarely up to the French automobile makers who must provide the required proportion of French contestants if they want the race run.



## METAL MARKETS

**W**HILE a slowing up of the downward movement in prices is most decidedly in evidence, steel buyers are apparently convinced that they have nothing to lose by committing themselves for their more immediate requirements and to this sentiment is to be ascribed the impressive volume of business placed in the last ten days for immediate shipment. This condition holds especially true in the case of the sheet rolling mills which are working at approximately double the rate of operations in vogue in other branches of the steel industry. A considerable portion of sheet business for immediate shipment emanates from the automotive industries. That producers are eager to place their present ratio of operations on a more permanent basis is only natural and several are asking buyers to place orders for deferred deliveries, prices to be determined on the basis of the market at the time of shipment. Non-integrated sheet mills which cater to the automotive industries contend that bargains in sheet bars have disappeared from the semi-finished steel market and that on the present basis of \$32 for sheet bars they are unable to shade prices for full finished sheets further. All in all, the next week or two should reveal clearly whether the present buying movement is merely a flash in the pan or the beginning of a genuine resumption of lasting activity. As stated previously, steel makers are devoting considerable attention to measures designed to bring down freight rates. This movement now appears to have crystallized into more concrete form. Report has it that a conference of "Independents" is to be held in New York in the near future and that on that occasion energetic steps will be taken to secure a 20 per cent reduction in freight rates. Should this movement be fraught with success, consumers will undoubtedly derive a large share of the saving accruing therefrom. In the pig iron market conditions are becoming more and more settled from day to day and, as one large blast furnace representative puts it: "Bargain hunters are not having the picnic to-day that they did a few weeks ago."

**Pig Iron.**—Most of the sales to automotive foundries are for prompt shipment but some inquiries are out for deliveries over the third and fourth quarters. Some of the sales agencies and blast furnaces are disinclined to accept future business at present low quotations.

**Steel.**—Most of the buying of cold-drawn steel bars by the automotive industries continues in less than carload lots, although the leading low-priced passenger car builder recently took 800 tons of cold-drawn in a 3,000 ton lot of miscellaneous steel. Some makers quote 2.50c. which allows \$15 for conversion of 1.75c. hot-bars. The Corporation seems to be quoting 2.75c. but is protecting its regular customers by meeting the lowest quotation they can get from "Independents." Small tonnage buyers of strip steel are more numerous and automotive parts producers are placing orders for a few carloads at a time. As low as 4c. has been quoted on cold-rolled and 2.40c. on hot-rolled, although the general cold-rolled quotation given is 4.25c. with up to 2.60c. asked for hot-rolled.

**Aluminum.**—The "outside" aluminum market is demoralized. London cable state that, although the nominal quotation is 125 Pounds Sterling for export business, sales have been made at as low as 100 Pounds

Sterling f.o.b. At the present rate of exchange this latter figure is the equivalent of 16c. per lb. In 300 ton lots prompt shipment aluminum has been offered in this market at as low as 18c. per lb., duty paid, f.o.b. New York.

**Copper.**—Producers and speculative holders are seemingly willing to cut prices to the bone in order to obtain funds.

**Tin.**—The market is still feeble and correspondingly attractive to bargain hunting speculators.

## FINANCIAL NOTES

**Moline Iron Works, Moline, Ill.,** has increased its capital from \$500,000 to \$750,000. Reports on business for the past year made to stockholders at their annual meeting were gratifying and it was said the outlook for the coming year was favorable. The automobile accessories branch of the company has done a substantial business since it was established. L. E. Nutt continues as president of the company.

**Wright Aeronautical Corp.** directors have declared on initial dividend of 25 cents a share on the 224,390 shares of capital stock now outstanding. The report of the company for 1920 showed net earnings after all deductions of \$411,349, equal to \$1.88 a share on the stock. The gross sales were \$1,486,000.

**J. I. Case Threshing Machine Co.** reports that sales for the first seven months of 1921 have increased month by month and now amount to approximately \$10,500,000 which was 45% of 1920 sales, 54% of 1919 sales, 71% of 1918 sales and 143% of 1917 sales for the same period.

**Spicer Mfg. Co.** in a balance sheet as of December 31, 1920, shows cash amounting to \$455,425; inventories of \$6,292,263; accounts and notes receivable, \$1,810,633. Notes payable come to \$2,852,691, accounts payable \$867,047 and surplus \$2,007,846.

**American Bosch Magneto Corp.** showed an operating loss of between \$40,000 and \$50,000 for the half year ended June 30. The company owes only \$400,000 on current accounts against which there are \$5,700,000 of quick assets.

**H. H. Franklin Mfg. Co.** directors have approved issuance of \$2,500,000 additional 7% cumulative preferred stock of the \$15,000,000 authorized. This brings the total outstanding to \$6,636,600.

**McCord Mfg. Co.** has announced that 10% (\$450,000) of indebtedness to banks and creditors will be paid Aug. 11, together with \$150,000 interest, with money acquired from reduction of inventories.

**Goodyear Tire & Rubber Co.** has placed on sale the new issue of prior preference stock. The issuance of this stock marks the final steps in the Goodyear Company's \$85,000,000 refinancing program.

**The White Co.** has reduced bank loans \$2,500,000 since March 31. The company has been selling trucks faster than they have been produced since the price cuts a few weeks ago.

**Hendee Mfg. Co.** during July reduced its quick liabilities \$189,000 or from \$492,000, to \$303,000, of this reduction \$140,000 was in bank loans, which now stand at only \$100,000.

**Kohn Mfg. Co., Milwaukee,** manufacturing spark plugs, has filed schedule on a petition in bankruptcy, showing assets of \$47,554 and admitting liabilities of \$34,747.

**D. C. Willis,** chairman of the Fourth Federal Reserve District, announces that the district discount rate on all classes of paper has been cut from 6% to 5½%.

German Car Makers  
Gaining Foothold

## American Correspondent Describes Plan to Open Foreign Markets

**CHICAGO, Aug. 9—**There recently have come to the United States from many sources reports that German automobile manufacturers were gaining a strong foothold in various countries for passenger cars and trucks which can be manufactured more cheaply there than in the United States. Substantiating these reports, the following wireless dispatch has been sent to the *Chicago Daily News* by George Witte, its correspondent in Berlin:

"Scores of the Americans who constitute the vanguard of the army of travelers and who have invested from 200,000 to 400,000 marks, or \$3,000 to \$6,000, in German automobiles de luxe say that they could not possibly buy machines as good as these for twice the money in the United States. If these instances are an indication of what will happen as soon as Berlin is visited by as many Americans as before the war, then the automobile manufacturers in the United States will have to look out.

"To-day Germany has more than 100 automobile factories, employing 50,000 skilled workmen. All are turning out high grade cars, of which 75 per cent are solely for export purposes. There is no market in Europe or South America to-day for cheap cars. The German makers argue that people who can afford to run cars with gasoline at 50 cents a gallon want something showy for their money.

"In Magdeburg, the center of the automobile industry, the writer found the factories with enough orders on hand to keep them running for 18 months, and give them a financial basis for extensions on a large scale. Owing to the cheapness of labor, steel, iron and other materials, the factories are able to offer for sale handsome cars with good engines at from one-third to one-half the standard American prices. As a result, Germany already has taken the lead in the Swiss automobile market away from the United States. Last year Germany exported to Switzerland automobiles valued at about 18,000,000 Swiss francs (approximately \$3,600,000) while the United States exported to the same country only about 16,500,000 francs, (\$3,300,000) worth of motor cars. Altogether Germany exported 20,000 automobiles of various kinds and 4000 motorcycles in 1920, while in the last year before the war she exported 6400 cars and 2700 motorcycles."

## KAHN LIABILITIES \$34,747

**MILWAUKEE, WIS., Aug. 9—**The Kahn Mfg. Co., Milwaukee, makers of spark plugs, recently declared bankrupt, filed schedules admitting liabilities of \$34,747 and claiming assets of \$47,554.

## MEN OF THE INDUSTRY

Mason B. McLaughlin of Cleveland, who has been manager of the central sales department of the White Co. for a number of years, has been promoted to a vice-presidency of the corporation. The action was taken at a meeting of the board of directors held here last week. Robert A. Woodruff, manager of the southeastern department of the company, was also named a vice-president. McLaughlin and Woodruff, with vice-presidents James A. Harris and George F. Russell, will have headquarters at the general offices, from which they will direct sales all over the world. They are to compose a sales committee, a new body which has been established.

H. J. Edwards has resigned as manager of the Ellyria plant of the Willys-Overland Co., where all the engines for Willys-Knight cars have been made. Edwards is one of the pioneer designers of the automotive industry. He designed the Stoddard-Dayton car, and when it was taken over by the United States Motors Corp. went with that company. In 1911 he designed the Edwards-Knight engine and established a factory in New Jersey. His engine rights later were purchased by John N. Willys and the motor has been used in the Willys-Knight car. Edwards has been with Willys continuously since that time.

A. J. Banta for years manager of the Chicago branch of the Locomobile Co. and more recently manager of the Maxwell Sales Co. of Chicago has been appointed general manager of the Clydesdale Motor Truck Co. of Clyde, Ohio. He is familiar with both the sales and manufacturing end of the truck business having merchandised Riker trucks as Locomobile manager. He formerly was associated with the production department of Maxwell and prior to that was in charge of production at the Premier plant.

D. H. Roberts, sales manager of the Latex Tire & Rubber Co., Fond du Lac, Wis., resigned Aug. 1 to accept a similar position with the Sangamon Rubber Co., Springfield, Ill., which formerly was known as the Wilson Tire & Rubber Co. Mr. Roberts is succeeded in the Latex organization by Harry Benner, who was assistant sales manager.

W. R. McCulla has been appointed district manager of the Bjur Motor Appliance Co. with headquarters in Detroit. He has had a long record of engineering experience with the Packard Motor Car Co., the Willys-Overland Co. and other automobile manufacturers.

Harvey J. Mallory, controller of the Buick Motor Co. has been elected a vice president of the company but will continue as controller. He succeeds C. H. Mott recently made chairman of the advisory committee of the General Motors Corp.

Guy W. Vaughan, who has been with the Van Blerck Motor Co., Monroe, Mich., for two years as vice-president and general manager, has resigned as general manager, but remains as vice-president and a member of the board of directors.

B. Edwin Hutchinson, for four years treasurer of the American Writing Paper Co., Holyoke, Mass., has resigned to assume a similar position with the Maxwell Motor Co. and the Chalmers Motor Corp. in Detroit.

August J. Luedtke, secretary and treasurer of the Milwaukee Corrugating Co., a large metal working concern of Milwaukee, has been elected vice-president of the Concordia Fire Insurance Co., Milwaukee.

Vern E. Burnett has been appointed advertising manager of the Cadillac Motor Car Co. He recently resigned as advertising manager of the Liberty Motor Car Co.

H. N. Schwarze, electrical engineer for the Cadillac Motor Car Co., has resigned to join the engineering staff which is being organized by R. H. Collins.

T. J. Turk, who has been manager for the receivers of the Spacke Machine & Tool Co., Indianapolis, axle division, for the last year, has resigned.

A. B. Fletcher, state highway engineer of California, will be appointed director of the new department of public works.

## INDUSTRIAL NOTES

Westinghouse Electric & Mfg. Co., East Springfield, Mass., has added 200 men to the working force in the last two months. This month the firm will ship 7000 starting motors and lighting generators with ignition accessories in proportion, for automobiles.

Reynolds Spring Co., Jackson, Mich., has plans for the erection of a new building, 132 x 204, two story and a trackless trolley system running between the Ostego and Water street plants. July was the best month of the year for the company.

E. L. M. Tire & Rubber Co. of Racine, Wis., is now operating its new plant of about 20,000 sq. ft. It was organized several months ago with \$200,000 capital and absorbed the E-Z Rubber Mfg. Co. of Racine. E. L. McKim, heads the new concern.

Marathon Rubber Products Co., Wausau, Wis., which recently took over the entire property of the Burlock Rubber Co., has plans for a brick and steel factory addition, to be ready about September 1.

Hood Rubber Co. sales for the first six months of the year were nearly up to the total for the first half of 1919, though some \$5,000,000 behind the figures for the same period a year ago.

Jasper Tire & Rubber Co., Jasper, Ind., and all of its tire, fabric and rubber for the making of tires will be sold at a private sale soon by Louis Mehringer, receiver.

Rolls-Royce of America has just completed its 100th car. Production for the year is expected to be about 300. Some of the cars will be shipped to England.

Ford Motor Co., of Canada's plant which was closed Aug. 1 for inventory will reopen August 16.

Sills Has Chevrolet  
Branch in New England

BOSTON, Aug. 1—W. C. Sills, formerly sales manager of the Chevrolet Motor Co., today took over the entire property of the Chevrolet Motor Co. of New England. He has formed the Sills-Chevrolet Company and will act as distributor for the company in this territory. Included in his purchase is the retail sales and show rooms on Huntington Ave., the wholesale department at 100 Cunnington St., and the large service station in the Shoe and Leather Building at Cambridge. He is reorganizing the entire three departments and he will have with him some men who were identified with Chevrolet sales in other parts of the country.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Clearly there is a great amount of money seeking highly liquid forms of investment. Secretary Mellon announced that the subscriptions to the recent offering of \$300,000,000 of Treasury Certificates amounted to no less than \$1,030,000,000 of which \$524,000,000 came from the New York Federal Reserve District. A total of \$376,362,500 was allotted.

The vast amount of capital for short term investment caused the abnormal drop in call money rates to 3½ per cent in New York on August 4 and this rate, so far below the general market for time loans, together with the requirements of the crop moving season, have tended toward the withdrawal of funds from the call money market. As a result the tendency last week was slightly upward, the range being 4½ to 6 per cent against 3½ to 5½ per cent in the previous week.

The stagnation in stock exchange speculation made the demand for call money as small as was the supply of this class of money, and the week closed with a rate of 6 per cent. The demand for time money also continued light and the offerings were few, the rate ranging from 5½ per cent to 6 per cent for all maturities from 60 days to 6 months. A few loans with all industrial collateral were put through at a ¼ of 1 per cent above this range. Commercial paper rates for choice names and all maturities were quoted around 6 per cent, with a rate of 6¼ per cent for secondary names.

The statement of the position of the 12 Federal Reserve Banks on August 3 shows a decrease of bills on hand for the week of \$22,341,000 to \$1,647,579,000. Deposits in the member bank reserve account declined also by \$18,717,000, but as a consequence of an increase in Government and other deposits the total deposits of the system actually increased \$9,792,000 to \$1,705,066,000 on August 3. Note circulation declined less than \$1,000,000 to \$2,536,673,000 in contrast with a decrease of \$27,000,000 in the previous week.

## Gold Holdings Increase

Gold holdings on the other hand increased \$21,582,000 chiefly through the acquisition of imported gold. This is about the same increase as during the previous week. Gold holdings stood on August 3 at \$2,552,832,000, but a decline of \$3,035,000 in legal tender notes, silver, etc., brought the total reserves to \$2,703,843,000.

As a consequence of these changes the ratio of total reserves to deposit and Federal Reserve note liabilities combined advanced from 63.4 per cent on July 27 to 63.7 per cent on August 3, and the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, advanced from 82.4 per cent to 83.1 per cent.

# Calendar

## SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28-Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 5, 1921—Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Auto-

mobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador, Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhib-

its in connection with the Brazilian Centenary Association Automobillista Brasileira.

## CONVENTIONS

Sept. 14-15-16—Detroit, Credit Convention Motor and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## RACES

Labor Day—Uniontown, Pa., Autumn Classic.

## Annual Licenses Show Increases in England

LONDON, July 10 (By Mail)—Ministry of Transport statistics show that licenses were in force on May 31 for approximately 853,900 motor vehicles.

The most marked increase in that of "motor-hackneys" annual license, for which now number 64,000 compared with 40,500. The licenses for these vehicles in the second quarter of the year were 32,500 compared with 1200 in the first.

The horsepower class, which includes all private cars, shows an addition of 2000 annual licenses, while the quarterly licenses have increased from 14,000 in the first to 36,000 in the second quarter—an indication that a large number of cars were laid up until the summer as a means of saving the tax.

On May 31 licenses were in force for 226,000 private cars, compared with 185,700 in 1920, 370,000 motorcycles compared with 278,600, and 96,500 motor-hackneys compared with 71,400.

The amount of revenue collected from Jan. 1 to May 31 was £8,750,000.

## Toledo Tractor Makers Again Cited to Court

TOLEDO, Aug. 10—The Automotive Corp., manufacturers of tractors here, is involved in further legal entanglements here in the Federal Court, where Judge John M. Killits appointed Fordyce Belford, master in chancery to handle the case for an indefinite time. The matter of appointing a receiver is held under advisement by the court.

It is claimed that the company has violated the "blue sky" laws by selling its stock for \$25 a share when only \$14 cash ever got to the company treasury.

It is claimed also that salesmen for the promoters declared the company had contracts amounting to \$2,250,000 worth of tractors, while the petitioners aver that less than \$1,000 is deposited with contracts which total only a few thousand dollars.

The complainant also points out that the corporation took over the Cyclomobile Mfg. Co., which is nil and has no visible assets. A. H. Wyatt is president; William Hulin, secretary-treasurer; and John L. Larkin, vice-president. The company has a factory in operation here and has built a few tractors.

## Sterling Executive to Direct New Company

MILWAUKEE, WIS., Aug. 9—Executives of the Sterling Motor Truck Co. of Milwaukee appear as the principals in the incorporation of the Motors Acceptance Co. of Milwaukee, which has been organized with an authorized capitalization of \$200,000 to do a general trade and commercial acceptance business, handling automotive business especially. The incorporators are Frank Luick, secretary, and Oscar E. Held, treasurer, of the Sterling Company, and Victor L. Brown, 1428 First Wisconsin National Bank Building, Milwaukee, one of the founders and for many years president of the Sterling company, who retired from office about a year ago to engage in financing affairs.

## Form New Organization to Handle Bell Trucks

OTTUMWA, IOWA, Aug. 9—The Bell Truck Sales Corporation has been organized at Ottumwa, Iowa, to take over the sale of the output of the Iowa Motor Truck Co., manufacturers of the Bell truck.

The new company is headed by Paul T. Browning, who is well known in the automotive industry, having been connected with General Motors for several years in the Buick division. He has been more recently with Sheridan Motors. Jack Miller, who has been with the Iowa Motor Truck Co. as sales and advertising manager, is secretary and advertising manager of the new corporation.

## Former Goodyear Man Becomes Manufacturer

AKRON, Aug. 9—The Falor Mfg. Co., Inc., headed by Shelby A. Falor, a former Goodyear official, has started production in its new factory in South Akron and will continue on a production basis of about 400 automobile tubes daily. It is announced the company will specialize in the manufacture of automobile tubes. Falor was with Goodyear for over 20 years as director of the sales department. He developed the Goodyear field in motorcycle tires.

For the past three years he was a member of the Goodyear board of control. He resigned when the board of control was abolished under the new financial control of the company and when the office of comptroller was substituted for it by E. G. Wilmer, successor to F. A. Seiberling as president.

## Philippine Railways Seek Doom of the Motor Bus

SEATTLE, WASH., Aug. 10—A vigorous fight is being made by railroad interests in the Philippine Islands, led by the Manila Railroad Co., to eliminate the automobile stages from the passenger and freight-carrying business in the Islands. Legislation to place prohibitive fees on the stages is being sought from the legislature of the Islands.

Public opinion in the Islands, according to the latest newspapers received here, is back of the automobile interests. Facts and figures showing the great development of motor vehicle transportation in the United States are being used with telling effect.

If the government considers it just and fair to the public, to kill the auto truck lines merely to save the railroad why not carry the governmental interference with business still further and deny the garages the right to hire cars to persons desiring to go to any place to which a train might carry them? asks one Manila newspaper.

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

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Number 7

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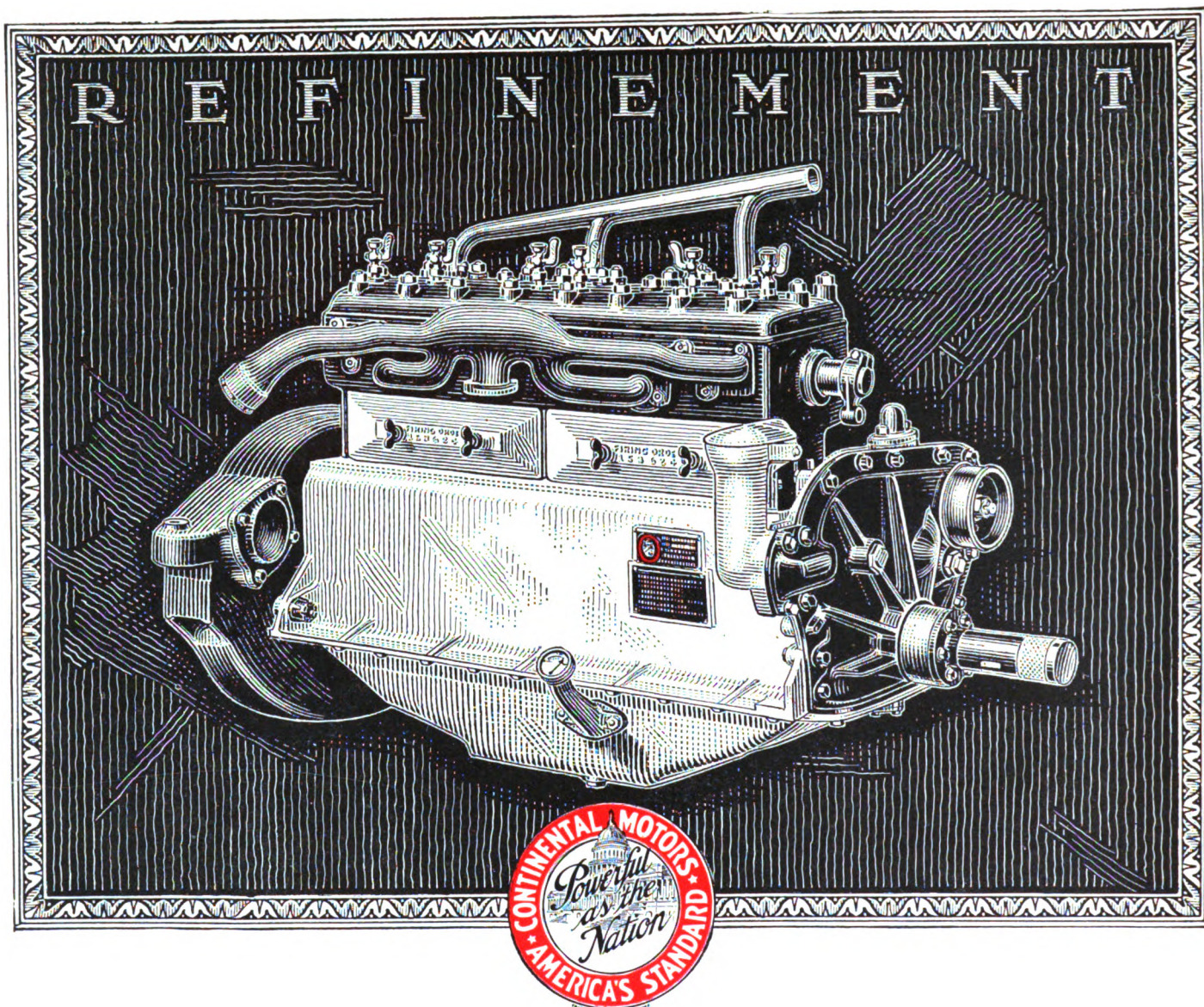
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# AUTOMOTIVE INDUSTRIES

## *The* AUTOMOBILE

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No. 7

## The True Relation Between Wages and Unit Cost

The relation between labor rates, labor earnings; and labor costs is not generally understood. Decreased wages do not necessarily mean decreased unit costs. Here is a timely discussion of a problem vital to the manufacturer at this time.

By Harry Tipper

**M**UCH discussion has been going on in the papers concerning the so-called liquidation of labor, which is not a liquidation in any sense of the word, but a reduction in the operating cost.

It is evident from these discussions that the relation between labor rates and earnings, with the concomitant relation between labor rates and costs, is not thoroughly understood.

A great many of the discussions have presupposed that a 15 per cent reduction in the rate of labor employed would bring about a similar percentage in the reduction of cost and a similar percentage in the reduction of earnings.

An examination of the best available labor statistics makes it evident that the rise and fall of labor rates does not agree with the fluctuation of labor earnings. Neither labor earnings nor labor rates have had more than temporary reductions in the history of labor since the beginning of the factory system. Although the rates of pay have gone up more rapidly in times of prosperity and remained more stationary in times of depression, they have receded only very rarely and the recession has been comparatively small and very temporary in its character.

"During and after the war the labor rates rose very much faster than the average earnings of the

workers in the same trades. Similarly the earnings of the workers in those trades have not decreased in proportion to the rates, since there was a tendency to reduce the rates of pay following the depression. The cost of wages to the manufacturer in the cost of production increased more rapidly during the latter part of the war and afterward, and since the depression began the cost per unit of production has fallen more rapidly than the reduction in the rate. In some of the metal trades factories, for instance, during the rise in wages the rate increased for some occupations to an average of 110 per cent.

At the same time, the efficiency decreased on the average to about 80 per cent, so that the actual cost was increased by considerably more than the rate.

In the period after the peak of industrial prices wages in some factories were reduced 15 per cent and in some others 20 per cent, while the efficiency of the workers increased 24 per cent, bringing the cost of production down much below the actual reduction in the rate of pay.

Curiously enough, however, during the rise, the individual earnings of the workers did not increase as rapidly as the rate and the earnings have not decreased very much since the turn of prices downward.

From the worker's standpoint, his whole position is measured by his earnings over the period. The carpenter who works on an average in the New York district of about 180 days in the year, does not figure that he makes ten dollars a day at that rate, but that he makes so much a week for the year. In fact, he is making about six dollars a day available income. Similarly, the factory worker who moves from job to job from time to time, who makes money at times from overtime and loses it from short time, and so forth, figures that he can depend upon a certain sum per week for his budget, whether he argues it out in this financial fashion or not.

For the manufacturer, of course, the rate of pay is important only where it represents an absolute rate per piece.

In any other situation the rate of pay must be translated into cost per piece before it can be considered in arranging factory costs.

From the beginning of the industrial development, the increased pay of the worker has been met almost every time by an increase in the productivity of the worker, either through the introduction of more skillful equipment or through the better distribution of the labor itself.

We have no evidence from past experience which could lead us to hope that labor would be reduced materially in its price over any considerable length of time. The cost of the labor must be reduced by the increased efficiency and this cannot be done solely through machinery or the better distribution of labor. It must be done through an increase in the human efficiency. Measures that will induce the worker to put out more productive power in proportion to his pay will play an important part in the reduction of labor cost in the period we are now entering.

Most of the labor statistics published are of little value because they record changes in the rates only, changes in the general conditions of employment only. They do not take into account the changes in the cost per unit of production or the average of the worker's earnings. The first is the necessary calculation in considering the manufacturing cost and the second is the important consideration in figuring the relative buying power of the worker.

Merely to say that the buying power will be decreased because the rates of pay are decreased is absurd. The reduction in the average earnings will do that. Merely to say that the factory cost will be reduced because the rates of pay have been reduced is equally absurd.

In some factories where the reduction has been arbitrary and without any apparent reason, the efficiency of the workers has dropped in equal proportions, so that the cost remained about the same. I know one or two cases where the rates of pay were reduced, while the price of the product remained the same, and I know that in one of these cases it was the definite intention of the workers under those conditions to produce less in order to even up for the manufacturer's action. His labor costs were not reduced by the reduction in pay and any fancied advantage he secured was nullified by the action he took.

The usefulness of the general labor statistics, therefore, depends entirely upon the elements entering into them and the way in which they are analyzed in the attempt to secure a knowledge of the tendencies from them.

Analysis of the methods employed by the individual manufacturer will do much to illuminate the problem of lower factory costs per unit of production and will show the very slight relation that exists between the rate of pay and the production costs in various factories employing the same type of labor.

The factors that enter into the labor cost per unit of production include the human factors and their influence upon the fluctuations in efficiency.

The figures alone are indicative only of the general tendencies; they do not illustrate the possibilities. Average figures are only relatively important; they do not aid in the solution of the problem for the individual manufacturer, and no average can be of much service to him in meeting the competition that he must face in his particular field.

There is a tendency for these general statistics to influence the manufacturer in his own actions unduly, either because these statistics appear to justify his own position, or because they suggest a lack of parity between his methods and the general condition.

The variation in the individual problem is the important element in the improvement of labor efficiency and the reduction of the cost of production.

The study of the individual problem is the important study.

Reflex action of the market will show any disadvantage from which the manufacturer may be suffering in his cost per unit.

The only way that his problem can be solved is by the study of his individual case, the elements that enter into it, and the methods that may be applied properly to its improvement.

The general statistics quoted so frequently in present discussions of labor conditions should not be treated too seriously by the manufacturer in estimating the future probability.

There is nothing in past history to indicate that the worker has willingly come back to a less convenient state of living or to lower earnings and nothing has come out of the past which would indicate that rates of pay have materially decreased for any length of time.

Increase in the efficiency of the individual is the only sound basis for the reduction of labor cost and this increase may be produced partly by mechanical arrangements, partly by a better understanding of the human being. In this direction the manufacturer can safely experiment, for every improvement will tend to become permanent.

In the direction of lowering the costs by the reduction of rates, there is not much hope of anything but a temporary alleviation, and this hope may not be realized if the workers do not increase their efficiency comparatively with the rate.

IT is believed that the production of platinum in British Columbia will soon be greatly increased. Investigations conducted during a number of years have disclosed the fact that the Fraser River and adjacent territory constitute one of the principal platinum deposits of the world. A plant is being erected and it is expected that reduction work will be commenced this spring. It is believed that for 250 miles along the Fraser River and 150 miles on tributary streams 75 per cent of the black sand deposits can be dredged and concentrates to the extent of 8 pounds to 40 pounds per cubic yard of dirt obtained.

# Design Features Brought Into Relief by Grand Prix

The straight-side cord tire performed specially well in the famous road race this year, while the large number of curves in the course brought the four-wheel brakes into particular prominence. Low weight of American cars created very favorable impression upon European engineers.

By W. F. Bradley

THE recent Grand Prix race marked a revival of long-distance road racing in France, after the disastrous race in July, 1914, when Germany with its six-cylinder aviation engines won first, second and third. This race has re-established with the French populace the value of road racing in the testing of the design of all parts of the car. Murphy's victory averaging 78.1 m.p.h. for 321.78 miles or 15 minutes faster than the Ballot, which finished second, left no ground for disputing the fact that the best car won. This speed, compared with 65.5 m.p.h. in 1914, indicates that advancement has been made during the past 7 years, notwithstanding the fact that the German six-cylinder Mercedes aviation engine, which was victorious in 1914, was well ahead of its time in engineering development.

To-day's race has drawn attention to straight-side cord tires in a way that could not be accomplished in 12 months of ordinary propaganda. It was a distinct victory for this type of tire, notwithstanding the fact that Europe has been opposed to the straight-side construction. The race was a victory for four-wheel brakes in that the 10.7 mile circuit, which was covered thirty times, was full of curves. It was also a victory for light-weight construction in that the Duesenberg cars were the lightest of the thirteen competitors in the race, with the possible exception of a 2-litre Ballot.

A very favorable impression was created by the low weight of the Duesenberg cars, compared with the European machines, and the conclusion was drawn that American metallurgists have got ahead of their European rivals. The following weights, although official, are not entirely accurate, but are valuable from a comparison standpoint. The total weight was obtained by deducting the declared amount of oil, gas and water in the car. As no machine came near the 800 kilos minimum, it was not necessary to empty tanks. Weight on front and rear axles was taken without any serious attempt to ascertain the center of gravity.

Car	Driver	Front Axle	Rear Axle	Total Weight
Duesenberg	Murphy	1052	1065	2028
"	Guyot	1053	1102	2041
"	Boyer	1049	1018	2006
"	Dubonnet	1049	1036	2015
Ballot	DePalma	1035	1131	2072
"	Chassagne	1042	1153	2081
"	Wagner	1023	1168	2055
"	Goux*	873	952	1814
Darracq	Boillot	1036	1102	2132
"	Thomas	1047	1223	2052
Talbot	Guinness	1078	1289	2191
"	Segrave	1113	1228	2189

\*2 litre car. All other cars had 3-litre engines.

In all cases the tanks contained very little fuel. It will be noticed that the Duesenbergs were more heavily loaded on the front axle than any of the others, this being due to their unit construction of engine and gearbox, compared with separate construction on a 3-point suspended sub-frame for Ballot, Talbot and Darracq.

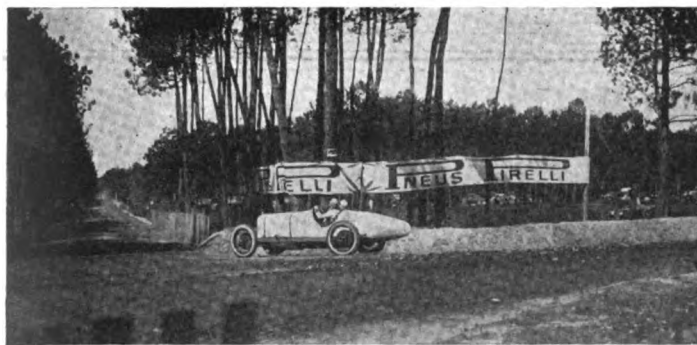
There is reason to believe that the lightest engines were the Talbot and the Darracqs, yet these cars were the heaviest of the group. In the frame members alone there was very much more weight than in the Duesenberg frames and less strength. The rear axle, too, was considerably heavier, and the very fine work done in the engine had not been carried out in all the details of the chassis, with the result that total weight was unnecessarily high.

Definite information regarding power output naturally was not given out. There is reason to believe that the Talbots and Darracqs got the highest power on the bench, but they did not have the same economical utilization of this power as their rivals. Duesenberg states that he reached the peak at 4200 r.p.m., which is the same figure as for Talbot-Darracq. For the Ballots the peak was 3600 r.p.m. For a course of this nature a four-speed gearbox would have been an advantage, but its absence did not prevent Duesenberg winning. As an offset, of course, he had low weight and the ability to run the engine at very high speeds for short periods.

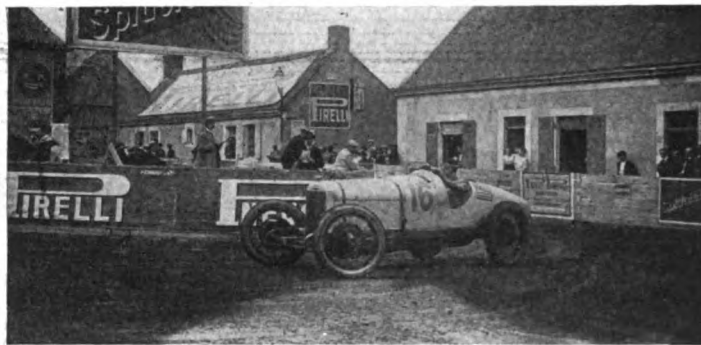
## Ignition Performance

Ignition honors were equally divided. Delco equipped Duesenberg, Talbot and Darracq, and the Swiss Scintilla magneto was used on the Ballot cars. There were no ignition troubles, and plugs, which were K.L.G.'s for the Europeans and A.C.'s for the Americans, were equally satisfactory.

After arrival in France three of the Duesenberg cars were equipped with the French Claudel carbureter. Murphy decided to retain his Miller, which he had got into first-class condition, for although the Claudel seemed to be rather better on acceleration, he was not disposed to take the risk of a road accident during a final test on the day before the race. The trouble with the Claudels was sticking throttle barrels, occasioned by road dust. Chassagne foresaw this and fitted a very heavy recall spring. Wagner and De Palma had to fit extra springs during the race. This was not the fault of the drivers so much as of the firm, for Ballot did not encourage suggestions from his drivers, and Chassagne was in a position to get work done which could not be attempted by the others.



One of the right angle turns



A hair pin turn

All cars in the race used four-wheel brakes. The Duesenbergs were of the hydraulic type and proved exceedingly efficient. For the road it was decided to inclose the drums and the operating mechanism, this being essential on a highway, although not necessary on the track. With the exception of Ralph De Palma's car, the Ballots were fitted with a service brake designed by Engineer Henry. It made the work of the driver lighter and proved very satisfactory in the race. Ballot had smaller drums on the front than on the rear. After road tests the Duesenberg crew realized there was an advantage in this and got the same result by cutting away a portion of the brake shoes. The Talbots and Darracqs had equal braking surface front and rear. Metal brake linings were used on all cars. The only use of fabric lining was for the Ballot clutches. Duesenberg led the field in the matter of stream lining. The shape of the body, the colors, the position of the drivers and the tone of the exhaust, all tended to exaggerate the impression of speed conveyed by the American cars, compared with their European rivals. Some of this, of course, was accidental, but the general impression was excellent.

### Tires

Tires played a very important part in the race which was started at one minute intervals, and in pairs. The Oldfield cords used on the Duesenbergs proved to be not quite suitable for stony French roads. No rain had fallen in this part of France for three months and the neighborhood being naturally sandy, all the road dressing disappeared after an hour's running, leaving certain portions of the course thickly strewn with stones. These were very destructive to the Oldfield cords produced under Indianapolis track conditions.

The Italian Pirelli company had brought out a new straight side cord tire of 35 by 5, which was supplied exclusively to the Ballot team. This proved to be a good tire for these conditions, for when Chassagne went out after 17 laps his tires were in first class condition, and Ralph De Palma covered the entire distance without making a change. The American driver imitated the Duesenberg team by going away without a spare wheel. The Frenchmen refused to do this. Experiments had shown that it was quicker to drive on the rim, even if the burst took place just after the pits, than to change on the roadside and then stop again to pick up a spare wheel. This was the first time cars had raced in France without carrying a spare wheel.

Dunlop also produced a new straight side cord which was supplied to the two Talbot and the two Darracq cars. This tire gave such poor service that Oldfield straight side cords and Michelin clincher bead cords had to be used. While it is extremely doubtful if they could have won the race, the Talbots and the Darracqs

certainly would have finished in much better position had their tires been equal to the Pirellis. These cars started out with the new Dunlop cord straight side but some of these only stood up for two laps, and before the end of the race the cars were running on a combination of Dunlop and Oldfield straight sides and Michelin clincher bead cord.

The French motoring public attaches an immense amount of importance to the lessons learned in racing, and the theorist who now comes forth to prove the detrimental influence of circumferential weight will find it hard to get attention. There are no signs that anybody is preparing to profit by this demonstration, but the fact remains that this race has made the way easier for the introduction of the straight side by dissipating many of the prejudices which existed against it.

The French cars had decidedly better tires for this class of road and were handicapped over such a comparatively short distance as 322 miles.

American prestige has been enormously enhanced by Duesenberg's victory in France. The win was so fair, there was such an absence of the element of chance, that all open-minded spectators admit the best car won. Boyer's Duesenberg went out with a broken rod, but Chassagne's Ballot was eliminated with a broken axle. Jimmie Murphy was overheating when he finished, but this was due to a leaky radiator punctured by a flying stone. Guyot's Duesenberg had clutch trouble, but so had Wagner's Ballot.

### Race Preliminaries

Murphy got into his Duesenberg still suffering from his accident of a week before, when, owing to the seizure of the brakes, he overturned in the ditch. He was carrying Louis Inghibert, who had been scheduled to drive No. 4 Duesenberg. Both men were pinned under the car. Inghibert was taken to the hospital with four broken ribs, but although the French doctors declared that Murphy had no fractures, he suffered so much that he believed one rib had been broken. Nevertheless he started in the race well bandaged.

All the competition lay between the Duesenberg and the Ballot teams. In addition to these two a couple of Talbots and two French Darracq cars had been entered, also a Mathis of only 1500 cubic centimetres, or half the piston displacement allowed under the rules. The Talbots and the Darracqs were in an unprepared condition and had been re-entered twenty-four hours before the start, after having been withdrawn. The Mathis had been delayed by strikes and in addition was incapable of winning by reason of its small piston displacement.

Louis Wagner burned the fabric lining of the Ballot clutch on the initial lap and after losing a quarter of an hour in making repairs and being further delayed

by sticking throttles, he did not figure as a serious contender.

Ralph de Palma, looked upon by the public as the fastest of the Ballot quartet, did not seem to have all the speed that was expected of him, and admitted after the race that his car was five miles an hour slower than when he drove it in America. He also was delayed by sticking throttle barrels. This defect was overcome by fitting extra springs, but not until a certain amount of time had been lost on the turns.

De Palma and Joe Boyer tied for first place on the initial lap, the time being 8 min. 16 sec. for the 10.7 miles of the course. Chassagne and Murphy tied for second place in 8 min. 21 sec., and Guinness and Andre Boillot tied for fourth place in 8 min. 39 sec. Thomas, on the Darracq, had mechanical troubles on the first lap.

Murphy and Boyer in Duesenbergs tied for first place on the second lap, making the two circuits in 16 min. and 13 sec., with Chassagne and DePalma following in the Ballots.

After a couple of laps Jean Chassagne on Ballot proved that he was the fastest of the Frenchmen. He handled his Ballot in a wonderfully clever manner and after trailing Murphy and Boyer for six laps he got ahead of the Detroiters in the seventh and took the lead on the twelfth lap after Murphy had stopped for two rear tires and gas. The Frenchman held the leading position for the next six laps, but could not shake off either Murphy or Boyer and began to be threatened by Albert Guyot, who, after an indifferent start, began to climb rapidly.

The height of excitement was reached at this point, for it was evident that all the French hopes rested on



Tommy Murphy in his winning Duesenberg

Chassagne. De Palma had never been able to get better than fourth, Goux was handicapped by having a car with a piston displacement of only 2 litres, and Wagner had a lot of time to make up by reason of his clutch trouble at the start. While Boyer and Murphy were chasing Chassagne hard, the difference between the blue French and the white American cars always being less than a minute, Chassagne pulled into the pits with gasoline streaming from his tank, caused by the breaking of the rear axle when the Ballot skidded on one of the turns in an effort to avoid Dubonnet's Duesenberg. The fractured axle struck the gas tank. This accident was similar to the one which befell Thomas when driving in the Targa Florio race.

With Chassagne out Jimmie Murphy had the race in his hands and was never headed until he crossed the line a winner.

## British Discuss Overseas Motor Car Trade

**A**N overseas automotive trade conference, promoted by a monthly automobile export paper, was held recently in London. The Government was represented by the new Minister of Overseas Trade who, while deploring the failure to stem the flood of imported automobiles despite the tariff of 33½ per cent on cars, had to explain the decision of the Government to cut down his own department to fit in with the country's present reduced spending capacity.

This Minister, however, was constructive and useful in suggesting the manufacture of a purely utility form of car for the Dominions.

The chairman of a truck company and a notable office bearer in the British trade's council indorsed the appeal to his fellow manufacturers to combine to produce the required car and urged that the overseas market could not be recovered unless wages were reduced and production increased. Ford has proved that there is a relation as of cause and effect between high wages and big output provided that the business is handled rightly and that those at the top of the enterprise concerned will reverse the British way of looking at things, namely, produce to create a demand, and not wait for the demand before starting to produce. This speaker, being a strong tariff man, deplored the Australian Government's recent decision to cut down the British preferential tariff to 5 per cent. Why not meet the situation with a combination of British automobile capital and set up a factory in the Dominions the same as other British industries have done recently, sending out their own picked staffs to develop the business?

Major Goddard, editor of the trade monthly which promoted the meeting, threw out several suggestions to the overseas visitors. In effect he asked the visitors to state "whether it was practicable to produce a type of car at a proper price for overseas trade; how best to push British cars and whether standardized component parts from which overseas traders could build their own cars would be of value?" Major Goddard, as might be expected from this quest for information, holds that the British automobile makers have failed in propaganda.

The visitor spokesmen told a few home truths to the effect that American cars are not the "duds" in the Dominions which interested parties would have us believe; that they wear reasonably well, and can be sold at the right price and that the business is effectively handled.

Ultimately it was resolved to convene a conference of overseas delegates to consider, first, problems of gearing; second, of adequate cooling, and, thirdly, of screening and hoods, as in these matters it was unanimously agreed by the overseas delegates that the American car was superior to the British.

**T**HE Stahlwerke Lindenberg A. G. of Germany have patented a new tool steel which, despite its relative softness, is claimed to allow of high cutting speed, to produce a smoother surface, to have a higher elastic limit and to require less lubrication than standard tool steels. These favorable properties are obtained by the addition of small quantities of refining metals, such as 0.3 to 1 per cent of chromium.



# Technical Features of New Durant Car

This new car, built along conventional lines, is likely to be a big commercial factor in the low-priced market. The engine is an overhead valve type, and the cylinders and top half of crankcase are in a single casting. Muffler construction adds materially to stiffness of the frame.

By P. M. Heldt

**T**HE new car of the Durant Motors Corp., which is being assembled at the former service station of the Ford Motor Co. in Long Island City, owes its importance mainly to Mr. Durant's standing in the industry. It will be turned out in large numbers and will undoubtedly be a big factor in the low priced market during the next few years.

The design throughout is along conventional lines for cars of the price class to which this model belongs, but the chassis is exceptionally "clean." The engine, which has cylinder dimensions of  $3\frac{7}{8} \times 4\frac{1}{4}$  in., corresponding to a piston displacement of a trifle over 200 cu. in., is of the overhead valve type. Cylinders and top half of crankcase are in a single casting, but the cylinder head is cast separately, so the valves can have their seats directly on water-cooled surfaces. The valves are located in a line extending the length of the engine and are operated through tappet levers in the usual way. The arms of the levers are of unequal length so as to give a slightly greater lift to the valves than the stroke of the tappet rods.

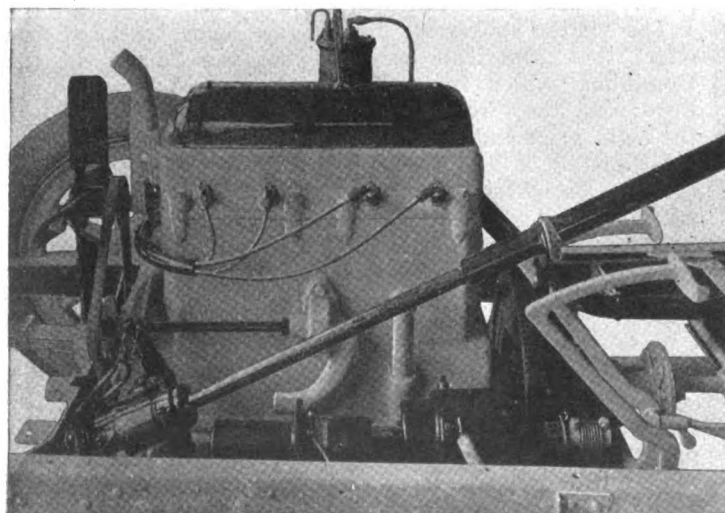
The waterjackets extend all the way down the cylinder barrels, and there is no offset in the casting at the lower end of the piston stroke. The tappet rods extending down the right hand side of the cylinder block are enclosed by a sheet metal cover, and there is another cover of pressed steel over the tappet levers and other mechanism on top of the engine. The latter cover is supported by means of risers cast on the cylinder head which also carry the shaft forming the pivot for the tappet levers. The cylinder head is held to the cylinder block by eight studs, of which the four on one side also hold in place the caps over the tappet lever pivot shaft. With valves in the head, the head cast-

ing is naturally much stiffer than one for an L-head engine, and a smaller number of bolts suffice to secure a gas-tight joint and hold the gasket securely.

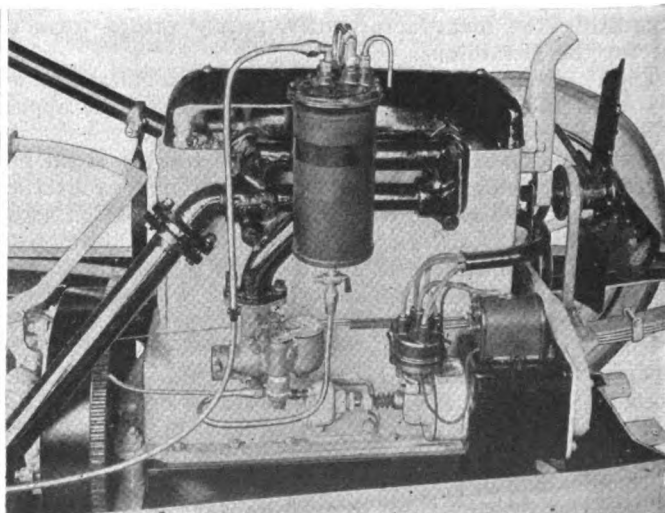
The pistons are iron castings with three rings above the piston pin. The piston pin is clamped tight in the connecting rod and its ends bear directly on the cast iron of the piston bosses. There is nothing out of the ordinary in the design of the connecting rods, which are I-section drop forgings and have their caps held on by two bolts each, duly secured by cotter pins. Piston and connecting rod together can be removed through the bottom of the engine after the oil pan is taken off. The crankshaft has three main bearings and is of light design. The caps under the two end bearings are cast with segmental flanges with which the crankcase bottom half makes an oil-tight joint. This bottom half is a steel drawing and has the splash troughs riveted in it. The engine has a four-point support on cross members of the frame. Camshaft drive is through helical gears at the forward end, the housing being closed by a sheet metal cover.

Fuel is carried in a 13.5 gallon tank mounted at the rear of the frame, from which it is fed to the carburetor by a Stewart vacuum feed tank which is supported alongside the engine. The make of the carburetor has not been finally decided upon, but the car from which these notes were taken was fitted with a Tillotson. A rather novel combination inlet and exhaust manifold is used, the shape of which is clearly shown by the sketch herewith. The carburetor is located toward the rear of the engine on the right hand side.

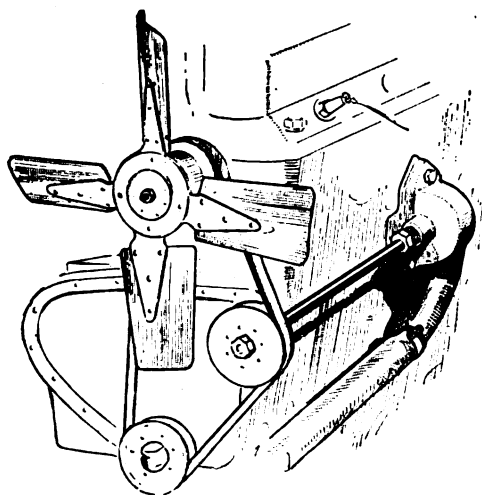
The electrical equipment is of Autolite make. The starter is located on the left hand side and drives to a gear



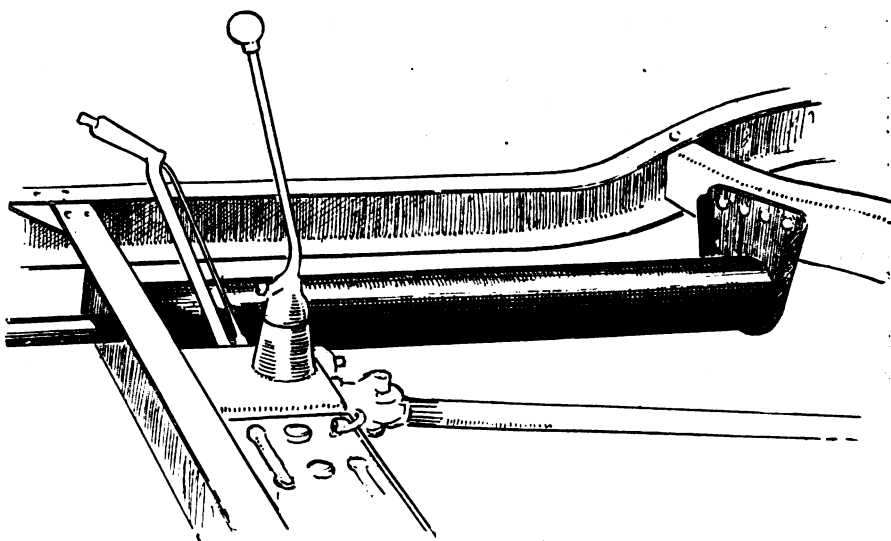
Left side of engine, showing mounting of steering post, starter and horn



Right side of engine, showing manifold and mounting of vacuum tank



Triangular drive of pump and fan



Muffler mounted so as to reinforce frame against weaving

ring cut on the flywheel through an inboard Bendix drive. It may here be pointed out that the gearcase is a separate unit and the flywheel, starter and drive are uncovered, so that both the starter and its driving mechanism are in plain view on the chassis and very accessible. The generator is mounted on the opposite side of the engine, forward, and is driven from the camshaft through enclosed gearing. The same as the starter, the generator has a square sectioned field frame, and on top of it is mounted the ignition coil. The timer-distributor is also mounted on the generator, being arranged vertically in the usual manner. The high tension cables from it to the spark plugs are carried through a metal tube around the forward end of the cylinder block. All other wiring is encased in flexible metallic tubing.

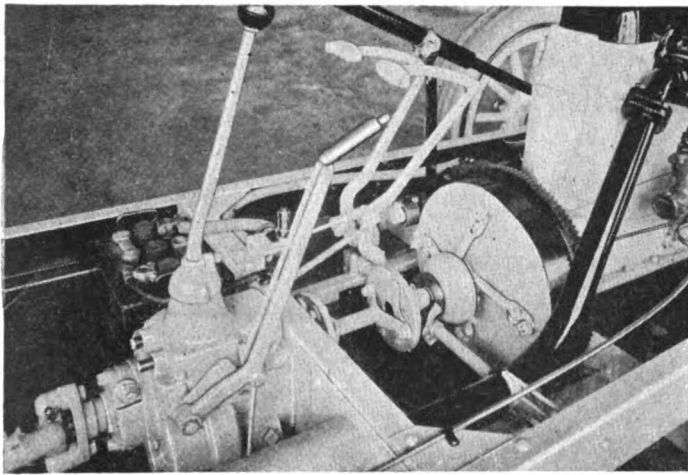
Lubrication is by the circulating splash system, a gear type of pump being carried on the outside of the crankcase on the right hand side and driven from the generator through a flexible coupling. Oil is fed to the main crankshaft and to the camshaft bearings directly, and a pressure gage is mounted on the instrument board to indicate the pressure at which oil is delivered to these bearings. Oil is also delivered into each of the four splash troughs and into the cam gear housing, and splash within the case provides lubricant to all the other bearing surfaces. The oil pump draws its oil from a large strainer at the lowest part of the oil pan. There is a combined breather and oil filler on the right hand side of the crankcase near the rear, which is carried up sufficiently high to make it easy to renew the oil supply. The oil passages to bearings are drilled and there is no outside piping.

Cooling is by pump circulation. A centrifugal type of pump is mounted on the right hand side and is driven by a Vee belt from the forward end of the crankshaft. The same belt drives the four-bladed radiator fan, the drive being a triangular one, with one side substantially vertical. There is one peculiarity to the water pump, and that is that its impeller is located partly within the engine water jacket and its housing is of substantially semi-cylindrical form. This brings the pump drive shaft very close to the cylinder block and ensures free circulation of the water by thermo-siphon action in case of failure of the pump or its drive. As a means for adjusting the tension of the drive belt, the base of the fan bracket is provided with elongated holes by which it is bolted to the cylinder block. The hub of the fan contains an oil reservoir from which its bearings are lubricated. The radiator is of standard form and has a cap covered with a molded heat-insulating composition.

The muffler, which is located just inside the right hand frame side bar, between a cross member directly in front of the gearset and another substantially over the rear axle, serves the additional purpose of stiffening the frame against weaving. The frame is made up of  $4\frac{1}{2}$  in. channel sections with few cross members, of which two at least are quite flat, so that as a whole it is very flexible. The muffler, however, being a long tube of about 6 in. diameter and relatively heavy walls, and securely fastened to the cross members by means of flanges at both ends, adds greatly to the stiffness of the frame. The muffling elements are of the simplest possible nature. The exhaust pipe enters the muffler centrally at one end and is carried part-way through it. Its end is closed up but that part of the pipe within the muffler is perforated and the exhaust gas escapes through these perforations into the muffler, from which it passes to the atmosphere through an opening on the lower side of the rear end, formed by a bulge in the head.

The clutch is built together with the flywheel and is of the single plate type. The steel driven plate is slotted radially so as to prevent distortion through heating, and consequent trouble. On both sides of the steel driven disk there are floating disks of wire asbestos  $11\frac{1}{2}$  in. in diameter and on the outside of these floating disks are the flywheel web and a plate which is in direct driving connection with the flywheel. The disks are pressed together by a series of coiled springs located near the periphery, while the disengaging pressure is transmitted through a series of four levers, which, instead of being arranged radially to the clutch axis, are offset from that axis to such an extent that they pass the clutch shaft, which permits of a greater multiplication of the pressure. Except for the disengaging pressure multiplying levers, the clutch is completely enclosed. There is a large oil chamber in the shifting collar, and lubrication of the clutch bearing needs to be attended to only once a year.

Between the clutch and the gearset there is a short intermediate shaft with two fabric universal joints, the spiders of which have two arms each. The gearset is supported on a cross member of the frame. It is of the ordinary three speed and reverse, selective sliding type and is fitted with annular ball bearings on its primary shaft. The shifting lever is of the ball-mounted, ball-handled type and is centrally located. Gear positions are arranged in accordance with S. A. E. recommended practice. The emergency brake lever is mounted on the right side of the gearbox and operates on a toothed sector as usual. Cast iron is the material of the gearcase. The latter is of the



Central part of chassis

functional form, the walls coming close to the contained parts at all points, and is therefore exceedingly compact. The speedometer drive is taken from the rear end of the gearset.

Between the gearset and the rear axle is inserted the solid propeller shaft with two metal type universal joints. The final drive is by spiral bevel gears and gives a reduction ratio of  $4\frac{1}{3}$  to 1. Ring gear and pinion are of chrome nickel steel, the former being fastened to the flange on the differential by riveting. The rear axle is of the built-up, three-quarter-floating type. At the differential there are annular ball bearings and at the wheels Timken roller bearings. The differential is of the two-pinion type. As usual with the built-up housing, the axle carries an under-running truss.

The frame, as already mentioned, consists of  $4\frac{1}{2}$  in. channel bars, and these are straight from end to end in the vertical plane, but are set considerably farther apart at the rear than at the front. The frame is supported by half-elliptic springs all around, the rear springs being 48 in. long and the front springs 34, and both sets 2 in. wide. The rear springs are underslung. The Alemite lubricating system is used for the whole of the chassis. All shackle bolts are hardened and ground. Torque reaction and driving thrust are taken care of by a Hotchkiss drive.

In connection with the frame, mention should be made of the method of supporting the storage battery. The latter is located alongside of the gearset. A shelf in the form of a steel plate is riveted to the underside of a frame cross member on which the battery is set. A steel band passes horizontally around the battery at about mid-height, its ends being provided with pull-up screws which extend through the web of the cross member and are drawn up by nuts, thus holding the battery firmly in position.

The front axle is of the regular I-beam type, but the steering knuckles are of the inverted Elliot type which is found more frequently in cars of the higher priced class. Stops are forged on the knuckles to limit the steering deflection and prevent contact between the tires and parts of the chassis. The tie rod is located to the rear of the axle in a protected position. The drag link extends crosswise of the chassis and connects to a separate ball stud. Two Timken roller bearings are fitted in each front wheel. A feature of apparently considerable importance from the driver's point of view is that each wheel hub is formed with an extension in which a central screw thread is tapped, so that by carrying along a bolt of quite moderate dimensions the driver always has a wheel puller with him.

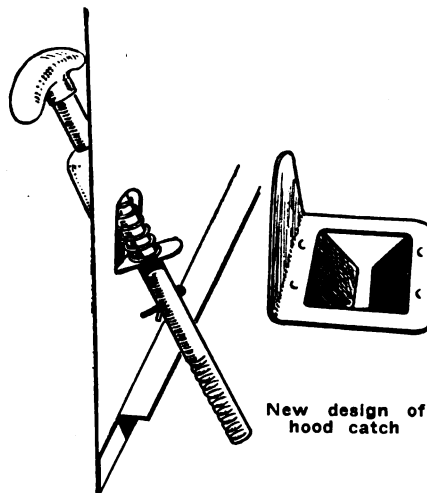
The steering gear is of the worm and complete wheel type and the post is strongly raked. The steering gear housing is located between the engine crankcase and the

frame directly to the rear of the frame cross member supporting the front end of the engine. Back of the steering gear housing is located the vibrator type of electric horn and back of this the starter. Beneath these parts there is a sheet steel filler plate extending between the engine and the frame. These accessories all lie quite low down, and the sides of the engine higher up are encumbered very little.

The steering wheel is 16 in. in diameter and has a walnut rim and an aluminum center. The inner ends of the spokes show as aluminum and the outer ends as wood, giving an attractive appearance. Spark and throttle controls are of the aluminum die-cast type, held in position by friction, and are mounted centrally on the steering post. The horn button is also located on top of the steering post. From the lower end of the steering post the connections to the carburetor and ignition unit are by flexible steel wires extending through tubes with their ends fixed, after the manner of Bowden wire controls.

Both sets of brakes act on drums on the rear wheels. The outside brakes are the service brakes and the inside the emergency. The brake drums are 12 in. in diameter; the inside bands are  $1\frac{3}{4}$  in. wide and the outside 2 in. Each set is provided with means of adjustment adjacent to the drum which can be operated without the use of tools. The cross shaft for the brake linkage is located in front of the gearset, being supported by the same frame cross member which carries the transmission and storage battery. For supporting the clutch and service brake pedals there is a small sub frame, that is, a pair of short channel section frame members extending longitudinally.

A somewhat novel form of hood catch is used. This consists of a T-fitting, the shank of which extends through an



opening in the hood, and is provided at its lower end with saw tooth slots on opposite sides, while the spaces in between are left smooth. Secured to the frame side members are catches of hardened steel which engage into the slots on the shank of the T-fittings when the catch is locked. When the driver wants to open the catch he slightly

presses down on the T-fittings and then turns them around their axis through a quarter circle, whereupon they may be pulled out. The sketch herewith illustrates the idea fully.

The construction throughout is quite light and the five-passenger touring car, we are informed, weighs only 2300 lbs. The bodies are upholstered in leather and the tops are made of a leather substitute and provided with a glass window in the back. The cars which the writer inspected at the Long Island plant had a well balanced and well finished appearance. Tire equipment is 34 x 4 in. Goodyear on wood wheels with steel fellos. A very rigid tire carrier is mounted at the rear of the body. The equipment includes drum shaped headlights with non-glare lenses; dash light, tail light and license holder on rear tire carrier, electric horn, speedometer, demountable rims with extra rim, ignition lock, robe rail, Alemite pump and a set of tools.

# New Model Light Cars Planned by British Makers

The success of the low powered, light weight car Rover is causing well known firms to enter this competition. Exhibitors at last Olympia show express dissatisfaction with the two building arrangement and some threaten to withdraw.

By M. W. Bourdon

**I**F present plans mature, the next Olympia show will see several firms well known in the world motor industry showing supplementary models which will be striking departures from their present output.

Rolls Royce, for example, has a 20 hp. six-cylinder on the stocks, but no details are yet available;

Daimler is planning a 12 hp. four-cylinder at a popular price;

A company associated with the Daimler, the Birmingham Small Arms Company (B. S. A.) now selling motor cycles only on the automobile side, has taken up a two-cylinder air-cooled Vee engine which Hotchkiss has been testing out and will make a runabout to compete with the highly popular 8 hp. Rover and cut across the elaborate motor cycle and side-car outfits in price and performance.

Armstrong-Siddeley has a 10 hp. water-cooled light car in prospect;

Singers, who have bought up the Coventry Premier, are making a four-wheeler under the last name also to compete with the little Rover.

The success of the Rover, both from the practical and the sales standpoints, will, in fact, result in its having several serious competitors next year with the reputations of well-established firms behind them, while the existing light car makers will also find competition increased by additions to their numbers.

The Star Co., for instance, has recently announced a new model of this type with a four-cylinder engine 69 x 120 mm. (2¾ in. x 4¾ in.) for two and four-seated bodywork and selling at £495 and £545 respectively (say \$2500 and \$2750 at normal rate of exchange.)

## London Show Space

**A**S a result of the dissatisfaction which was loudly expressed by those exhibitors at the 1920 London Show, who were relegated to the White City buildings instead of being accommodated at Olympia, a deputation waited upon the Council of the Society of Motor Manufacturers with a protest concerning the method in which the ballot for positions has in the past been conducted. They wanted all exhibitors to be given equal chances of getting into Olympia or else an assurance that some at least of the most widely known firms should accompany them to White City.

It has been felt that the public looked upon the White City section as a "side show" where only new and unimportant firms were to be found, and as stated in *AUTOMOTIVE INDUSTRIES* at the time of the last show, this was undoubtedly the view taken by a large proportion of the public. The majority of American cars were at White City, though there were many at Olympia

as well; the former were mostly newcomers to the British market and they certainly were not exhibited to the best advantage in being unable to have space at Olympia.

But the S. M. M. T. has decided that existing ballot arrangements must hold, despite the threat of complete abstention from the show on the part of the deputies and those they represented failing acquiescence with their request. To enable the matter to be further considered by the dissatisfied firms it was decided by the Council to postpone for a week the closing date for applications for space. Incidentally it was mentioned to the deputation that the attendance last year at White City was approximately 70 per cent of that at Olympia, but if the writer's opinion is justified it was the other 80 per cent that included the majority of potential buyers; they went to Olympia first, from habit if not through ignorance of the existence of the other section and Olympia got most of their orders.

This division of the show is a very poor makeshift for a one-building exhibition, and there is an increasing demand for a complete withdrawal from Olympia and a concentration at White City; the latter would accommodate all comers. But the S. M. M. T. Council consists mainly of representatives of firms entitled to participate in the initial ballots for space and naturally they are not keen to give up the advantage they hold under the existing arrangements.

## Motor Tractors in French Railway Service

**E**XTENSIVE use of motor tractors in the distribution of freight is being made by the Orleans railroad in France. Tractors of 3100 lb. weight are used, which are strongly built only in the frame, but as regards the engine power are about equal to ordinary passenger cars. The tractors are fitted in front with single and in the rear with dual pneumatic tires, and carry over the rear axle a vertical screw spindle which serves to press down the tongue of the trailer, so that part of the trailer load can be transferred to the axle of the tractor. This makes it possible to haul with so light a tractor trailers which carry up to 8 tons useful load. The trailers themselves run on solid rubber tires. Originally the railroad provided two trailers for each tractor, while in addition one tractor served for switching purposes in the yard. Later the number of trailers was increased to three. According to the experience so far had, one driver can make four trips daily with 18 to 20 tons of freight and a mileage of 28, which is equivalent to the work of two teams. The company plans to install a total of 20 tractors and 50 trailers at the Ivry Depot in Paris.

# A New Block-Cast Six-Cylinder Engine

Overhead valves are operated by rocker arms and push rods from camshaft in crankcase. Constant clearance aluminum pistons employed. Engine is characterized by unusually neat external appearance. Weight is 600 lbs.

By J. Edward Schipper

**T**HE Rochester engine is an interesting combination of racing and commercial practice. It differs materially from the Rochester-Duesenberg four, described in *AUTOMOTIVE INDUSTRIES* for March 4, 1920. An overhead valve with overhead rocker arm action is used in place of the long side rocker arm employed for the racing engine and the four-cylinder type previously described.

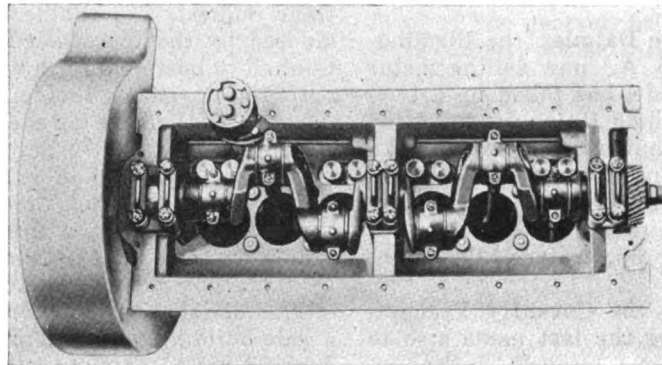
The Rochester six-cylinder engine employs two valves per cylinder. It is a block-cast unit with detachable head in which the valves are carried. The crankcase is of conventional type, the upper half carrying the main bearings. Aviation practice has been followed in one particular for the main bearing studs run completely through the case and hold down the cylinders.

The cylinders have a 3.6 in. bore and the stroke is 5 in. A maximum of 80 b.h.p. is developed at 2600 r.p.m. The cylinder casting is of semi-steel and is noteworthy for its clean exterior. On the right side of the block there is nothing except the water outlet and the valve adjustment cover plate. To the left side of the engine are bolted

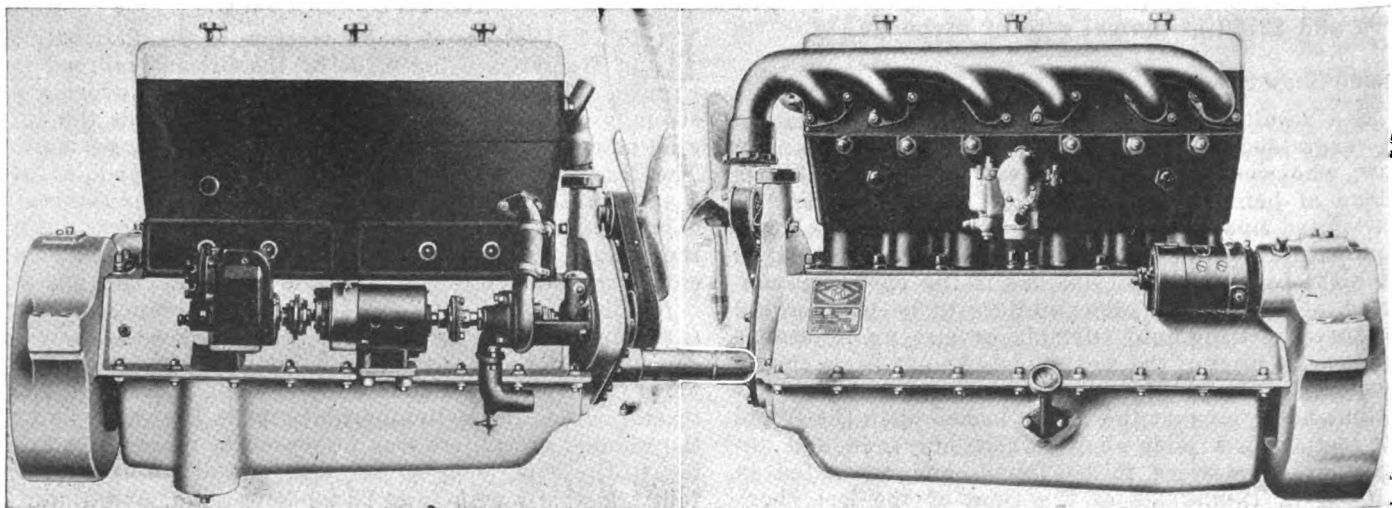
the exhaust manifold and the carbureter, which latter is of a horizontal type, the intake manifold being integral with the cast iron cylinder head.

The pistons are aluminum alloy of the constant clearance type. In this piston, the head is partly separated from the skirt by means of a slot which compensates for the normal expansion of the metal. The pistons are of the flat head type and are equipped with three rings all above the piston pin. The piston pin is of seamless steel tubing, hardened and ground. The pin floats in the piston, and is clamped in the end of the connecting rod. The piston assembly weighs 1 lb. 4 oz. The clearance of the piston skirt is 0.004 in. and the clearance over the ends of the piston pin is 0.025 in.

The connecting rods are I-beam section and weigh 3 lb. The lower rod bearing is a bronze backed, babbitt lined type, the cap being retained by two nickel steel bolts. The crankshaft is a three-bearing type, drop forged from 40-50 point carbon steel. The shaft is of the inherently balanced type with bow shaped throws. The main bearings are babbitt



View of Rochester engine with bottom pan removed showing crankcase and crankshaft bearings



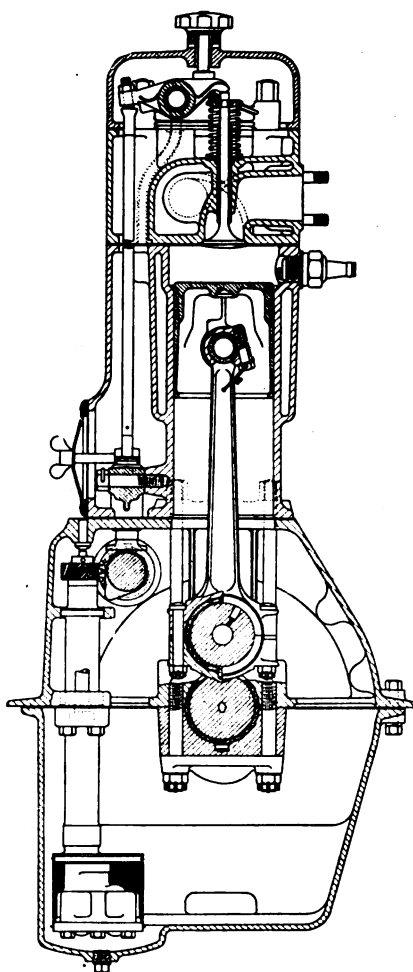
Right side of Rochester, six-cylinder, block-cast engine showing water pump, generator and magneto drive

Left side of Rochester engine showing exhaust manifold which has its outlet forward. The intake manifold is integral with cylinder head



lined and bronze backed. The bearing sizes are  $2\frac{1}{4}$  in. diameter throughout, the lengths being 2.5 in. for the front and center bearings and 3.5 in. for the rear bearing. The flywheel is a steel forging.

The valve actuating mechanism consists of a train of three gears, these being connected with the crankshaft, water pump and camshaft respectively. The camshaft and water pump drive gears are of 40-50 point carbon steel, whereas the camshaft gear is of Bakelite. These are helical gears and they are housed in the usual manner in the front end of the crankcase. The three-bearing camshaft is located within the crankcase. Besides the integral cams it carries a helical gear for the oil pump. The camshaft is pack-hardened and ground. The cam followers are of 35-45 point carbon steel, of the mushroom type, operating in cast iron guides bolted to the cylinder blocks and detachable in groups of six. The push rods are of seamless steel tubing, with ball and socket ends. The upper end of the push rod is socketed to receive the ball on the end of the rocker arm. The rocker arms are also of 40-50 point carbon steel, with a hardened button which bears on the end of the valve stem. The other end of the rocker arm is drilled and fitted with an adjustable tappet bolt, the lower end of which rides in the push rod socket, as described. This tappet bolt is secured in position by a lock nut, and movement of the bolt provides adjustment on the valve drive. The rocker shaft bearings are bronze bushed, the shaft being of steel tubing secured in three brackets in the cylinder head.



Transverse section through  
Rochester six-cylinder overhead  
valve engine

The valves are of  $1\frac{9}{16}$  in. clear diameter with  $\frac{3}{8}$  in. lift. The inlet valves are of nickel steel and the exhaust valves of tungsten steel. There are two coil springs to each valve. Over the valve mechanism is an aluminum alloy cover bolted to the cylinder head with three center studs.

Lubrication of the engine is by a full force speed system. The oil is pumped by a gear driven pump operated from the camshaft by helical gears. The entire pump can be removed as a unit from the base of the engine for cleaning. Oil is forced to the main bearings and connecting rod bearings, as well as to the camshaft and rocker arms. Overflow from a relief valve lubricates the water pump shaft and timing gears. The pistons, piston pins and cam followers are oiled by spray.

Water circulation is effected by a gear driven, centrifugal water pump. The fan pulley is located on the forward end of the pump shaft, which also takes care of the generator, and distributor or magneto drive. The fan is a four-blade, aluminum casting, of the propeller type. Either battery or magneto ignition can be employed with the engine. When magneto ignition is used, the magneto is mounted on a bracket to the rear of the generator and driven through the pump and generator shaft. When battery ignition is used, the distributor is driven by a vertical shaft just to the rear of the timing gear case. The bracket for

the magneto and generator are cast on the crankcase.

The engine is provided with standard S. A. E. bosses throughout. Its weight is 600 lb. It is manufactured by the Rochester Motors Corporation.

## Cooling Surface Requirements of Airplane Engines

**F**LIGHT tests were recently made at McCook Field, Dayton, Ohio, on a Fokker D-VII equipped with a 200-hp. Mercedes engine to determine the effectiveness of the cooling system. It was found that during climb the system operated on a temperature difference of 71 deg. C., which will insure against boiling with a normal air temperature gradient and 75 deg. F. ground temperature. This is 16 per cent cooling capacity less than U. S. Air Service requirements, and is characteristic of European planes. Cooling requirements in Europe are not as severe as those in the United States.

The shape and position of the radiator are advantages from the standpoint of installation and clean design, although effectiveness of cooling surface is somewhat decreased at the sides by the slanting core face. It is not a very satisfactory radiator for production, owing to the use of tubes of several different lengths. The shutter is unsatisfactory, giving poor control, owing chiefly to its failure to tightly cover the air passages through the radiator core and it being in the rear of same.

The over-all dimensions of the radiator were 28 in. in width, 25 in. in height and 12 in. in depth, and the

weight was 48 lb., empty. The frontal area in the direction of travel was 1.45 sq. ft.; the cooling surface, 126 sq. ft.; the outside diameter of the core tubes 0.250 in. and the thickness of the walls, 0.007 in.

Curves published in connection with the report show that the circulation was at the rate of 70 gal. per min. for a corrected pump pressure of 2 lb. per sq. in.; 98 gal. per min. for 3 lb. per sq. in. and 132 gal. per min. for 5 lbs. per sq. in. The cooling system reached a maximum temperature between 3000 and 4000 ft. altitude, the jacket inlet temperature then being 70 deg. C. and the outlet temperature 76 deg. C., which gives a water temperature gradient of only 6 deg. C. or 11 deg. F.

**T**HE final report of the Chief of Air Service A. E. F. to the Commander-in-Chief, American Expeditionary Forces is printed in No. 180 of the Air Service Information Circular, dated Feb. 15, 1921. It contains an account of all the activities of the Air Service from the time the United States entered the war to the signing of the Armistice, with numerous tables and diagrams. Concerning the Liberty engine it is said that "in actual service it fulfilled the highest hopes of it which had been entertained."

# An Analysis of the Automatic Ignition Advance Mechanism

Desirable rate of advance is for most engines a direct function of speed, but since centrifugal force increases as square of speed a compensating mechanism, the design of which is here outlined, is required.

By C. H. Hindl

ONE of the advantages of electric ignition is the ease and accuracy with which the spark can be timed. It is the purpose of the following paragraphs to deal chiefly with the method by which the spark timing is automatically controlled.

The point where ignition occurs is of considerable importance in the operation of the engine. Although the phenomenon of combustion is not clear in some of its details, it is a well-known fact that a considerable interval of time passes between the periods in which ignition occurs and in which the combustion of the mixture is complete. This period is usually spoken of as time required for the flame to propagate to various parts of the cylinder. In addition to the time required for the combustion of the mixture, there is an additional interval of time before any pressure is obtained in the cylinder. In other words, the flame travels part way through the combustion chamber before any pressure is registered on the piston. Since it is desired to utilize this pressure during the power stroke and have complete combustion before the end of the stroke is reached, it is necessary to carefully regulate the time when ignition occurs with respect to the piston position.

In the early days of the automobile, drivers were more or less skilled in the operation of the engine and controlled the spark advance by hand according to the "feel" of the engine. However, the use of the automobile has increased to the extent that the driver in most cases is not familiar enough with the engine operation to adjust the spark to the position for best engine efficiency. As a result, the engine may run hot and lose power on account of the spark being too far retarded or the spark may be advanced excessively, causing loss of power and knocking. Another serious disadvantage of hand control becomes effective when the engine is started, as the spark may have been advanced to a degree that will cause backfiring, which might seriously damage the starting motor and its mechanism, while with automatic advance the spark is always retarded at cranking speeds so that backfiring cannot occur.

The usual automatic advance mechanism varies the ignition timing in accordance with the speed of the engine

through the use of centrifugal force caused by weights revolving with the ignition drive shaft. This is usually accomplished by fixing the pivot of the weight integral with one shaft and having another point on the weight connected to the other shaft by means of a pin and slot or by levers. The weights should be of such size that the amount of advance will not be affected by friction or vibration. The mechanism should be designed so that the resulting forces due to driving torque produce the least possible turning of the weights about their pivots, especially at slow speeds, when the centrifugal force is small and any forces due to friction or driving torque are comparatively large. However, the cost, accuracy, space available, and appearance must be considered in determining the design of the advance mechanism.

The desired rate of advance for most engines is approximately a direct function of the speed. It is usually convenient to design the pin and slot or link mechanism so that the angular movement of the weights will be nearly proportional to the spark advance. If such conditions exist, it is necessary that the weights move about their pivots through an angle that is practically pro-

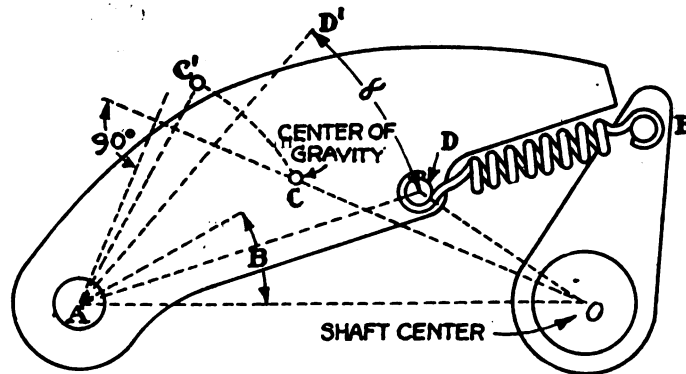


Fig. 1—Diagram used in deducing the formula expressing relation between angular motion of pivoted weight used in advance mechanism and speed of driving shaft

portional to the speed. Since the centrifugal force on the rotating weights increases with the square of the speed and the tension of the spring only directly with its elongation, it becomes necessary to place the spring so that either its elongation or its moment arm increases rapidly as the weights swing outward. Since the centrifugal force of the weights is small at low speeds, the effect of the springs must be slight when the weights are in their initial position. This is usually accomplished by making the elongation on this position very small and by having the line of action of the springs pass nearly through the pivot of the weight, resulting in a small moment arm through which the spring may act.

A general case is illustrated in Fig. 1 and will be used in the following analysis. The method of analysis can be applied readily to practically any form of similar mechanism.

Let  $O$  be the shaft center;

$A$ , which is integral with the shaft, the pivot center of the weight;

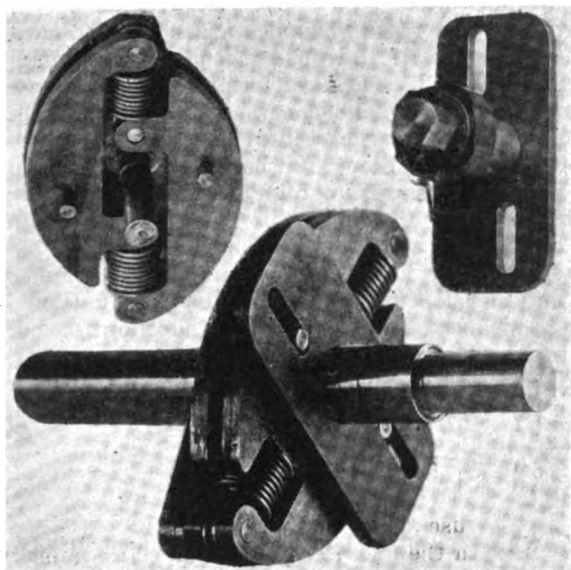


Fig. 2—Examples of the pin and slot advance mechanism

$C$  the center of gravity of the weight;

$D$  the point where the spring is attached to the weight;

$E$  the point where the spring is attached to the fixed pin integral with the drive shaft.

Let  $B$  be the angle between  $AC$  and  $AO$  when there is no rotation and assume  $ADE$  to be a straight line which will be approximately true, since any tension of the spring in this position should act through a small moment arm about the point  $A$ . As the device rotates, the weight swings outward about the point  $A$ , and the points  $C$  and  $D$  take the respective positions  $C'$  and  $D'$ . Assume the angle through which the weight swings to be  $\alpha$ .

The centrifugal force on the weight acts radially along the line  $OC'$  and will be equal to

$$C.F. = \frac{w}{g} \frac{v^2}{r} \dots \dots \dots (1)$$

$$v = 2\pi r N$$

Where  $r$  is a variable and equals the distance from the center of gravity to the shaft center in inches.  $N$  equals revolutions per second of the ignition shaft.  $w$  is in pounds and  $g$  in inch-second units.

$$C.F. = \frac{w}{g} (2\pi N)^2 r \dots \dots \dots (2)$$

The moment arm  $L$  through which the centrifugal force acts to rotate the weight about its pivot is

$$L = \frac{(OA)(AC) \sin(\alpha + B)}{r} \dots \dots \dots (3)$$

This represents the length of a line drawn perpendicular to the line of action of the centrifugal force which acts along the line  $OC'$ . The moment due to centrifugal force acting on the weight is the product of (2) and (3)

$$\text{or Moment} = \frac{w}{g} (2\pi N)^2 (OA)(AC) \sin(\alpha + B) \dots \dots \dots (4)$$

As the weight swings outward the spring elongates and takes a position such as  $ED'$ .

$S$  = length of spring

$$= \sqrt{AE^2 + AD'^2 - 2(AE)(AD) \cos \alpha} \dots \dots \dots (5)$$

and since  $DE$  is the free length, the spring elongation

$$\delta = \sqrt{AE^2 + AD'^2 - 2(AE)(AD) \cos \alpha} - DE \dots \dots \dots (6)$$

If a spiral spring is considered and the following nomenclature is used,

$P$  = tension in pounds;

$r$  = mean radius of spring;

$n$  = number of turns;

$K$  = torsional modulus of elasticity for steel = 12500000;

$d$  = diameter of the spring wire.

the elongation of the spring is

$$\delta = \frac{64 P r^3 n}{K d^4} \dots \dots \dots (7)$$

Substituting the value of  $\delta$  from equation (6) in equation (7) and solving for the spring tension

$$P = \frac{G d^4}{64 r^3 n} \left\{ \sqrt{AE^2 + AD'^2 - 2(AE)(AD) \cos \alpha} - DE \right\} \dots \dots \dots (8)$$

The moment arm  $N$  through which the spring tension acts equals

$$N = \frac{(AE)(AD) \sin \alpha}{\sqrt{AE^2 + AD'^2 - 2(AE)(AD) \cos \alpha}} \dots \dots \dots (9)$$

And the moment of the spring acting on the weight about its pivot is equal to the product of (8) and (9).

$$(P)(N) = \frac{G d^4}{64 r^3 n} \left\{ (AE)(AD) \sin \alpha - \frac{(AE)(AD)(DE) \sin \alpha}{\sqrt{AE^2 + AD'^2 - 2(AE)(AD) \cos \alpha}} \right\} \dots \dots \dots (10)$$

For a state of equilibrium the moment exerted by the spring must equal the moment exerted by the centrifugal force of the weights.

Hence equating (4) and (10),

$$N^2 = \frac{G d^4 g (AE)(AD)}{64 r^3 n W (2\pi)^2 (OA)(AC) \sin(\alpha + B)} \left\{ \sin \alpha - \frac{(DE) \sin \alpha}{\sqrt{AE^2 + AD'^2 - 2(AE)(AD) \cos \alpha}} \right\} \dots \dots \dots (11)$$

This expresses the relation between angular rotation of the weight and the speed of the shaft.

A convenient manner for proceeding is to approximately assume the size and position of the weight and the position of the spring. The size of the spring can then be found by substituting the maximum value of speed and the desired value of  $\alpha$ .

The maximum stress in the spring should then be checked and should be less than 50,000 lb. per sq. in. in order that the characteristics should not change during service. If the stress and the space available for the spring are correct, a curve should then be plotted between  $N$  and  $\alpha$ , using equation (11). This shows the movement of the weight with speed. Some mechanism must then be utilized to convert the motion of the weight into shaft rotation, or, in other words, produce advance. Two types of such mechanisms are illustrated in Figs. 2 and 3. The

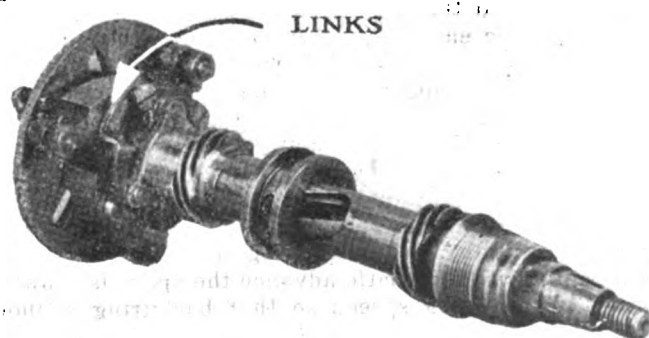


Fig. 3—Example of a link-type advance mechanism

pin and slot method of Fig. 2 is usually more convenient, since the slope and the length of the slot may be varied to suit any desired advance, while the links can be varied only through certain limits.

If the weights and spring have been determined and a curve has been plotted between  $N$  and  $\alpha$ , it then becomes necessary to apply a mechanism similar to Figs. 2 and 3, which will convert the motion of angle  $\alpha$  into rotation of the shaft which carries the ignition cam. This mechanism should be designed so that the resulting curve between speed and spark advance will follow points determined experimentally for the particular engine.

The use of a properly designed automatic advance ignition unit will produce greatest economy of automobile operation with the average driver. However, the throttle opening, amount of carbon in the cylinder, and the varia-

tion in fuels affect to a certain degree the proper point of ignition, and these variables are not taken care of by the usual automatic advance mechanism operating as a function of speed. These variations have led some manufacturers to apply hand control in addition to the automatic in order that the skillful operator can occasionally vary the ignition timing for best operation. There have been various attempts to regulate the advance by means of the throttle opening itself and also in conjunction with speed, but the complications involved are no doubt greater than the advantages obtained. Although the future may develop devices which vary the ignition timing through means separate from, or in addition to, speed control in an attempt to produce maximum economy, it is certain that present devices will fulfill the specifications required by the engine designers for a number of years.

## New Rotary Surface Grinder

A NEW machine designed for grinding rings, discs and cylinders which must have flat and parallel surfaces has been brought out by the Pratt & Whitney Works. It is of heavy, compact construction, permitting of heavy cuts and large output. It is claimed that sensitive adjustments, with convenient control, provide for rapid production on gear blanks, washers, cutter hubs, sprockets or other work requiring extreme accuracy. In addition, means are provided for grinding concave or convex surfaces.

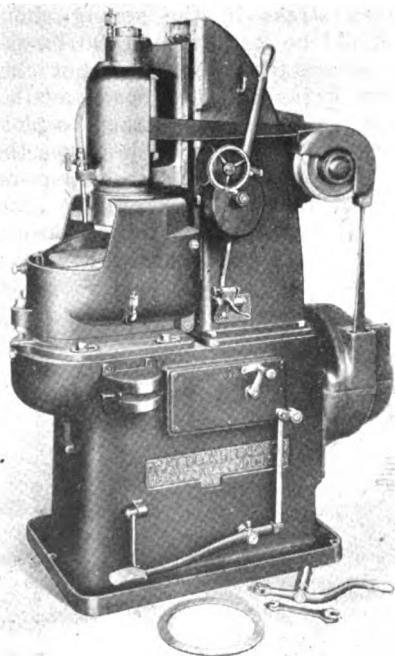
The spindle is mounted on ball bearings provided with adjustments for wear. The wheel is cemented in a holder screwed to the spindle, which makes changing a simple task, and a band clamped around the wheel guards against breakage. Surrounding the wheel is an adjustable steel guard which covers the entire wheel when raised to the idle position, so that chuck work can be handled safely.

The rotary magnetic chuck has two speeds and can be tilted for concave or convex work. This chuck is controlled by a pedal, and a connecting brake retards the rotation when stopping. The magnetic chuck is controlled through a switch on the side, which also acts as a demagnetizer.

The wheel feed is controlled by a lever like a drill press, and a position stop is provided to grind to a specific thickness. Fine adjustments are made through a hand wheel which can be locked and used as a feed wheel when desired. Back lash is neutralized and the wheel slide is over-weighted for easy control and extreme accuracy.

The machine is equipped with a pump, and the tank is located within the column. Lubricant is supplied to the inside and outside of the wheel, the flow being regulated by valves, and an adjustable hose takes care of washing the chuck and work. The tank can be cleaned from a removable settling pan. The shut-off valve is ordinarily controlled by the feed lever, but can be disconnected and operated by a pull knob. The spray is confined by a guard, the front of which can be lowered for work handling.

Belt drive is regularly furnished and is fully guarded at all points. The main drive shaft and idler pulleys are mounted on ball bearings and the clutch is mounted on a thrust bearing to take the load. The two-speed gear shaft is mounted on bronze bearings and the gearing runs in oil, the bearings being lubricated by the splash system. A flexible coupling takes care of chuck tilt and alignment.



Pratt & Whitney 8 inch rotary surface grinder

## Great Britain to Stop Airship Development Work

IT was recently announced that the British Air Ministry had definitely decided to give up all its airship activities and hand over its airships, material and stations to the Disposal Board provided no offer was received before Aug. 1 from a British company prepared to take over and run the airships on a commercial basis. The airships available are the R 80, R 33, R 36, R 37, L 64 and L 71. Of these vessels the second last and last are the large airships surrendered by Germany in accordance with the Peace Treaty. Airship R 37 is nearly completed, but work has now been stopped on it, while R 36 is fully equipped as a passenger carrying vessel. These ships the Government is prepared to hand over, free of charge, to the proposed British commercial airship company. In addition, it is willing to present the company with all its other airship material and stores, to assist it with information, to lend it airship specialists for a limited period, and to sell or lease to it the airship stations at Cardington and Pulham. It is officially explained that the Government's decision to give up airships as a fighting service was arrived at only in view of the urgent demand for economy.

# Grinding in the Automotive Industry

## Part II.—Development of Specialized Forms of Grinding

The first grinders were employed for general work. A demand arose, however, for specialized forms, for grinding methods that could be used in production work. This article follows up the discussion of types of grinding wheels and traces the development of special forms of grinding.

By P. M. Heldt

**U**NDoubtedly the first class of grinding in the machine shop was tool grinding, because tools of hardened steel could be given a cutting edge only by means of the grinding wheel. The grinders employed, however, were not what are to-day known as tool room grinders, by means of which it is possible to grind geometrically exact cutting edges on the tools, but rather floor stand grinders. These same grinders were used for snagging and other offhand work, and are so used to-day.

The same as in the machine tool line universal types of machine, such as engine lathes, came into extensive use first, in the grinding field the first machines developed were universal grinders on which it was possible to do almost any job that might come up in the machine shop. Universal grinders still have a large field, in tool rooms and jobbing shops, and are to-day being manufactured in highly developed designs.

As the use of grinding as a manufacturing operation increased there arose a demand for grinders for special purposes which should have all the characteristics of production tools, that is, low cost due to simplicity of design, and a high degree of automaticity with consequent low labor cost and high output. The first type of production machine was probably the plain cylindrical grinder. In a booklet on Principles of Cylindrical Grinding issued by the Norton company there is illustrated an early type of cylindrical grinding machine made by Ambrose Webster about 1861. The machine has a rather primitive appearance and does not seem to have come into commercial use. Cylindrical grinding as a recognized machine shop operation is only a little over 30 years old. One of the first concerns to introduce it was the Geiser Mfg. Co. of Waynesboro, Pa. (now the Emerson-Brantingham Co.), manufacturers of agricultural machinery, including steam traction engines. About 1889 A. B. Landis built for the concern a machine for finishing the crankshaft bearings of these engines by grinding instead of draw-filing and polishing. The Geiser Mfg. Co. also was among the first concerns to grind piston pins and crosshead pins. It is related that the first machine built by Landis remained in practical use until 1915. Some trouble was at first experi-

enced because only a drip of water was used, but when a stream of water through a  $\frac{3}{4}$ -in. pipe was substituted for this the process proved a success.

Following is an enumeration of the different forms of grinding practised in the automobile and allied industries to-day:

Offhand grinding, including snagging of rough castings.

Cylindrical grinding.

Internal grinding.

Surface grinding.

Disc grinding.

Ball grinding.

Cam grinding.

Gear grinding.

Form grinding.

Tool grinding.

A representative machine of the universal type is the Bath, manufactured by the Universal Grinding Machine Co. With the aid of a number of attachments it can be

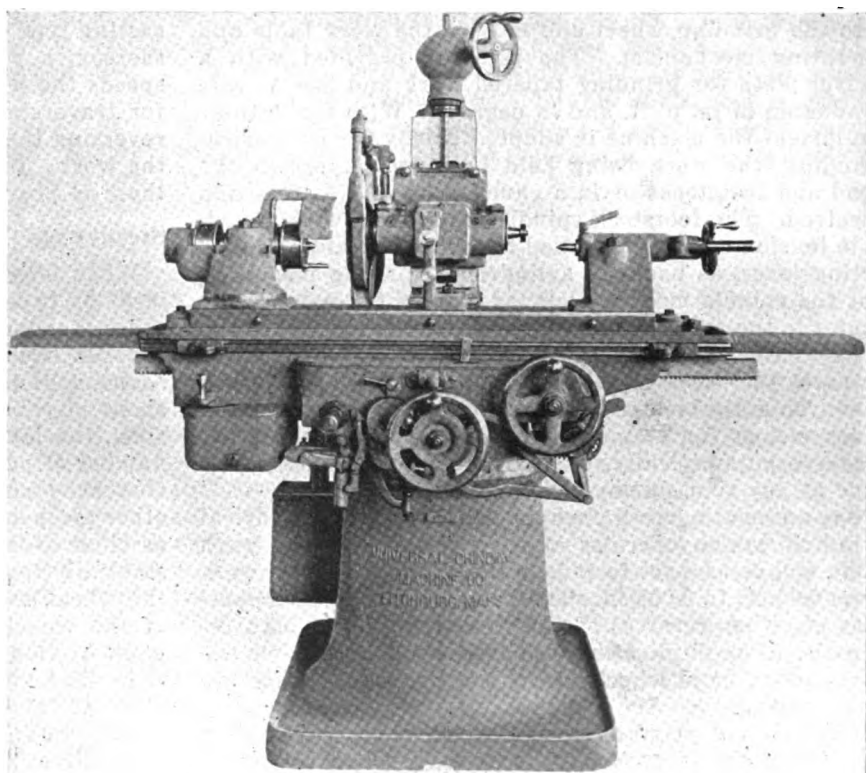


Fig. 1—A typical universal grinding machine equipped for cylindrical grinding



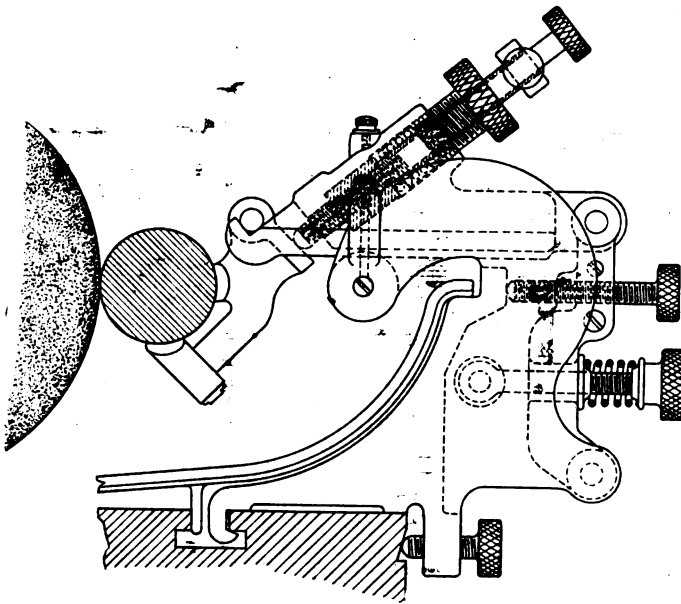


Fig. 2—A form of back rest used in cylindrical grinding. (Brown & Sharpe design)

used for cylindrical, internal, surface, cutter and reamer grinding. An illustration of this machine is shown herewith. The base is a single casting of column form, to the top of which is bolted an internally ribbed vertical column with a circular flange base as large as the machine base. To this vertical column is gibbed the grinding wheel head, which has a vertical movement. The cross slide knee, which carries the cross and longitudinal slides, has a large circular base that fits over the cylindrical part of the vertical column, thus providing a bearing of liberal dimensions for the knee to swivel on, the knee being swung around the column to bring the work table into the proper relation to the wheel for the various operations the machine may be used for. The knee is graduated in degrees and can be clamped at any angle from 0 to 90 degrees.

The cross slide provides means for feeding the work into the grinding wheel and carries the work table and operating mechanism. The table is provided with a swivel plate for grinding tapered work and has a scale graduated in in. p. ft. and in degrees. With the regular equipment the machine is adapted chiefly for cylindrical grinding, the work being held between centers in the head and footstocks or in a chuck in the head stock and revolved. The footstock spindle is provided with a variable tension spring controlled by a handwheel and quick acting lever, as usual in cylindrical grinding machines, but the spindle may be clamped rigidly for holding the center to the work. The table is controlled by adjustable dogs operating against the reversing lever, which latter actuates the reversing clutch, or it may be controlled by a conveniently located hand reversing lever, which provides means for stopping the table at the end of its traverse automatically, by giving the lever a part of a turn at any time during the traverse of the table.

An automatic cross feed is provided for cylindrical grinding, which operates at each reversal of the work table and can be set to reduce the diameter of the work from 0.00025 to 0.005 in. The automatic cross feed operates at either reversal of the work table or at both reversals. For duplicating work there is a stop on the cross screw hand wheel. Work and traverse speeds are independent.

For internal grinding a rigid attachment is bolted to the side of the column near its base, in which the wheel spindle is supported, the latter being driven from a

pulley which is clamped on the nose of the main wheel spindle. The work is held in a chuck. For surface grinding another attachment is furnished, which is secured to the grinding wheel head. The attachment spindle is screwed to the main wheel spindle and is driven through it. In this case the table is swung around through 90 deg. A universal work holder is furnished with the machine which adds to the variety of work which can be done upon it. This holder is particularly valuable in tool grinding.

In cylindrical grinding where the work is held between centers or in a chuck, it is revolved in the same direction as the wheel; that is, if the wheel turns right-handedly the work is also revolved right-handedly, so that the surfaces of the work and the wheel between which the grinding action takes place move in opposite directions. In internal grinding where the work is held in a chuck, work and wheel turn in opposite directions. Sometimes parts have to be ground cylindrically that cannot be held either in a chuck or between centers. They may then be laid in a Vee block and the wheel fed up against them, in which case the work will be revolved in the opposite direction as the wheel, so that the surface motions at the points where grinding takes place are in the same direction. While this is not as satisfactory as having wheel and work revolve oppositely, cylindrical surfaces can be obtained in this way.

The motion of the wheel head in the direction of the wheel axis is known as the traverse. Naturally a grinding wheel cannot remove a great depth of metal at one passage, and the grinding wheel is therefore traversed continuously, being fed forward automatically at the end of each traverse or after every second one. In repetition work the feed stops automatically when the work has been reduced to the desired diameter. Of course, wear of wheel is not allowed for in this, but the operator soon learns how many parts he can grind before the wheel has worn down an amount equal to the smallest possible adjustment of the cross slide, and he will then make the adjustment after passing that number of pieces through.

Plain cylindrical grinding machines are manufactured in a great variety of designs. They usually have a box-casting type of base with headstock and footstock jibbed thereon, a wheel head, gearing for driving at various speeds the work spindle and the wheel spindle, a drive for traversing the wheel and automatic mechanism for reversing the wheel travel and feeding the wheel toward the work. In addition to the automatic feed mechanism there is provision for hand feed.

### Steadyrests

When long, slender pieces have to be ground, trouble is likely to be experienced from shattering, and in such cases steadyrests should be used. These comprise two shoes or saddles with a face in the form of a cylindrical segment of the same radius as the finished piece. The shoes may be made either of wood, brass or hardened steel, the latter material being preferable when a large number of parts of the same dimensions are to be made. One shoe should be located underneath the shaft or other piece of work. Some makers recommend placing it as close to the wheel as possible, so as to take the substantially tangential component of the reaction between the wheel and work and overcome the drawing-in action of the wheel. The other shoe is located opposite the point of contact between wheel and work, so as to take the radial component of the reaction. Both shoes should be of sufficient width to span any slight inaccuracies in the circumference of the work. Steadyrests are provided with screw adjustments for both shoes so as to adapt them for use with work of different diameters. In grind-

ing camshafts, steadyrests of the enclosed type are often used, somewhat similar to lathe steadyrests, in which the camshaft turns under very much the same conditions as when assembled in the engine.

### Surface Grinding

Plane surfaces are ground either with the circumferential surface of cylindrical wheels or the ends or faces of ring wheels. In the ordinary surface grinder the work is mounted on the table which is jibbed to the base, table and work being fed past the stationary wheel head. Where the grinding is done with the side of the wheel the wheel spindle may be either vertical or horizontal and the work table fed past the wheel head or else the work table may revolve around its axis. When grinding with the side of a ring or cup wheel the cutting area naturally is comparatively large, and, in consequence, stock is removed quickly and great power is absorbed.

In addition to grinding plane and cylindrical surfaces it is also possible to grind surfaces of revolution whose section comprises one or more circular arcs or even irregular curves and straight lines. This is known as form grinding, and its most important applications in the automotive industry are in the grinding of ball bearing rings and of the grooves in splined shafts. In order to do this grinding the grinding surface of the wheel must be given the proper form by truing it with a forming device. Circular arcs can be easily formed on the wheel by mounting the truing diamond on a pivotal truing device having the proper radius. For irregular shapes the diamond must be guided by a former of the same shape as the section of the cutting surface to be produced. The majority of ball bearing rings, especially in the larger sizes, are ground in oscillating grinders, but some of the smaller rings are ground in plain grinders with formed wheels.

### Disk Grinding

Disk grinders are machines in which a circle of abrasive material is supported by a steel disk. Originally this form of grinder was used only for polishing and light finishing, but recently the disk grinder has come to be quite a production machine. The machine is used chiefly on work which has previously been turned, shaped, planed or milled, so that it has one true surface to which the surface finished in the disk grinder is usually perpendicular. Disk grinders are of exceedingly simple construction. The usual single spindle type comprises a floor stand with two split bearings at the top in which

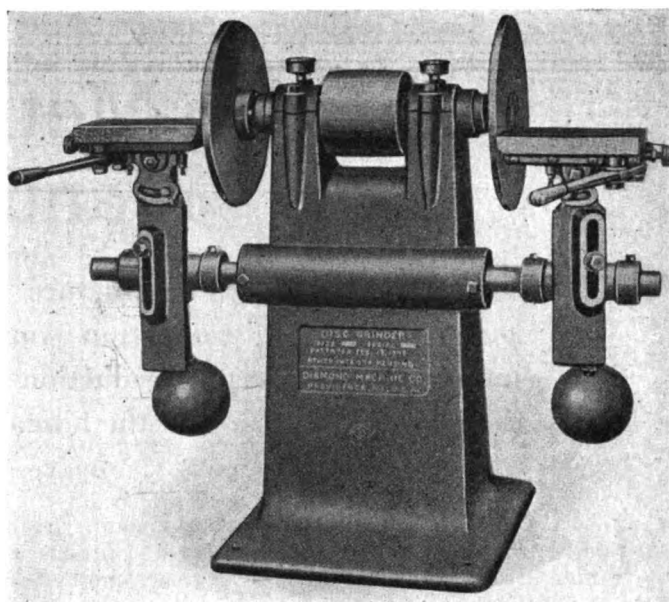


Fig. 3—Disk grinder with hand lever feed (Diamond)

are supported the spindle carrying clamping collets for the two steel disks and the pulley by which it is driven. Tables on which the work is held are mounted in such a way as to be universally adjustable. In the more elaborate designs ring wheel chucks can be substituted for the disks, the tables are provided with T grooves and are fed toward the disks by means of a hand lever. The abrasive circles are cemented to the disks by means of a special press furnished with the machine.

Plain tables which are rigidly clamped in position are used when the work is to be forced against the disk for squaring up and when a small amount of stock is to be removed. Semi-universal swinging tables are provided with a counterweight, which permits of swinging them across the face of the disk, thus facilitating rapid removal of stock. Universal swinging tables have a tractor in addition to the counterweight, which makes it possible to accurately grind angles on them.

When it is desired to produce duplicate parts in large quantities and remove considerable stock, use is made of a universal lever feed table. The table is fed toward the disk by a lever and link motion, the feed being limited by a micrometer stop.

(To be continued)

## Condensers in High Tension Circuits

IN Germany tests have recently been made on "spark intensifiers" in the form of condensers in the secondary circuit, connected across the spark plug gap. In an article on the subject in *Der Motorwagen* it is claimed that the auxiliary gap type of spark intensifier is of little practical use; that the effect of such intensifiers on the spark cannot be noticed by direct observation and that the effect on the ignition apparatus is detrimental, especially if the auxiliary gap is located close to the spark plug. With a condenser in parallel with the spark plug gap, very favorable results are said to have been obtained. The effect is to produce during the sparking period condenser discharge oscillations which are remarkable on account of their high capacity and current strength. Experiments have shown that condensers of from 250 to 400 cm. capacity are best suited.

Tests on engines fitted with condensers in parallel to

the spark plug gaps were made the past year by Professor Becker in the Internal Combustion Engine and Motor Vehicle Laboratory of the Berlin-Charlottenburg Technical High School. When visibly operating spark plugs were provided with a condenser in parallel, a material increase in spark volume was observed. Comparative tests on a 10-25-hp. Adler automobile engine with and without spark intensifier showed an increase of 14 per cent in the output at 1000 r.p.m. when operating on a benzol-kerosene-gas oil mixture of the proportion 40:50:10, and an increase of 6 per cent in output at 1400 r.p.m. when operating on kerosene. A test run with a 16-45 Mercedes-Knight-engined car showed that with the same carbureter adjustment the car would run on one liter of fuel, 5.9 km. with condensers and 5.2 km. without, indicating a saving in fuel of 13.5 per cent when condensers were used.

# Production Methods in Armature Manufacture

Several details of the armature manufacture described here are well adapted to other production work. The article presents, moreover, an intimate discussion of production methods in making this widely used unit. The importance of the human element appears in several instances.

By Norman G. Shidle

**M**ANUFACTURING methods in parts plants are of interest to the automotive engineer and production man in several ways. By studying such methods he becomes familiar with the details of practice in the related industry and is better able to discuss design and specification problems with relation to production limitations. Production in parts plants, moreover, frequently includes minor production methods which may be advantageously adapted in the manufacture of other units made within the automobile plant itself.

Both these advantages are to be found in examining the production of the generator armature for a well known passenger car at the Springfield plant of the Westinghouse Electric & Mfg. Co. The equipment used for stamping out the core laminations, for instance, carries excellent suggestions for stamping out other flat metal parts, while the knurling operation on the armature shaft is performed in a specially efficient manner. There is a general interest, too, in the importance of the human element in certain key operations. These factors can be examined in proper perspective through a detailed description of the production operations.

There are nineteen operations in the shaft. Fig. 1 is a drawing which indicates the form of the finished shaft. The first operation is performed on an automatic screw machine. This machine turns and faces the rough stock, necks the shaft in two places, centers one end, and cuts off the piece.

One end is turned and threaded in the next operation, which is performed on a Warner & Swasey lathe. The other end is also centered. A Wisconsin hand miller then cuts the keyway.

The next operation is that of grinding the shaft for knurling. The shaft must be ground down to allow for the increased diameter which results from knurling. The knurling operation, next performed, is specially interesting, since the method used permits of high production, and yet is comparatively simple. Fig. 2 is a close-up of the machine on which the knurling is done. The shaft is placed in the slot at the inside of the table. The knurling tool, shown in the photograph, is a flat piece. It is given a rectilinear downward motion like that of a stamping press, turns the shaft, and imparts the knurl.

The knurlings serve the function of firmly holding the laminations in any degree of spiral arrangement of armature slots and of taking the place of the various types of keyway necessary with other methods.

After having been knurled, the shaft is heat treated and tempered. It is then necessary to clean the centers and straighten the shaft, since some slight warping usually results from the heat treatment.

A series of six grinding operations are next performed on Norton grinders. First the commutator is rough ground, then the main bearing and the gear seats are rough ground. Finish grinding the small bearing follows next, and then the finish grinding on the gear seat, commutator seat and main bearing in order. The shaft is then sent to a lathe and the shoulder on the back of the oil thrower is faced. An inspection of the shaft completes the operations on this unit.

## Punching Core Laminations

The metal sheets from which the core laminations are punched are "coated" immediately upon arriving at the plant. This work is done with a machine which facilitates the handling of the bulky material. The sheets are placed on a continuous conveyor and are moving steadily while

being painted with a rust preventing and insulating compound.

The sheets are then slit into strips of a width suitable for the press work. Slitting rolls are used for this operation, by means of which a number of strips can be slit at the same time. The slitting rolls are illustrated in Fig. 3.

The next operation, that of stamping out the core laminations, is performed in a specially effective way. A Bliss 73¾ power press is used, and a special three part die stamps out the pieces. Like all the other presses and machine tools in the plant, this press is operated by an individual electric motor. The press is equipped with rollers on each side. The strip of metal is inserted in the rollers on one side, the rollers are started moving, and the strip moves through the die and is pulled out through the rollers on the other side. It is necessary for the operator merely to insert the strip in the rollers and start the press. There is no danger connected with the operation, and the production capacity is greatly increased by means of these rollers. The speed of the press can be regulated in accordance with the kind of work, and the principle involved is applicable to innumerable stamping jobs of similar character.

There are three parts to the die, as noted previously. The first die stamps the main outlines of the laminations, the second die straightens the piece, and the third part pushes it through the die. Fig. 4 shows the details of this operation and the dies which are used in its performance.

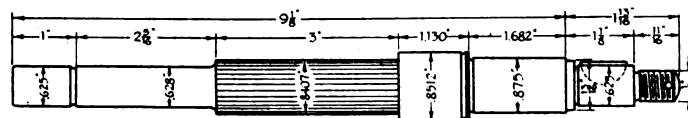


Fig. 1—Drawing of finished armature shaft

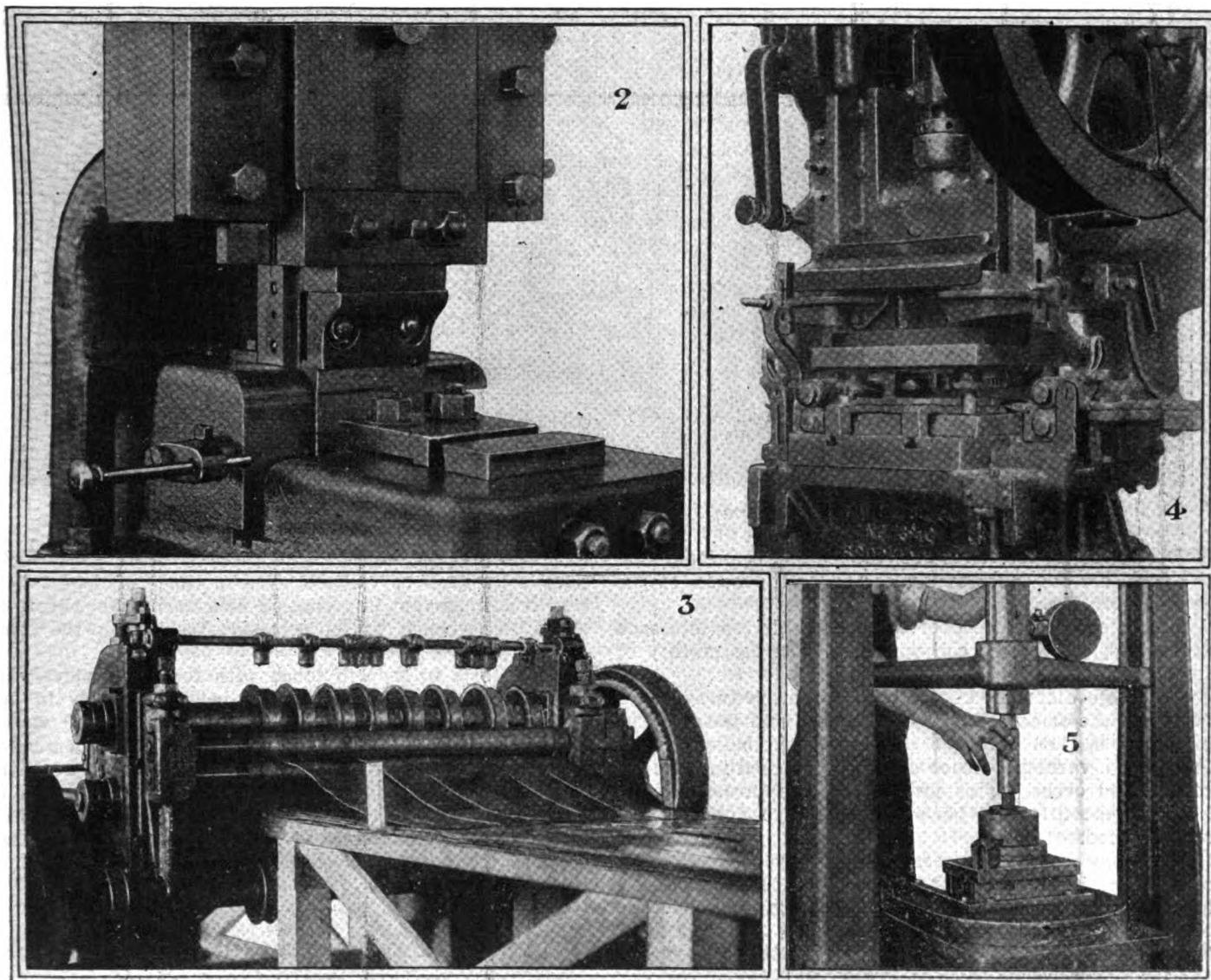


Fig. 2—Knurling machine. Fig. 3—Rolls used in slitting metal to sizes suitable for punch press in punching core laminations. Fig. 4—Roller feed punch press and dies used in stamping core laminations. Fig. 5—Assembling core laminations to shaft

### Assembly Begins

The next operation consists in placing a given number of core laminations together, the same side up in each case, and of tying them together. This is known as the "match, weigh, and tie operation," the number of laminations being determined by weight. The tying is done simply for convenience in handling.

Next the laminations are staggered to the proper degree and are held in that position by means of specially made skewers, whereupon they are placed in a die in a Lucas press. The knurled shaft is then forced through the laminations as shown in Fig. 5. It is evident that very careful work must be done in grinding and knurling the shaft, since the diameter of the knurled part of the shaft and the diameter of the hole in the laminations must bear a very exact relation to each other. The knurled part is forced into the compressed laminations, holding them firmly. The slots are filled during the next operation.

The commutators are obtained from the commutator department of the Westinghouse plant at Pittsburgh practically finished. The commutator slots are merely milled and burred, and the commutator is inspected.

Insulation, in the form of a heavy fish paper, is next placed in the slots of the core. This is followed by the

important operation of winding. It is difficult to describe the intricacies of this operation in a few words, although the general principles are commonly understood. To perform this task efficiently and accurately, however, takes many months of training and experience. It is the sort of job that a person must learn through practice, and it is one of the important key operations in armature manufacture.

It is interesting to note that the human element enters into this work so strongly at this vital point. On some jobs, the increased labor supply during recent months has made easier the obtaining of skilled workmen, but on this operation, which can be done by only a few, the labor surplus has had practically no effect. The degree to which the human element enters into any given operation varies, of course, but there is no industrial work into which it does not enter in an important way if observations are made over a long period of time. This winding operation is interesting as one of the more obvious examples of the importance of this phase of production studies.

After the cores have been wound, they are tested for grounds. This work is done by girls, but the winding operations are performed by men. Next the commutator and oil thrower are pressed on. The armature then goes to



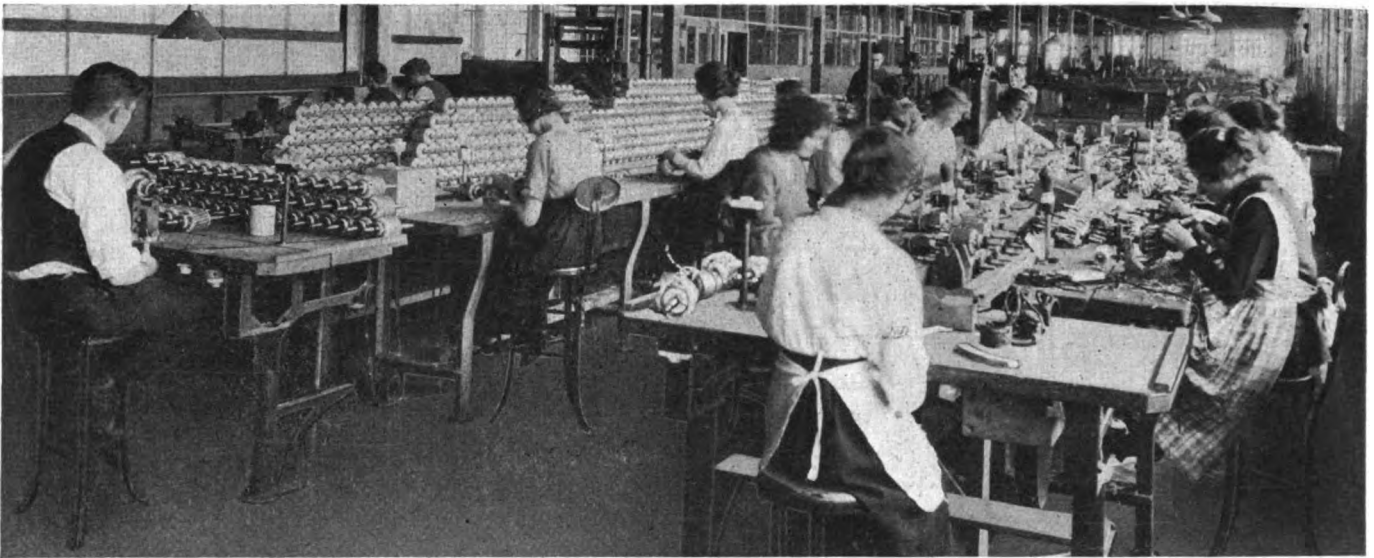


Fig. 6—Scraping and connecting lead wires

girls at a bench, the wires are scraped and connected, and the leads are set and sweat soldered to the necks of the commutator bars.

Special shaped white fiber wedges are driven into each armature slot over the coil winding. The desirability of this is apparent.

The large diameter of the commutator is turned in a lathe and the armature is then inspected and tested. The armature is then ready to be dipped and baked. It is dipped in a varnish solution and is then baked in specially constructed ovens. This process is gone through twice. Prior to the first dip, however, the entire unit is thoroughly dried.

When the armature comes from the oven the shaft is cleaned and is inspected for straightness. The face of the armature parallel with the shaft is then ground, followed by a bearing grinding operation. The next operation takes the armature to a lathe, where the commutator is turned and the oil thrower is faced to length. Next the oil thrower is faced to gauge, and the commutator is turned again. The mica insulation between commutator bars is then undercut on a hand miller, and the commutator is polished on a lathe.

The armature is then balanced and passes on to a final inspection, after which the style number is stamped on it. A cotter pin hole is drilled in the shaft and this is followed by the necessary re-threading operation. This completes the process of manufacturing the automobile generator armature.

When working at capacity, about 1200 generator armatures can be produced per day, a force of 480 men being engaged on armature work.

The automotive section of the new plant has a capacity of 1000 generators and 1000 starting motors a day, and employs about 1000 men for peak production.

The relation of the human element to production is well illustrated in the experience of this plant. As in most other factories, it has been necessary to lay off a number of workers since the beginning of the industrial depression. The employment department made an effort to keep in touch with these men, so that they might be reinstated when business picked up again. Recently it was found necessary to increase the working force considerably. Old employees were sought. Many of them were brought back into the plant, thus saving much money which it might have been necessary to expend in breaking in new workers.

It was found, however, that the better workers in a few cases had already found jobs elsewhere and were not avail-

able. This is an indication of the fact that a good workman is likely to be valuable even in times of depression; that it is important in laying off men to consider carefully the future when it will be necessary to build up the force again.

The efforts to keep in touch with former employees at this plant have resulted in great benefits already in up-building the force again. It has been found well worth while to follow up former employees, to have them leave the plant with a feeling of goodwill, and to have them eager to return again when the opportunity offers. It is not the policy here to "take it out" on labor for past conditions. The maintenance of rates once set, and a general attempt at practical honesty is producing excellent production results.

## Tests by the Bureau of Standards of Centrifugally Cast Steel

**T**HE production of metal castings by the centrifugal process may be said to have passed beyond the experimental stage; at least, in the case of certain non-ferrous metals and cast iron shapes. However, very little appears to have been published concerning centrifugally cast steel. Opportunity was given to the Bureau of Standards to examine in detail the physical and chemical characteristics of six centrifugal castings made by the Millsbaugh process.

The results are interesting since they show what may be expected from such metal as compared with the product of more usual manufacturing processes. The advantages to be expected from centrifugally cast steel are physical soundness and freedom from chemical segregation and thus the elimination of waste metal to be discarded, which last is always a very important factor in other casting processes. For certain shapes forging and boring operations may be eliminated.

The investigation shows that highly satisfactory castings which are physically sound and free from serious segregation, can be produced by the centrifugal method. It is shown that the properties of these castings can be greatly improved by subsequent heat treatment, the resulting metal being in a condition to compare favorably with metal that has been forged.

Technologic Paper No. 192 of the Bureau of Standards dealing with the above subject may be secured from the Superintendent of Documents, Washington.



# Patching Body Panels—a New and Important Service Problem

Mr. Mercer recently visited many service stations and found that practically none of them had proper knowledge of body panel repair methods. Factories were not helpful. The problem is growing and demands attention of manufacturers. Repair methods are discussed here in detail.

By George J. Mercer

**W**HILE the average life of a car is something over five years, the body begins to deteriorate materially during the second season. Many minor faults, such as dullness of paint, worn spots in trimming, doors out of alignment, etc., often begin to show up. Such defects, perhaps, are to be expected to a certain extent, and the owner is usually willing to bear the burden of such renewals or repairs as may be necessary.

Where an actual break in the metal panels occurs, however, a different situation is presented. Such breaks do occur, and in most cases the owner is likely to protest loudly that he has not received fair service from his car. Consequently, the matter of repairing damage of this kind is extremely important.

Before discussing the methods of repair for steel and aluminum panels the causes of the breakage may be analyzed, since to eliminate those causes would be to eliminate the damage and the dissatisfaction. There are two chief causes to which such body breakage may be attributed:

1. Unfair conditions of usage
2. Inferior quality of workmanship

Extreme weave of the chassis frame usually results from sudden stopping and starting, rapid acceleration and other similar jars to the frame. Every violent swing twists and strains the car body. It is only a matter of time until the framing will weaken at vulnerable points and cause the metal to break through continual bending.

Roadsters and coupes generally give out first around the door opening of the rear compartment, because the opening space makes for high local stress at the four corners. If these points are rigid enough to withstand the strain, the joint between the rear deck and the rear panel is likely to part. This latter point is indicated by the letter "A" on Fig. 1.

Inaccurate design or poor workmanship often show up in improper fitting of the body to the frame. Subsequent body injury is invited when the body does not fit easily and without forcing at the points at which it is bolted to the frame. If the body is pulled down to make it touch at the bolt hole, the framing will bend and the panel will break at some place near to that at which the pressure is exerted. Strains will be set up, moreover, in other places by the pulling stress on the framework.

Poor workmanship also shows up in many other ways. Sometimes, for instance, the wood is so framed that a joint will come opposite a panel joint where excessive strains will occur. Again, joints may be poorly made

or the wood not well dried, so that it shrinks after being framed and draws away from the joint. The panels may be filed too thin at the welding points. This defect frequently occurs and is not readily detected until a break actually occurs.

In normal times few of these deficiencies should be present, but the results of the comparatively unskilled labor that was rushed into service during the last few years are showing up at this time.

The causes of the trouble being fully understood and the importance of such difficulties recognized, means for remedying breaks after they do occur must be devised. Methods for repairing steel and aluminum differ slightly, and both will be discussed here.

Steel is really the better material for panels for several reasons. The most important of these may be enumerated as follows:

1. It has greater strength
2. It is possible to join steel panels in such a way that they are as strong as any other part of the body
3. Irregular places can be filled with solder
4. There is less reason to file thin at joint points
5. Repairing is more simple; welding a piece into a steel sheet does not require the fine and intricate work necessary in welding an aluminum sheet
6. Although aluminum can be welded, it must be hammered and filed. Solder cannot be used for filling up irregular places

Assume, for instance, that the break at "A" was in a steel panel. It is probable that the break could be welded, the irregular part around the new weld filled with solder, and the underside reinforced to overcome weakness. Painting would then be the only additional operation necessary.

If the steel sheet is thin at the point of breaking, or if the cooling metal breaks at the same place after the first welding attempt, the material must be cut away until sound metal is reached. A piece can then be welded in. The metal should be lightly hammered around the weld as it cools. Water should never be used for cooling. The heat is kept within a small radius and protection is afforded the wood underneath by means of loose asbestos, packed tight by wetting with water. This asbestos is packed between the wood and panel and a ring of the same sheet is used around the weld. Just enough space is left to provide convenient working area for the torch. The roughness of the metal is leveled up with solder.

Suppose, however, that the same break occurs in an aluminum body. The procedure would be different. The first operation is to cut away the metal on all sides of

the break and insert a piece of size and shape suitable for the particular space.

An example of this operation is shown in Fig. 2. This piece or insert is slightly smaller than the opening, so that a space equal to the thickness of the metal sheet separates the edges of the panel from the insert on all sides. Thus the flame from the torch is allowed to pass clear through and to build up the weld from the bottom.

In Fig. 2 the break is shown cut away and the insert in place. The space, equal to the thickness of the metal all around, is also shown. To make the repair, the part to be welded is surrounded by wet, tightly packed asbestos fiber. This fiber has been hand molded into a ring and is placed as near as possible to the work. The piece is held in place until the welder can make a catch-hold at one or two places. Then the surface of the insert and panel are leveled with a hammer. The welding operation is then continued until the work is completed.

The welding outfit for repair work consists of the oxygen-acetylene tanks, a moderate small size nozzle and a strip of aluminum sheet about one-half inch wide, cut from a panel of the same thickness and character as the sheet forming the panel and the insert. This strip of aluminum is used in the same manner as solder. No acid is used, but the parts are cleaned with a file or emery cloth. The end of the soldering strip is warmed with the torch and dipped into the aluminum flux. This operation is repeated until the flux adheres to the end of the strip. The work of welding is rapidly performed by melting the fluxed end of the aluminum strip with the torch until the space between the insert and the panel is bridged and the two become one. A good welder working quickly will not add much thickness at the weld or allow the heat to be stationary long enough to distort the metal surface. These defects will be noticeable to some extent, of course, but if it is possible to use a hammer, most roughness can be leveled up and the file will do the rest.

Solder cannot be used to fill the uneven places as with steel. All leveling must be done by the file and hammer. Therefore, the aluminum welding operation must be done very carefully, since only a limited amount of filing can be done; in fact, the original break is often due to filing the sheet too thin in an attempt to level the panel. In this way the strength is greatly decreased and the least strain causes a rupture.

### Difficult Repairs

When the weld has to be made over part of the wood framing, there is no chance to get at the under side to bring up dents or depressions. In such cases the leveling can be accomplished by inserting a thin strip of steel between the wood and the metal. By rubbing with this thin strip, the low points and depressions will be forced up.

Another method is shown in Fig. 3. Here a part of the panel is dented down over the framing. The illustration shows a counterbore from the under side of the wood. This should go about half way through; then, with a flat-end punch, the wood forming the bottom of the hole can be forced up. The wood will then rise over quite a large area and raise the panel evenly for quite a distance around the hole.

The welding operation described above is not novel,

nor has it any features that will attract the attention of the man who is working in some of the large shops where this work is going on every day. Considering the number of shops interested in bodies, knowledge in respect to properly repairing panel breaks is not very large. Even some well-equipped repair shops are not sure of the best methods of making repairs on a broken aluminum panel. Just to be able to know that it can be successfully done is a matter of no small importance. It can be successfully carried out by the ordinary good workman who has had experience with welding. A good aluminum weld will be just as strong as any other part of the sheet.

Every repair shop is equipped with a welding outfit. The flux, of which there are several makes on the market, is easily obtained, and with a little patience at the start this work can be done on any part of the body with confidence that the result will be satisfactory.

When a break occurs it is necessary to make sure that there are not inherent weaknesses or unnecessary strains in the frame that will cause the metal to break again at the same place. The very fact that a break has occurred should indicate the necessity of making doubly sure by adding some reinforcement in the shape of a plate or corner iron. If, however, the break has occurred because the original panel was filed too thin, then the matter of reinforcement need not be considered.

Strains concentrate on the body at certain points, such as the bottom of the doorway, the corners of the opening on the rear compartment on roadsters and coupes or the small doors into the rear compartment on the side of roadster

bodies. Whenever possible, a vee should be cut across to allow the panel to weave slightly without crumpling. A vee is the safest where moldings butt and there is thickness to each piece; in fact, a vee should always be used if the length and location will not make it look unsightly.

### Cautions

One bit of caution should be given about the use of asbestos fiber on the panels when welding. In theory this is the ideal way to curtail the space within which the heat will operate and thus protect the general surface of the panel. But it has to be used with caution, because, when applied, more heat has to be used at the weld than if no asbestos were used. Therefore, there will be a tendency to use so much heat at the welded spot that the metal becomes fluid and consequently quite a large spot may fall away entirely.

This has been discovered in shop practice also with regard to the use of cast iron forms. When welding was first practised on aluminum sheets, cast iron forms were used to draw the heat away from the sheet and keep it more nearly level during the work. It has been found, however, that better and quicker work can be done without any agency to assist the sheet in cooling. When the heat is drawn away, the amount of flame needed to make a weld is much greater. Consequently, the sheet often will flow before the weld is made. The asbestos will do the same as the iron form. Therefore, unless it is needed to protect the wood frame or keep the paint surface protected, it is best to dispense with the use of anything that will cool the panel.

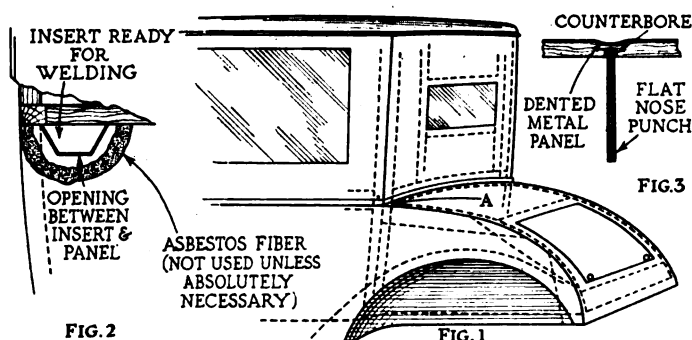


FIG. 3

FIG. 2

FIG. 1

# Relation Between Factory Service and Engineering Departments

Perfect cooperation and accord is not always secured between the factory service and engineering departments. The subject is treated by an engineer and by a service manager in the two articles following. Each one presents his point of view in a forceful and interesting manner.

- I. By B. B. Bachman\*  
II. By E. V. Ripplingille\*

## I

**I**N preparing this paper for you, I found myself, first of all, at a loss for a title which might in some degree serve as a text around which I might build my subject.

It may be well in starting to arrive at some definitions so you may know what I have in mind when using certain terms. I do not ask you to accept these definitions as complete, as they relate to complex things about which our ideas are changing as new conditions arise and experience gives us a broader viewpoint.

The first thing I will try to define is service. Of all the abused phrases which fall from our lips with ill-considered glibness, the majority will contain either the word service or co-operation. They sound well, and we love to roll them under our tongues and taste their sweetness. But what is service? As I can see it, service is that which, being exercised by the individual or associations, obtains good will.

Service is, therefore, honest because the one who would render it to obtain good will cannot succeed if he seeks to take advantage by wilful misrepresentation of those with whom he is dealing. Service is also just, for if by chance misrepresentation has been made, or if full value has not been given for the consideration received, then service demands that these things be corrected. On the other hand, if the buyer wilfully attempts to take advantage of the frankness and honesty which characterize service, then justice demands that such claims be refused.

This definition is too broad for our purpose, however, for it goes back to the character of the individual or individuals responsible for the policies of the business, and is manifest in every activity of the business. Service, as I would define it for use in this paper, is the function of the Service Department, and this department in our business is charged with the establishment of repair stations, with adequate equipment, personnel and stock, in such locations as to insure our customers having access to facilities which will be capable of supplying their needs in the proper maintenance of their equipment at a fair cost if they wish to use them.

Engineering is also a broad term. It has been defined as the utilization of forces and materials in the development of the products and services of industry. Such a

definition embraces the entire activities of the race. Again I would, for our immediate use, restrict the definition of engineering to the functions of the Engineering Department, which is charged with the creation of designs, the furnishing of drawings and specifications to the Production Department by means of which these designs may be translated into the finished product, and the preparation of such technical information as may be required by the Sales Department in sales and application of the product, and by the Service Department in the adjustment and repair of the product as well as instructing the owner in these things.

In discharging the first function, the creation of designs, the Engineering Department must provide itself with men having the requisite training in technical theory and the practical experience in production and operation, which will enable them to view the result of their work as an article of commerce and utility. There must also be provided equipment for analysis and testing of materials and structures to prove their fitness and the degree of success with which they function.

In addition to this, a successful design can result only from a sympathetic consideration of problems of sales, production and maintenance. Probably no design can ever be called complete. Changing conditions of use, new and more efficient methods of production, new materials, weaknesses which seem to develop only under the strain of actual operation and features of construction which hamper and make for expensive repair operations are continually coming up, and these call for changes.

No matter how broad a viewpoint the Engineering Department may have, it cannot hope to contain within itself the sources of information which will enable it to understand thoroughly all these different factors. Therefore, it becomes necessary to consult with the Sales Department with regard to uses, markets, etc., with the Production Department regarding equipment available, methods to be used and their relation to the form which the various parts shall take, and with the Service Department on the manner in which the apparatus functions, where weaknesses are apparent and where improvement should be made to increase efficiency, lengthen life and secure greater simplicity and accessibility to make maintenance cheaper.

Now that we have arrived at a definition of the Service and Engineering Departments, together with a conception of their relative positions in an organization, we can proceed to consider the relation which they bear to each other and how they should work together.

\*Mr. Bachman is engineer for the Autocar Co. and Mr. Ripplingille is service manager for Hudson Motor Car Co. These papers were read at the recent N. A. C. C. Service Managers' Convention.

From what I have said you will understand it is my belief that the Engineering Department must depend upon field reports for information which will enable it to satisfactorily solve many problems. In order that this information shall be authoritative and of the greatest value, it should be complete and accurate. Gross defects in design, material or workmanship will be brought to light even if there is no organization to collect data by the complaints of the user, but such conditions should not exist if the Engineering Department is properly efficient. The art of motor vehicle design and construction has passed the days when, due to lack of engineering data, errors of this sort should occur.

For the more difficult task of closely observing operation, for the minute study of repair work to observe evidences of little things which, by their frequent recurrence in a large volume of cars in operation, become serious, and the scrutiny of operation to determine those features of design which cause unnecessary expense, an experienced and efficient organization must exist and it must function with proper methods.

Most men do their best only when spurred to do their best, and one of the most efficient spurs is criticism. I mean by this, criticism which arises out of an opinion supported by an understanding of the subject which can be obtained only by study. Only too often criticism is the result of unfounded prejudice, although I am frank to admit that prejudice is not always the attribute of the critic alone.

We hear the word "constructive" linked with criticism many times, and too often this is interpreted to mean that with the criticism should come a suggested remedy. I do not believe that this is essential; and certainly in the case which we are considering, criticism should not be withheld because it is not supported by a means of cure. This is the Engineering Department's job.

The thing the Engineering Department wants to know quickly is the effect; if the cause can be given at the same time, so much better. If a means of curing the trouble can be suggested, either in form or principle, better yet; but if the effect only can be reported, give us that. If we have knowledge of the trouble, we ought to have the ability and means to find out what causes it and how to cure it. As a matter of fact, the Engineering Department is often hindered in corrective troubles because the deduction as to cause has been in error and a remedy is suggested and vigorously supported, with the result that if adopted no improvement is made, and if not adopted a more or less lengthy scrap ensues, till the means actually adopted is sold. Again, I must hasten to add that I am not taking the position that the engineer "can do no wrong."

On the other hand, in indicating wherein improvements can be made to facilitate repair work, it is highly desirable that suggested constructions be submitted, because no one should be better able to do this than the repair man. Naturally, other considerations which the repair man has not taken into account may make it impossible to incorporate such suggestions, but this is again the engineer's part of the job.

Another way in which these two departments can assist each other is in experimental and research work. I have stated above that laboratory and field engineering tests are not 100 per cent. It takes the hard bumps of actual service to put their ideas through the refiner's fire. It is certainly not good policy to let experimental features go out in quantity production. Therefore, by the assistance of a properly organized Service Department, these designs can be put into actual service in

the hands of and under the observation of those who have not creative pride to temper their critical viewpoint.

To do these things which I have suggested there must be a systematic method and a proper organization. I hold no brief for any system, nor for any particular form of organization, and am not going to bore you by attempting to outline either in detail, because if you have thought on the matter you probably would not agree with me, and, if you have not thought, anything I might say would be of little or no benefit.

In principle, however, the Service Department should be in charge of and have in its personnel some men with an engineering training and a sympathetic understanding of the functions and policies of the Engineering Department, in addition to the other qualifications which fit them for their work.

The Engineering Department, on its part, should be free from the professional limitations too often manifested in the intolerant attitude adopted toward the opinions of those who have the temerity to suggest that there may be other and better ways of doing things than they have advocated.

For the reason that the collection of the information, which I have indicated the Engineering Department wants, really partakes of the nature of technical data, it should be collected methodically and recorded accurately. This will naturally involve the use of standard forms, etc.

Stock inventory files should be followed to note the distribution of repair material with regard to kind, quantity, locality, service conditions, etc. For instance, engine parts may be affected by fuel and lubricants, which vary in different localities, or a part which will perform with entire satisfaction in one class of work will be inadequate in another.

Repair orders also afford a fruitful source of valuable information as to the character of work which is required. Study of the ratio of labor time to material used gives an index as to the accessibility of the design, as well as to a means of comparing the relative efficiency of methods employed by different shops.

Records kept of new designs and comparisons in performance with old forms to judge their value is another activity which, when carried on in a practical manner, is valuable. Naturally, it should be pointed out that these things can be done effectively and thoroughly with little red tape or fuss, or they can be so completely hide-bound in system as to result in little beside overhead.

A very important activity of the Service Department is education, in operation and in care, adjustment and maintenance. On new designs the information for use by them in this work must be furnished by the Engineering Department. From an ideal viewpoint, possibly, no design should need explanation; but though the automotive vehicle has traveled far, it is still a great way from such a state of perfection.

For this reason assembly and sub-assembly drawings, which will be intelligible to the repair man, should be prepared which will enable him to grasp the principles of construction, and, on being interpreted into his own and the user's language, used to build a defense against possible trouble which might result from lack of attention to some relatively slight detail.

You will probably recognize the fact that my views are predicated in large part on a homogeneous organization which can probably exist only where the manufacture, sales and service functions are carried on by

one organization. Where selling and service is handled by more or less independent dealers, other problems, no doubt, arise. With these, however, my experience gives no warrant for the attempt to say anything. My views are naturally colored strongly by my own experience and that of the company with which I am connected.

You may logically ask the question that in the organization with which I am connected do the Service and Engineering Departments function together in the matter above outlined. Answering this frankly, I would say that neither of us feel that we have reached a point of perfection; but with due allowance for the frailty of human natures, I am of the opinion that the relationship between the two departments is as near ideal as could be expected, and there is no question as to the existence of a completely co-operative relationship.

## II

The subject of the relationship between the Engineering and Service Departments is idealistic to the extreme. In my humble opinion the only way to express it is "the implicit confidence of one department head in the other." Surely, such a relationship cannot be other than beneficial.

Let us assume that the definitions of "engineer" and "service manager" are understood according to our individual ideas, but with this exception, as far as the writer is concerned, the engineer must possess as near 100 per cent theory as possible, regardless of other qualifications—and the service manager as near 100 per cent practical knowledge as possible, regardless of the amount of theory. Co-operatively, two such individuals will absorb so much from one another that, unhindered by outside restrictions, the result on the product will be fundamentally perfect and universally practical. This, you will say, is the millennium.

So far we have considered the ideal. Let us now look at the practical side; for it must be realized that there are certain limitations imposed by the personalities involved in both departments.

Except in a general way, there can be no defined rules as to the extent and methods of co-operative effort between engineer and service manager because the nature of the functions of each vary directly with the design and cost of the car or truck. Obviously, the most simple design and the lesser cost will present the least problem as to the necessity for constant intercourse and detail consideration. Production will be on a big scale, hence periodic changes will be fewer. Facilities for observation of the merits of individual points in design will be greater; and the realization of possibilities for improvement will most always be ahead of production to a far greater degree than in an expensive small-volume product.

Contrast this with the \$5000-car class. Here service means a great deal more than the mere guarantee of usefulness. The equipment details and luxury of such a car call for more constant attention to the temperamental needs of the purchaser and the advice of the merchant or dealer. A more exacting demand for perfection in operation, colors, styles and numerous little things that less expensive cars rate as accessories are imminent at all times.

The executive of the Service Department occupied with such a car must be a "sales" engineer in every sense. Practical knowledge of the design, assembly, methods, repair and operation are the first essentials if such a man is to be looked upon as an authority in his line. That he must have executive ability and business acumen, together with a sound knowledge of the principles of marketing and distributing, both cars and repair

parts, goes without saying. To discuss these qualifications at a meeting of service managers is superfluous. But just now we are interested particularly in his relationship to the Engineering Department; hence it would seem that we should take time only to discuss the attributes necessary in order for him to accomplish the ideal relationship.

Given a man with the practical knowledge before mentioned, he must next have such a personality as to insure his being recognized as an authority within his own organization. This establishes confidence in his suggestions and advice regarding the product.

Now consider the second party—the engineer—with whom the service manager must collaborate. Such engineers are the least numerous of all the personnel in the automobile industry. Usually there is but one to every company—the few assistants attendant upon the engineer's duties counting for relatively little as far as actual design or changes are concerned. Engineers, by reason of their training and concentrated application to theory, are inclined to be temperamental; at least we are apt to think so. They are usually of a highly analytical nature and far more attentive to detail than the practical man. They have a disconcerting way of asking questions.

We must appreciate, however, that it is only through such minute analysis and consideration that real improvements are created; the absence of such a trait of character would exclude the engineer's right to his title. How many failures have come about through too much experimentation without analytical consideration, and a lack of application of first principles?

My criticism of the service manager is that he is usually either too intolerant of theory or impatient at not being understood. Often it is the problem itself rather than the man who expounds it that is not understood. This, therefore, develops into a plea for more fundamental knowledge and a more thorough presentation of practical experiences to the engineer on the part of the service manager.

To bring this about it will be necessary for him to actually "know" what he is talking about at all times. Present your engineer with a definite statement and a carefully considered recommendation. Don't take the other fellow's word for anything—prove it. Only by this method can you establish a confidence in your ability and knowledge.

Meetings of service managers from different localities—not too many men at a time—for the purpose of discussing definite features and for obtaining positive information should be encouraged. Let us not discount the importance of the ability of a practical man to keep cars running, despite owners' idiosyncrasies and inherent faults in design—for the latter always exist, say what you may and pay what you like. Such intercourse with the outside is good for the engineer; he will soon take an interest in your meetings when he discovers your purpose and the valuable, first-hand information to be gained. Don't be afraid that your engineer will learn too much of the practical side; that's impossible, because the very nature which made him elect to work with his head rather than his hands will place limitations upon him—unless he is one in a million.

Last, but not least, my advice is to make your contact a personal matter—the memorandum and the table of statistics attached is a cold way to confer on a subject of importance. Cultivate your man and don't be too formal; engineers are very human.

My plea to engineers is a small one—more tolerance for the man who has forgotten his text books



or who never saw them! Many times in my own experience I have seen a lecture in elementary mechanics, forcibly impressed, but delivered in a friendly way and in simple language, result in an agreement and harmony instead of an altercation and lack of respect for each other's ability. When the practical man and the theoretical man get together with the idea that each has the advantage over the

other, all progress stops. Intolerance has slowed up more than one organization.

Both engineer and service manager must be suited to the need of each individual organization. But in the latter one essential is paramount—as far as his relationship with engineering is concerned—the ability to hold his place as the recognized authority on what the public thinks of the excellence of his company's product.

## An Automotive Steam Engine

**A**N automotive steam engine, which is said to be practical for all kinds of automotive use, has recently been developed in Detroit. It is of the eight-cylinder, reciprocating type, weighs approximately 160 lb., and is said to develop 72.8 b.hp. It is 12 in. high, 15 in. long overall, and 11 in. long over the heads and cylinders.

The engine is novel in that it has no base, crankcase or crankshaft. Neither has it connecting rods or flywheel. It is assembled without packing or gaskets and there are only eight bolts in the entire engine. Not a single bolt or screw is connected with any moving part. It operates both forward and reverse at the same speeds, having only two rotating valves. Another feature of the engine is a one lever control, which starts and stops the engine, and handles all speeds forward and reverse as well as neutral.

The cylinders of this particular engine are of  $2\frac{1}{2}$  in. bore and the stroke is  $2\frac{1}{2}$  in., but the engine can be made in any desired size. Power for the pistons is transmitted to the driving shaft through a power ring similar to the wobbling plate and in some unconventional internal combustion engines as well as in some steam engines. The difference between this power ring and others lies in its flexible construction. It is actuated by trunnions which fit into the notches provided in the cylinders, which encircle the power ring. Each trunnion has a brass ball on its end, which works through slots in the cylinder wall. The ball is so attached to the ring that it can move in any direction through an arc of approximately 3 deg. Steam is admitted to the cylinders through the rotating valves at either end of the engine. The intake and exhaust are so arranged that two opposite cylinders are idle at any one moment, while the two groups of three cylinders between

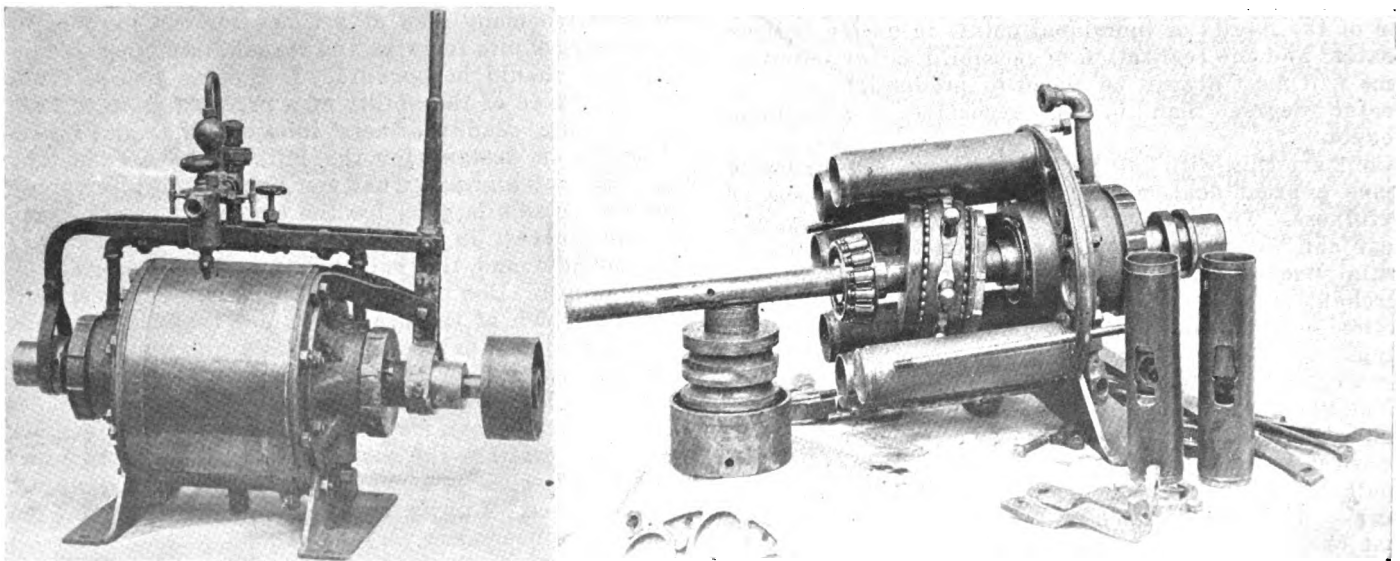
them are working in opposite directions. By this means a balanced power output is secured and end thrust on the roller bearing on the shaft is said to be eliminated. The engine is double acting and, according to the inventor, is virtually two engines in one. It is possible to use one end for an air compressor and the other for a steam engine, if desired.

The engine is the result of development which started in April, 1917, by the inventor, E. U. G. Reagan, and is to be built by the Superior Steam Engine Co. Mr. Reagan claims that development work on the engine is about complete.

## Recent Aircraft Development in America

**‘‘W**HATEVER has been achieved in American aeronautics during the last year has been due rather more to individual vision and courage than to general support.” This is a statement from the opening chapter of “The Aircraft Yearbook, 1921,” recently made up by the Manufacturers’ Aircraft Association and published by Small, Maynard & Co.

This new review indicates the need for a more sound aircraft program in this country, together with a more general support of constructive efforts toward aircraft development. The various aircraft achievements of the last year are recorded and discussed, including commercial airplane development, aerial transport, mail aircraft, aerial forest patrol, marine uses of aircraft, aerial photography, aircraft in news gathering, and other similar features.



Reagan steam engine, assembled and partially dismantled

## Exports of Automobiles and Tires for June, 1921

COUNTRIES	COMMERCIAL				PASSENGER				Parts	TIRES			All Other Tires
	Complete Cars		Chassis		Complete Cars		Chassis			Casings	Inner	Solid	
Europe													
Belgium	1	\$520	1		11	\$17,792			\$2,341	\$5,264	\$658		
Denmark	1	1,711			12	24,670			30,554	40,726	1,146	\$1,003	\$552
Finland					1	1,000			783	2,523	438		
France					27	71,903			19,874	61,923	215		
Germany					3	2,485			425	290	29		22
Greece	5	2,598			39	16,887			18,361	9,640	807		
Iceland and Faroe Is.										3,105	44		
Italy					2	1,750	1	\$440	1,987	1,489			
Malta, Gosa, and Cyprus Is.					1	383			900				
Netherlands	34	15,976	1	\$2,100	57	49,503	1	4,782	6,529	6,473	310		720
Norway	1	1,862			4	3,675			6,945	4,775	176	935	
Poland and Danzig					23	15,073	10	3,876	8,303	1,640		850	
Portugal									1,482	430			
Roumania					1	5,000			1,751			563	
Russia in Europe			1	3,000	2	3,000							
Spain					18	29,566	1	1,500	14,629	2,531	217	1,647	
Sweden	5	3,225			58	53,347			7,224	4,020	1,037	2,534	
Switzerland					8	13,438			2,080	1,242	60		
Turkey in Europe					15	8,606			3,196	953	211		
England			10	12,900	14	29,100	9	7,048	70,703	190,360	6,139	10,713	5,796
Scotland					1	500			532				
Ireland					2	647			2,276				
Yugoslavia, Albania, etc.					2	3,388	5	2,791	196				
North and South America													
Bermuda	2	4,571							281	188	41		
British Honduras													
Canada	36	60,636	19	36,677	502	695,284	5	7,907	1,119,792	34,744	3,587	3,660	1,201
Costa Rica									929	445	471		
Guatemala					1	2,000			1,943	547	50	225	29
Honduras					2	4,500			1,732	1,074	79	1,242	
Nicaragua									255				
Panama	12	13,338			7	7,500	3	1,126	4,709	5,248	1,021	1,466	916
Salvador									1,132	2,627	23		
Mexico	109	114,949	11	16,635	599	465,343	1	375	151,097	111,312	13,580	3,497	10,621
Newfoundland and Labrador					1	663			1,030	7,887	1,015		40
Barbados	1	700	1	500	3	3,965			969	1,468	405	206	
Jamaica	3	1,584			9	3,567	2	890	14,054	9,055	771	8,518	425
Trinidad and Tobago	15	7,587	3	1,349	7	5,039			16,094	9,517	936	1,446	169
Other British West Indies					6	4,100			1,723	2,260	632	13	289
Cuba	14	8,105	8	33,263	56	59,181	2	651	321,678	33,047	7,557	16,968	338
Virgin Islands of U. S.					2	1,002			1,895	412	121	949	
Dutch West Indies	2	899							828	302			
French West Indies									3,168	2,501	159		
Haiti					2	1,035			4,320	15,798	905	300	
Dominican Republic	1	1,600			5	5,230			11,074	7,365	464	619	
Argentina					4	11,393			1,082		304		
Bolivia									3,120			466	
Brazil									7,653	13,381	2,997		
Chile	2	1,039			1	1,800			2,897	1,100	301		
Colombia	2	4,575	3	1,300	3	3,354			2,101	2,639			
Ecuador					1	1,000							
Falkland Islands									1,897	2,433			
British Guiana									143				45
Dutch Guiana													
Peru					3	12,214			10,527	3,985	550	636	
Uruguay									11,151	2,721	356		
Venezuela					18	19,044			9,047	6,284	659	49	592
Asia													
Aden					3	2,830			401				
China			3	3,765	40	47,216	10	4,300	8,811	22,303	294		
Canton									4,167				
British India	8	20,850	3	6,662	40	72,065			28,284	2,713	1,012	6,244	
Straits Settlements					1	2,089			6,186	11,325	776	6,256	
Other British East Indies									417				
Dutch East Indies			10	29,390	3	4,500			26,514	17,038	1,692	23,576	300
French Indo China									315				
Hongkong									1,429	1,957	115		
Japan	18	32,780	50	25,980	83	59,580	52	26,299	35,132	20,923	853	6,666	1,015
Siam									149				
Turkey in Asia	1	615	1	3,000	19	15,231	15	17,800	11,279	5,348	516	1,572	
Australia			3	9,939	22	32,986	23	26,239	109,886	1,799	575	2,329	
New Zealand			10	27,000	11	13,268			13,504	25,177	376	1,365	
Other British Oceania					2	2,148			385				
French Oceania					1	1,844			337	1,210	166	1,220	
Other Oceania			1	500					217	75	24		
Philippine Islands			1	200	1	600			14,380	24,253	4,146	28,836	7,845
Africa													
British West Africa									7,774	1,888	863	540	
British South Africa			6	17,354	17	13,080			22,691	3,420			
British East Africa					5	6,510			1,883	1,414	212		
Canary Islands					10	3,762			3,799	761		344	
French Africa					10	4,330			1,722				
Morocco									79			572	
Egypt					9	4,780	14	5,720	1,970	769	43		
Total	273	\$299,720	145	\$231,514	1,810	\$1,945,746	154	\$111,744	\$2,211,528	\$758,518	\$60,620	\$138,015	\$30,915

# Taking Advantage of Changing Conditions in Foreign Market

Ford is reported to have organized to cover rich agricultural and mining territories in Peru. Other American manufacturers have recognized the possibilities of the developing market in South America. Road development and use of cars for utility is materially aiding sales growth.

By George E. Quisenberry\*

A RECENT news note from Lima, Peru, reported that the Ford representative in that country had established branches and sub-agencies in a number of new cities and towns and that a dealer net was being organized to cover all the rich agricultural and mining territories of the Republic. The report further declared that Ford was apparently enlarging his dealer representation throughout other countries of Latin-America in an effort to take his cars, trucks and tractors into every section that offered any sales possibilities.

This brief notice may be interpreted as recording the opening of a new phase in the foreign sales of automotive equipment. A few years ago the American automobile was little known outside of the United States and particularly in those great territories of the various continents which had depended upon Europe for their automobiles and their automotive equipment. But the war stopped the European exports and the small automotive trade of these countries perforce sought the United States. This small trade was almost entirely a city business—the automobile was considered only as a pleasure vehicle, to be used solely by the rich and as a badge of the owner's social status.

The pioneer American exporters of automotive equipment had, of course, a different viewpoint. Theirs was a vision of the essential automobile, built and sold by production methods, and useful alike in the cities and the country districts. This thought took hold slowly and spread gradually, but the after-war demand prevented its realization to the fullest extent. So far as this is concerned, it may be said that sales were made during 1919 and most of 1920 without any rhyme or reason. It was a period of extravagant buying for every kind of product and one in which the normal course of development mattered little, either to the buyer or to the seller.

This period, of course, is definitely passed. Undoubtedly, it should be said, happily past and never to return. What we may look for in the future is an export trade built soundly upon essential needs and essential reasons, a trade that, when all is said and done, will be more satisfactory, more valuable, more permanent and of greater volume than any of the past. The country sections will be more closely covered, the automobile will be used for essential purposes and the motorization of all sections will develop fully.

This will be the second phase of automotive exporting. Some companies, notably Ford, already have seen it and are reaching out with all the ability and honesty that characterizes the best of American business. Many companies have not begun to sense it, while others perhaps never will. Those of the first category are going after this coming trade with all their resources—and they are

making shipments now to all parts of the world. The companies of the second class are awakening to the potential business and indicate that they are about to get back into the foreign field and go aggressively after business. The remainder, of course, are not worth worrying about, except as they will make sporadic sales from time to time, without providing service, that will reflect discredit upon the rest of the industry.

To go more into the proof. Although of a localized character, it may be taken to be general in its interpretation and will point out a condition that is becoming world-wide.

The proof refers to Chile. This southern Republic has been hard hit by the financial depression. Its currency has depreciated to an extent that causes the ordinary exporter to "quit cold." But, fortunately, all the exporters of American automotive equipment are not "ordinary"; many of them are tremendously alive and are carrying on with a vision that sees beyond conditions of the moment.

Chile held its first automobile show at Santiago, the capital, from May 20 to June 5. Although promoted by a private company, all makes of cars represented in Santiago were shown except a few, the agents of which are being changed. The exhibition was held in the center of the city, in a handsomely decorated building, and so successful was it that an annual show will be held hereafter, probably during the month of March.

The significant factor is this, which is quoted verbatim from the report sent from Santiago by the show committee:

"While statistical figures referring to imports show a considerable reduction in automotive products, based on our deep knowledge of the market, we can confidently state that this situation is only momentarily upset. We must remember that all automotive progress in Chile has been accomplished in spite of the lack of good roads. Just a few days before the formal opening of the show the Highway Law was passed. This calls for extensive road construction throughout the country.

"This will undoubtedly mark a new era for the motor car in Chile. The automobile which has been a vehicle of luxury and recreation will become an object of practical utility and of absolute necessity. The importance of the automobile is a fact that can be readily understood by considering the topographical conditions of our country. To this dominating factor we must add lack of sufficient rail transportation and continuous freight congestion. The automobile, we repeat, is a factor absolutely essential to our national life."

Apply that factor of absolute essentiality to all parts of Latin-America, to South Africa, to Australasia, to Asia, and to the other automotive markets, and the future cannot

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be misunderstood. The "new era" will not be confined to Chile, it is spreading into Argentina, Peru, Brazil, Colombia and Venezuela, Mexico, India, China, the Far East and every developing territory of the world.

More road building is under way to-day in China, it is reported, than for many years, and letters from personal friends in the treaty ports say traders and business men see unprecedented prosperity just around the corner. New highway activity that means the expenditure of thousands of pounds sterling has been commenced in New South Wales and other parts of the Australian group. Nearer home, the state of Sao Paulo, Brazil, is leading the way to highway betterment. To the fine road from Santos to the capital has been added an equally fine stretch of 110 kilometers in length from Sao Paulo to Campinas and work is progressing on the highway from Sao Paulo to Itu, something more than 150 kilometers. These are all macadam highways and the review does not consider other inland roads which are reported to be in good shape, notably from the capital to Ribeirao Preto, a distance of 440 kilometers. "At the present time our Government is displaying unusual activity in road work," a dealer from Sao Paulo writes.

Venezuela has undertaken a program of highway building that is showing more results than is generally accredited. Panama, for instance, has just let new road contracts totalling \$270,000, the third project to be under-

taken this year, all the work of which is in the territory of the Republic and none of which is in the Canal Zone. The city of Santo Domingo, in the Dominican Republic, has decided to seek a loan of \$500,000 for public work, much of which will be for paving the principal streets. The activities in Mexico are better known and roads are being constructed in Cuba despite the present difficulties. Argentina, likewise, is displaying more activity than in previous years and a goodly number of long distance automobile tours and races, together with increased utility of the automobile, has this year added to the consciousness of road necessity.

Automotive exporters, in common with those of other lines, feel more optimism to-day than they have since the readjustment began. With Hoover they believe the corner has been turned and the future will witness a gradual but none the less certain restoration of normal business that will be re-enforced greatly by the growing understanding of the essentiality and utility of the automobile.

Ford is getting in on the ground floor in Peru. His foreign department apparently is going after the rural trade. It has realized that there are other cities and towns in each of the foreign territories than the capital or the chief port. A man does not have to live in Lima to own an automobile; he can use it just as well in Trujillo, Ica, Chincha or any of the other towns that dot the rich agricultural and mining areas.

## Home-Made Fuel for South Africa

THE production of a home-made fuel for automotive vehicles is contemplated in South Africa, according to reports from Trade Commissioner Stevenson of Johannesburg to the Bureau of Foreign and Domestic Commerce. The new fuel, which has been patented in the Union under the name of Penrol, will be made principally of alcohol, which will be produced from locally grown maize or corn. A company is being formed to produce and market the fuel and it is claimed that all ingredients can be produced locally. The selling price is to be considerably less than that of gasoline; it has no smell and it does not carbonize, although it is claimed to be equal to gasoline in power. The report declares that it has been subjected to experiments for a considerable period in passenger cars, motorcycles, trucks and airplanes with excellent results. The gasoline consumption of the Union is estimated at 12,000,000 gal. annually.

### Suggestions for British Trade

A writer in the (weekly) Trade Supplement of the London Times makes a notable admission regarding the strong position of American cars in markets which, he, in common with other writers in British organs, regards as eminently suited for British interests, or, in many cases, as though Great Britain had some special and prescriptive right to them.

This later view of the situation is largely traceable to the no longer applicable saying that "Trade follows the Flag," for from a variety of circumstances it is not true to argue that the colonizing influence extends far beyond the immediate purview of the first in-comers.

However, here are a few excerpts from the writer's fair statement of the case through the Times: "It must be remembered that the American vehicle has obtained a firm footing and standardized opinion as to the capacity of a car. Where there are, say 30 American cars to one British, it would be wrong to assume that local opinion is that American cars are cheap and powerful. The opinion is that British cars are far too dear, have

too much finish, and require too much "driving"—i.e., gear-changing—for local conditions.

"There is a little doubt that the British Empire would supply a valuable market for British engineers, if they are willing to design a special overseas model.

"The technical requirements are strikingly simple and almost universal for overseas markets. The track should be the standard, viz.: 4 ft. 8 in. The clearance should be never less than 10 in., and more in the case of cars of long wheelbase. The cars should be capable of good top-gear performance, and this means a large engine and low gearing.

"The finish should be sufficient and not excessive. That means that imitation leather should not be used, but that less varnish than usual is an advantage. As to body work, the Empire is preparing to look after itself in the matter and exporters to Australia and Canada are well advised not to undertake the risk and cost of supplying British bodies unless specially required."

### Tractors in South Africa

The British Trade Commissioner at Cape Town has sent a report on the working of farm tractors in South Africa, which incidentally gives some useful hints.

High altitudes affect adversely the power output of internal combustion engined tractors by as much as 10 per cent at 4000 ft. Engines, therefore, must have a fair surplus of power for the stipulated load; must be sturdy and their shaft-speed should not exceed 600 r.p.m. and certainly not more than 1000 r.p.m.

Tractors and tractor ploughs must be capable of tackling land ploughed ordinarily by local oxen. Such land is hard after a drought, becomes dusty and little of it is easily broken.

Skilled labor for tractors and tractor implements is not usually available.

A cheap lubricant is essential.

Generally the tractor required must be as near fool-proof as possible.

# Weights of 1921 Cars on Which Kansas Bases License Fee

Comparison of sedan and touring car shows that for 75 makes the average excess of the closed car is 362 pounds, the maximum difference being 655 and the lowest 200 pounds. Heaviest car in this record was a 1914 model brougham, weight 6200. Ford the lightest car listed.

**H**OW much should the weight of a sedan exceed that of a touring car? This and other interesting questions regarding the weight of the various makes and styles of automobiles have frequently been asked, but answers were impractical because weight data has been almost impossible to obtain.

Beginning in July, automobile licenses in Kansas are based on weight. The Secretary of State, upon whom the enforcement of the law was placed, asked all factories to supply him with the shipping weight of all styles of cars. In some cases this information was not supplied to him. His procedure in these cases was to weigh a car of the make and style desired when it was presented for licenses, and to deduct 100 lb. as an allowance for fuel, oil and extra equipment. This compilation of weights has been printed as a guide for those concerned with the issuance of licenses.

A study of this list is interesting. In the main, the weights increased slightly from 1912 to 1914, but since that year there has been a tendency to lighter cars. There are exceptions, of course, but chiefly the exceptions represent an increased number of cylinders and a larger car generally. In some cases the greater number of cylinders and increased wheelbase appears to have been accomplished without material increase in weight.

The heaviest car in this record is a brougham built in 1914, which weighed 6200 lb. The lightest car is the most numerous one.

It is quite interesting to note the difference of weight between the various styles of cars of the same make for 1921. The lowest added weight over the touring car for a sedan is 200 lb. The greatest is 655. The average of 75 makes of cars is 362 lb. The following weights for 1921 cars is taken from the Kansas compilation:

Allen			Chandler			Dixie Flyer			Franklin		
Model	Style	Weight	Model	Style	Weight	Model	Style	Weight	Model	Style	Weight
M-43	Roadster	2,500	N-S	7-pass. touring	2,985	H	Touring	2,650	S-9B	Touring	2,430
M-43	Touring	2,500	N-S	4-pass. roadster	2,985	H	Roadster	2,550		Sedan	2,755
M-43	Sedan	2,825	N-S	2-pass. roadster	2,985	H	Sedan	2,950		Brougham	2,705
M-43	Artcraft	2,594	N-S	Dispatch	2,985					4-pass.	2,435
	Anderson		N-S	Sedan	3,400		Dodge			2-pass.	2,305
8-21	Sportster	3,555	N-S	Coupe	3,230	30	Roadster	2,225		Demi-sedan	2,537
8-21	7-pass touring	3,600	N-S	Limousine	3,430	30	Touring	2,450		Demi-coupe	2,442
8-21	4-pass. anniv. tourster	3,750		Chevrolet		30	Coupe	2,520		Club sedan	2,755
8-21	7-pass. anniv. touring	3,825	4-90	Touring	1,900		Sedan	3,045		Friend	
8-21	4-pass. sedanette	3,925	4-90	Roadster	1,820	M-17	Touring	2,397		Touring	2,430
8-21	7-pass. sedan	3,925	4-90	Sedan	2,160	M-12	Roadster	2,305		Roadster	2,400
	Auburn		FB-50	Coupe	2,040	M-17S	Sedan	2,709		Coupe	2,650
6-39H	Touring	2,950	FB-20	Touring	2,745	M-12C	Coupe	2,520		Gardner	
6-39K	Roadster	2,885	FB-30	Roadster	2,640					Touring	2,370
6-39	Townster	2,940	FB-40	Coupe	2,818					Roadster	2,320
6-39	Coupe	3,195		Sedan	2,947		Elcar			Sedan	2,735
6-39	Sedan	3,245		Cleveland		D-4	Touring	2,790		Grant	
	Briscoe			Touring	2,548	D-6	Touring	2,910	HX	Roadster	2,625
4-34	Touring	2,225		Roadster	2,455	H-4	Sportster	2,760	HX	Touring	2,725
4-34	Roadster	2,180		Sedan	2,879	H-6	Sportster	2,880	HX	Sedan	3,000
4-34	Sedan	2,465		Coupe	2,703	K-6	Coupe	3,145	HX	Coupe	2,900
4-34	Coupe	2,390		Cole		G-6	Sedan	3,175		Haynes	
	Bulck		870	Touring	3,590		Elgin		47	7-pass. touring	3,600
44-6	Roadster	2,980	870A	Tour. with perm. top	3,740	All Models	Touring	2,600	47	Tourister	3,550
45	5-pass touring	3,120	871	Roadster	3,320		Scout	2,650	47	Speedster	3,550
46	3-pass. coupe	3,285	872A	Sportster	3,440		Sedan	2,950	47	Brougham	3,800
47	5-pass. sedan	3,545	878	Sport. with perm. top	3,590		Coupe	2,840	47	Suburban	4,100
48	4-pass. coupe	3,545	879	Sportsdean	3,890		Essex		48	7-pass. touring	3,800
49	7-pass. touring	3,420	879A	Sportosine	4,000	All Models	Phaeton, L. H. D.	2,560	48	Tourister	3,750
50	7-pass. sedan	3,760	883	.....	4,000		Phaeton, R. H. D.	2,560	48	Speedster	3,750
	Cadillac		884	Sportcoupe	3,680		Roadster, L. H. D.	2,545		Brougham	4,150
59	7-touring	4,050	885	Tourosine	4,130		Cabriolet, L. H. D.	2,675		Suburban	4,350
59	2-roadster	3,800		Toursedan	4,090		Cabriolet, R. H. D.	2,675		Hudson**	
59	4-phaeton	3,800	L-53	Crow-Eikhart	2,575		Sedan, L. H. D.	2,900		7-pass. phaeton	3,575
59	5-imperial	4,450	L-54	Roadster	2,575		Sedan, R. H. D.	2,900		4-pass. phaeton	3,405
59	limousine	4,450	L-55	Sport	2,575		Chassis, L. H. D.	1,910		Sedan	3,815
59	5-limousine	4,400	S-63	Touring	2,575		Chassis, R. H. D.	1,910		Coupe	3,620
59	4-sedan	4,150	S-64	Roadster	2,690					Touring limousine	3,840
59	7-suburban	4,350	S-65	Sport	2,690					Cabriolet	3,550
59	4-victoria	4,050	S-67	Touring	2,690		Ford*			Limousine	3,860
59	5-town brougham	4,350		Sedan	3,075	Touring	Touring	1,500	R	Chassis	2,690
	Case		V	Cunningham			Runabout	1,400	RR	Hupmobile*	
V-20	Touring	3,540		Touring	4,400		Sedan	1,725	RQ	5-pass. touring	2,470
V-20	Sport	3,410		Davis			Coupe	1,525	RK	Roadster	2,375
V-20	Coupe	3,650	51	Touring	2,900					Sedan	2,910
V-20	Sedan	3,800	52	Sport	2,900		When equipped with starter add 90 pounds.		6-38	Coupe	2,710
	Chalmers*		53	Special sport	2,900		When equipped with demountable rims and tire carrier add 45 pounds.		6-38	Jackson	
6-30	5-touring	2,890	54	Sedan	3,400		All models and styles less than 2,000 pounds.		6-38	Touring	3,000
6-30	Sport	2,900	55	Coupe	3,400				6-38	Semisport	3,200
6-30	Coupe	3,075	56	Roadster	2,900				6-38	Sport	3,300
			57	Special roadster	2,900				6-38	Cal. special	3,320
									6-38	Coupe	3,545
									6-38	Sedan	3,525
									21-4	Touring	2,400

When equipped with starter  
add 90 pounds.

When equipped with demountable rims and tire carrier add 45 pounds.

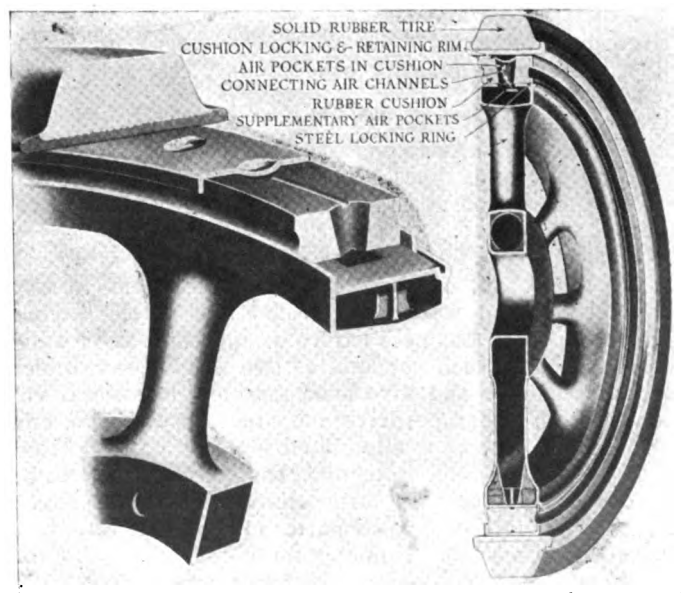
All models and styles less than 2,000 pounds.



Model	Style	Weight	Model	Style	Weight	Model	Style	Weight	Model	Style	Weight
Jordan			Master			4-5-pass. duplex			B-41	Sedan	
M Roadster		2,700	Six	Touring	2,750	coupe	4,580		B-42	Coupe	2,600
M Landaulet road.		3,100	Master			7-pass. duplex				Seneca	
M Sedan		3,100	Six	Sedan	3,100	sedan	4,670			5-pass. touring	2,180
M Brougham		3,075	Master			Packard Single Six				4-pass. roadster	2,180
M 5-touring		2,850	Six	Coupe	3,000	5-pass. touring	2,920			2-pass. roadster	2,180
F 7-touring		3,200	Mitchell			2-pass. runabout	2,790			Standard	
King			Roadster			5-pass. sedan	3,170		J	Touring	3,700
Touring		3,390	F-3-40	Sport	3,250	4-pass. coupe	2,990		735A	Stanley*	
Foursome		3,400	F-4-40	Touring	3,000	Paige			735B	4-pass. touring	3,800
Road King		3,255	F-5-40	Touring	3,440	3-pass. roadster	2,910		735D	7-pass. touring	3,900
Limoudan		3,850	F-7-42	Touring	3,400	4-pass. roadster	3,030		735C	Sedan	4,450
Kissel			F-40	Coupe	3,600	Coupe	3,040			Coupe	4,400
7-touring		3,420	Moline			Sedan	3,235			Stephens	
C.B. six 4-tourster		3,645	R	Touring	3,200	Touring	3,235	82		Roadster	3,140
C.B. six 2-speedster		3,645	R	Sedan	3,540	Touring	3,540	83		Coupe	3,300
C.B. six Coupe		3,810	R	Coupe	3,360	5-pass. roadster	3,475	84		Touring	3,235
C.B. six Sedan		4,010	Monroe			Coupe	3,725	84-B		Touring	3,265
C.B. six 4-sedan urban		4,010	S-9	Touring	2,360	Sedan	3,985	85		Sedan	3,645
C.B. six Coach sedan		3,925	S-10	Roadster	2,300	Paterson		86		Touring	3,345
Lexington			S-11	Sedan	2,775	Touring	3,050	87		Artcraft top	3,215
6-S-21	Touring	2,900	S-12	Coupe	2,658	Sedan	3,700	88		Artcraft top	3,425
6-S-21	Coupe	3,100	Moon			Coupe	3,600	89		Artcraft top	3,460
6-S-21	Lex. sedan	3,100	6-48	Touring	2,925	Peerless***		92-B		Roadster	3,240
6-S-21	Sedanette	3,100	6-48	Roadster	2,800	Touring	3,830			Stevens-Duryea	
6-S-21	Thorobred	2,900	6-48	Coupe	3,200	Roadster	3,885	E		Touring	4,600
6-T-21	Touring	3,250	6-48	Sedan	3,200	Sedan	4,175	E		Sport	4,600
6-T-21	Salon sedan	3,450	6-68	Touring	3,350	Coupe	3,900	E		Limousine	4,800
6-T-21	Sedanette	3,450	6-68	Sedan	3,700	Limousine	4,225	E		Sedan	4,800
Liberty*			The models for 1920 and 1921 weights are based on wood or disteel wheel equipment. Deduct 50 pounds for wire-wheel equipment.								
10-C	Touring	2,750	Nash			Pierce-Arrow				Studebaker	
10-C	Roadster	2,600	41	Touring	2,530	4-touring	4,281	EJ		Touring	2,500
10-C	Speedster	2,650	42	Roadster	2,432	6-touring	4,420	EJ		Sedan	2,900
10-C	Sedan	3,160	43	Coupe	2,732	7-touring	4,430	EJ		Landau-roadster	2,600
10-C	Coupe	3,000	44	Sedan	2,942	Coupe sedan	4,588	EH		Touring	2,850
10-C	Brougham	3,100	National*			6-sedan	4,775	EH		Coupe	3,190
48	Touring	5,325	BB	7-touring	3,780	6-vest sedan	4,875	EH		Sedan	3,270
48	Sport	5,080	BB	Roadster	3,769	7-limousine	4,715	EH		Chummy	2,830
48	Limousine	5,734	BB	Coupe	2,732	Landaulet	4,665	EG		Touring	3,125
McFarlan			BB	Sedan	2,942	Brougham	4,565			Stutz	
142	Roadster	4,600	Sextet			Runabout	4,098	4-K		Bearcat	3,450
145	Sport	4,700	BB	7-touring	3,780	Pilot		4-K		Roadster	3,550
147	7-touring	4,700	BB	4-touring	3,769	5-touring	2,890	4-K		4-pass.	3,950
151	Town car	4,900	BB	Roadster	3,769	Roadster	2,830	4-K		6-pass.	4,010
154	Cabriolet	5,200	BB	Coupe	3,870	Sedan	3,245			Velle	
155	Sedan	5,200	BB	Sedan	3,990	Coupe	3,225	48		Touring	2,980
156	Sedan	5,200	34-C	Touring	2,421	2-roadster	3,050	48		Roadster	2,850
157	Brougham	5,200	34-C	Roadster	2,231	5-touring	3,050	48		Sport	3,065
151	Limousine	5,100	34-C	Sedan	2,733	7-touring	3,050	48		Sedan	3,301
161	Landaulet	5,100	34-C	Coupe	2,550	Sedan	3,300	48		Coupe	3,195
Malbohm			Oldsmobile			Coupe	3,300	48		7-pass.	3,215
B	Touring	2,350	46	Touring	3,150	Premier		34		Touring	2,544
B	Sedan	3,000	46	Pacemaker	3,100	7-pass. open tour'g	4,120	34		Roadster	2,485
Marmon			46	Sedan	3,400	7-pass. encl. tour'g	4,470	34		Sedan	2,895
34-6	Touring	3,530	43A	Touring	2,883	4-pass. open tour'g	4,070			Westcott*	
34-6	4-roadster	3,600	43A	Roadster	2,858	4-pass. encl. tour'g	4,470	C-48		Touring	3,550
34-6	7-touring	3,600	43A	Coupe	3,033	2-pass. speedster	3,950	C-48		Sedan	3,700
34-6	Sedan	3,850	43A	Sedan	3,143	4-pass. coupe	4,370	C-48		Limousine sedan	3,750
34-6	Limousine	3,900	Overland			7-pass. limousine	4,290	C-38		Touring	2,900
34-6	Landau	3,900	4	Touring	1,914	Reo*		C-38		Roadster	2,850
Maxwell			4	Roadster	1,814	Touring	3,050	C-38		Coupe	3,200
Roadster		2,000	4	Coupe	1,994	Roadster	3,000	C-38		Sedan	3,300
Touring		2,100	4	Sedan	2,154	Saxon				Winton Six	
Sedan		2,525	Willis-Knight			Touring	2,630	25		Touring	4,075
Coupe		2,225	20	Touring	2,793	Sedan	2,972	25		Roadster	3,630
All Models			20	Roadster	2,770	Coupe	2,800	25		Limousine and	
Master			20	Coupe	3,010	Sayers				sedan	4,480
Six			20	Sedan	3,142	5-pass. touring	3,014			*1920 figures, 1921 figures not given.	
Metz			Packard Twin Six			2-pass. roadster	3,050			**Models not divided by years since 1916.	
Roadster		2,650	7-pass. touring	4,470		5-pass. sedan	3,385			***1919 figures used, 1920 and 1921 figures not given.	
			4-5-pass. phaeton	4,300		Limousine	4,110				
			4-pass. runabout	4,245	B-39	Scripps-Booth					
			7-pass. limousine	4,595	B-40	Touring	2,500				
						Roadster	2,400				

## A New Cushion Wheel

THE cast metal wheel shown in the accompanying cut has recently been announced by a manufacturer who has for some years made a similar type of wheel without the cushion feature incorporated in the new product. The cushion consists of rubber with air pockets and is placed between the felloe band and a second metal band on which the solid tire base is mounted in the usual manner. The wheel consists of four parts—the hollow spoked wheel, rubber cushion, steel locking ring, for locking the rubber cushion in place, and the retaining rim outside the cushion. The air spaces are interconnected with channels which permit air to circulate in the periphery of the wheel and thus convey heat generated to the metal from which it is radiated. The cushion wheel differs but little in appearance from other cast spoke wheels made by the same concern, Smith Wheel, Inc. The makers state that the design is such that the tires cannot be forced off by hitting an obstruction. Depressions in the cushion retaining rim prevent creeping of the cushion around the wheel. It is said that the wheel requires no attention until the tires are entirely worn out.



Sectional views of Smith cushion wheel



## Consolidation in Trailer Industry

Editor, AUTOMOTIVE INDUSTRIES:

Development of the trailer industry is now, and has been for several years, a sales problem. Mechanically the trailer is simple as compared with the motor truck, and the major engineering and manufacturing problems have been overcome. It will succeed in time, but the process is slow and made doubly hard by the present waiting attitude of industry and commerce for the anticipated turn in business conditions.

The industry has manufacturing facilities greatly in excess of present demands for its product and of probable sales possibilities for a year or two to come. Sales have doubled and tripled from year to year, but the increase has been more than equalled by additions to the number of manufacturers and increased productive facilities. Profitable operation of the plants therefore waits on larger sales.

This would be problem enough of itself under present conditions, but it is magnified by the fact that salability of the product is affected by manufacturing costs and the almost impossible necessity of getting the list prices down to a reasonable conformity with reduced truck prices. The prospective purchaser of a trailer mistakenly looks upon it as a mere assembly of truck frame, axles, springs, wheels and body, and feels that a price ranging from a third to one-half that of a truck of equal capacity is entirely too high. At the same time the trailer distributor and dealer take little interest in pushing the sale of trailers on an equal commission or discount basis with trucks, which are more easily sold and represent two or three times as much profit. Reduced prices of parts and materials and a lower wage scale will permit of some lowering of trailer prices, but the apparent disparity of list with truck prices will remain, as well as the problem of effective inducement to the distribution agencies.

High manufacturing costs are due primarily to the inability to get into quantity production. This is brought about by

1. Low volume of sales.
2. Division of sales among too many manufacturers.
3. Multiplicity of types, sizes and models.
4. Production of special designs to meet customers' wants.
5. Unsystematic operation of plants.

Most, if not all, of these faults are inherent in any new industry, and were very pronounced in the earlier years of the truck business before design came to be fully standardized and such variants as two and three cylinder engines, two-cycle and air-cooled engines, horizontal engines, friction and rope drive and other troublesome and inefficient designs were eliminated. Manufacturing cannot, of course, be on an economical basis until parts can be produced continuously in large numbers and assembled into the final unit in a systematic, progressive way that eliminates lost motion. Probably no better example of the advantages of this method exists than the manufacture of Ford cars, in which the concentration of all efforts on a single model permitted the fixing of a retail price that

led to a succession of increased annual sales followed by further price reductions. On one side of a certain but indeterminate line is the vicious circle of low volume and high cost, which react adversely on each other, and on the other side large volume and low cost, which affect each other favorably and lead to success. How to bridge the gap from one condition to the other is the problem that has wrecked innumerable manufacturing enterprises.

The most practical way of making this possible, in the opinion of the writer, is by a consolidation of the largest and best equipped companies now in the industry. There is no insurmountable difficulty in the way of accomplishing this; in fact, the possibility and advantages of such a consolidation are realized by leading trailer makers. A competent organizer from outside the industry, who could command or interest sufficient working capital, not necessarily very large, could put the deal across if he had a practical plan and was able to enlist the confidence of the industry.

Without attempting to outline such a plan here, it may be pointed out that about half a dozen of the most modern and best equipped plants now in operation have potential capacity to produce all the trailers likely to be sold during the next two or three years. Each plant, instead of manufacturing three or four types and as many sizes in each type, constituting a line of from one to two dozen models, could and should be confined to from four to six models, preferably of one type. For example, one factory should specialize in four-wheel models, another in semi trailers, another on pole trailers and a fourth on two-wheel balanced trailers. Or, the division could be made along the line of heavy-duty and light-duty models, in which standard parts and fittings would interchange to a considerable extent.

It is imperative that the total number of models should be reduced to the minimum consistent with good business policy and that these be standardized as to units. Many special parts of identical form and dimensions, as well as bolts, nuts, etc., can be used in several types of trailers and also in several sizes of the same type, since some oversize of these in the lighter models is not detrimental. This will reduce the number of drawings, patterns, molds, jigs, etc.

It is maintained by some of the manufacturers that trailers have not yet been developed to the point where standardization is practical; however, by selecting the best designs of all the companies that would be embraced in an amalgamation, very satisfactory and commercially salable models would result that would warrant standardization. One of the smaller plants could be maintained as an experimental shop for development of new patents and designs. This would avoid interruption of systematic production in the other factories.

Sales records of all the plants taken into the consolidation could be assembled, compared and studied to determine the trend of demand for different types and sizes and those eliminated for which there was relatively little sale and which were unprofitable. The reduction of models and standardization of those retained would increase the volume of each to be produced and greatly re-

duce the stocks of materials and parts to be carried by the factories and by the service departments of distributors and dealers. Much capital now tied up in such stocks would be released. Furthermore, adoption of standard dimensions of frames and axles would enable the frame and axle manufacturers to produce desired special designs for trailers and offer them to the trade at prices fairly comparable with such parts for trucks, whereas now the orders of individual trailer companies for any particular size and pattern are too small to justify the making of special forms for presses and forges.

The chief advantage accruing from a consolidation would be the pooling in one plant of all orders for a given type and sizes of trailers now divided among all the factories, with a resulting increase in volume that would permit continuous production in large lots, more extensive utilization of labor-saving machinery and progressive assembly.

A secondary advantage would be the possibility of eliminating much of the selling expense by consolidating or reducing the number of selling agencies in the different cities throughout the country and by reducing the percentage of advertising cost per trailer sold. It would be poor policy to curtail the aggregate advertising appropriation, as perhaps above everything else the trailer needs advertising and publicity, but the expenditures would be concentrated on fewer makes and models and as sales increased the cost per trailer would be less.

It would be desirable in a combination such as suggested to take in as many existing companies as possible whose product or whose business condition made their acquisition desirable. Stockholders in many of these companies would almost certainly be willing to exchange their holdings for an equivalent in stock of the new corporation. Others might have to be bought outright. The more companies taken in, the more competition would be eliminated and the more useful patents, sales data, goodwill, etc., would be acquired. It would be found advisable if, say, a dozen companies were embraced in the consolidation, to close about half of them, removing to the larger and better equipped factories such machinery and stock as could be utilized to advantage and disposing of the remainder, together with the land and buildings of the less efficient plants that were closed.

If assembling and sales plants were maintained in or near New York, at San Francisco, in the Middle West and at a Gulf port, large savings in freight could be effected on both domestic and foreign sales.

The present money market cannot be said to be favorable to launching such a consolidation, but there are so many strong arguments in favor of the trailer as an economical transportation medium that the favorable attention of capitalists and bankers can be obtained.

The personal factor must be taken into consideration in connection with the practicability of a trailer consolidation. Each company naturally believes it has the best designs and hopes to be among the successful survivors in the industry. All will admit, however, that industrial history indicates that not all will survive and that any one of them may be among the number that do not. They will also admit that efforts to reach voluntary agreements on standardization, reduction of models, exchange of patent rights, interchange of manufacturing and sales data, and pool advertising—all calculated to reduce manufacturing cost, increase sales and get the industry on a systematic, quantity production basis—have so far been ineffective and disappointing in their results. In normal times the trade might await the slow development of voluntary co-operation to bring these things about, but prevailing business conditions make such a delay unwise. Consolidation would make it possible to enforce economies

in manufacture and selling that would place the industry on a firm foundation ready to raise a towering and safe superstructure as rapidly as the business revival develops.

H. W. PERRY.

## Battery Life

Editor, AUTOMOTIVE INDUSTRIES:

I note in your issue of July 21 a reference to the probable basic reason for failures of storage batteries as supplied for starting, lighting and ignition.

At the outset, let me say that I write not only from the viewpoint of one who has used and sold, but who has built and installed storage batteries for sixteen and one-half years.

In the first place, the automobile manufacturer is responsible for the "eight to fourteen months" batteries now usually supplied, his instructions to his purchasing agent being: "Watch price and capacity." In the days when starting and lighting batteries were being developed, the lowest price, the greatest capacity that could be crowded into a limited space, and minimum weight, were the factors in demand. Battery manufacturers met the requirements by thinning down the plates and increasing the number. This results in high capacity, light weight, a short lived battery and one not able to resist the abuse it is subjected to; hence the inevitable result is warped or buckled plates, internal short circuits, heating up upon charge and rapid disintegration; and, finally, a new battery and a dissatisfied customer.

Also, there is a feverish desire on the part of some battery manufacturers to have their battery standard equipment. Price being the goal of the purchasing agent, cheaper production by the battery manufacturers, and sales at little or no profit, a speedy renewal or new battery bought by the consumer and at a profit covering the virtual loss sustained when original was sold.

I can recall when I was in competition with other manufacturers and upon submitting my price was informed that it was 50 per cent too high; that it would cost the automobile manufacturer for his entire equipment \$250,000 more if my battery was bought; but I am satisfied that \$2,500,000 would have been saved the consumer.

AUTOMOTIVE INDUSTRIES is partly right in stating that the \$40 battery to the consumer would not have cost the automobile manufacturer \$10 additional had he demanded a battery that would have lasted the consumer 2½ to 3 years.

To illustrate, I was asked by a certain purchasing agent to fix up his battery (starting and lighting) that had been in a popular car about three years. Knowing the battery very well, I advised looking into the cells, and upon examination found the plates in excellent condition but slightly buckled. The plates were straightened and new wood separators put in, and the last I heard of the battery it was four and a half years old. That battery did not cost the consumer \$40, but it was sold to the automobile manufacturer at a fair price and all the profit was not received from the consumer.

If the automobile manufacturer desires, he can demand and will receive a battery that will last 2½ or 3 years under ordinary circumstances, but he will have to pay a reasonable price for same, and probably leave a little more space and carry a little more weight, but it will give the service. And if the automobile manufacturer would pay a fair price, the battery manufacturer would not be compelled to get all his profit out of the car user, nor would the owner be compelled to pay \$40 for a new one at the end of three years. But even if he did, \$40 less the allowance for the old one extended over three years is reasonable.

J. W. FRASER.



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## Accessibility and Maintenance Cost

**H**OW much is it necessary to sacrifice in accessibility to attain low cost in the production of automotive vehicles? Very little, we believe, if sufficient study is given to maintenance and repair problems when laying down the design.

It is of great importance, of course, to study production problems if the first cost of any piece of apparatus is to be minimized, and this is more apt to be given consideration than the cost of maintenance for the reason that the designer is usually in closer touch with production than with the maintenance problems.

It must not be forgotten, however, that most purchasers of cars, trucks and other automotive equipment have already had experience with the same general type of vehicle they are buying, and that such purchasers usually know very well that the cost of maintenance is nearly or quite as important as first cost. For this, if for no other reason, factors controlling maintenance and operating cost should

be given much closer attention than heretofore.

Some chief engineers make it a point to get the benefit of criticism of service engineering in various local branches before deciding finally upon a new design. It is a good practice and one which could be profitably followed in all cases. Whether this is done or not no design should be put into production until it has been given careful consideration from the standpoint of accessibility and serviceability under average conditions of use.

## Necessities, Not Luxuries

**I**T still seems necessary to occasionally point out that the automobile of to-day is a necessity and not in any sense a luxury. There are, of course, a small percentage of cars operated largely for pleasure by wealthy owners, which may fall in the luxury class, but even these are used more as a means of transportation than to give pleasure to the owner.

If any legislator doubts that cars are to be classed as utilities let him, for example, make a trip into any small town (more than half of our cars are used in towns of under 5000), and observe how and why cars are used for nearly all road travel in preference to horse-drawn vehicles. We recently had occasion to observe conditions in a New York town of about 500 inhabitants which is typical of thousands of towns in the East. Nearly every family had its automobile and could not do without it. The car carried milk to the creamery; it fetched cattle feed from the nearest railroad town 8 miles distant; it transported farm hands; it carried children to larger and better schools—to mention only a few uses. We were informed that less than a half dozen natives paid an income tax, yet men who should know better assert that an automobile is a luxury which no one with an income of less than \$2000 per year can afford to own!

The saving in time alone made possible by the use of a car often more than pays for it in the case of many owners.

A year ago some wiseheads predicted that the use of the automobile in common with other "luxuries" would be greatly curtailed during the current financial stringency, yet more gasoline was consumed in this country during the first six months of this year than during any previous six month period. Luxuries which are such in truth have been curtailed, but the automobile has long since become a utility of the first order, a necessity in our modern scheme of civilization. As such it can justly be taxed only as other necessities are taxed and in particular only as other means of transportation are taxed.

## Sound Future Development

**T**HE stability of the automotive industry and the sound basis present for its future development has been attested by every intelligent examination of authentic statistics. It is natural at a time like this that many persons will endeavor to predicate future trends on the basis of past statistics. This is an excellent tendency, despite its dangerous features, since

it indicates a desire to analyze the true facts of the situation and base future plans on sound data.

Among recent discussions along this line, the estimate recently made by C. A. Dana, president of the Parish Manufacturing Corp., is of interest. This executive estimates that there is a replacement market for 1,800,000 vehicles yearly on the basis of the present registration. This estimate indicates that there is a market for 83 per cent of the enormous 1920 production, even though no new buyers were developed. In discussing this estimate, Mr. Dana takes the sound view that we can look confidently to the future.

The best available statistics indicate a healthy growth for the industry. This growth, however, must be accelerated by careful analysis of markets and by intensive study of merchandising factors.

## Internal Combustion Turbines

EVER since the movement toward higher fuel economy in automotive engines started, a certain amount of interest has been shown in the internal combustion turbine, as possibly a more efficient engine than the Otto cycle piston engine. The hopes attached to the internal combustion turbine in this connection are undoubtedly based on the great economies effected by the use of steam turbines as compared with reciprocating steam engines. According to recent figures, the best efficiency obtained from reciprocating steam engines is in the neighborhood of 15 per cent, whereas large multi-expansion steam turbines give as high an efficiency as 28 per cent. That a similar improvement in results cannot be expected from the gasoline turbine is fairly obvious when we consider the difference in the conditions. In the case of steam we have in the boiler a fluid under pressure which can be supplied directly to the turbine, thus doing away completely with reciprocating machinery. In the case of internal combustion apparatus, on the other hand, the working fluid must be compressed and exploded before it can be fed to the turbine, and thus the reciprocating machinery cannot easily be done away with.

Another difficulty with the internal combustion turbine is due to the high pressures and corresponding high gas velocities which must be employed. It is a fundamental rule of turbine design that for maximum efficiency the blade speed must be one-half the speed at which the working fluid issues from the nozzles. In internal combustion turbines it is difficult to attain the desired speed because the high temperature of the gases greatly reduces the strength of the blade material.

A very thorough research of the work that has been done on internal combustion turbines to date and on the possibilities which the turbine holds out for aircraft applications has recently been published by the (British) Aeronautical Research Committee (Engine Sub-Committee Report No. 54, *The Internal Combustion Turbine*, by W. J. Stern). The conclusion is reached that the internal combustion cycle cannot be utilized in a turbine powerplant without large losses. These losses are largely of a mechanical nature and take place in the compressor and in the

turbine proper. Owing to the limitations of peripheral speed by the state of the metallurgical art, either very lean mixtures must be used or else water injection resorted to, both of which practices are thermodynamically wasteful. It is shown that the best thermal efficiency which can be expected from a turbine of large capacity and fitted with a regenerator is 20 per cent, which compares with 28 per cent of present large aircraft piston engines.

Looking at the subject from the standpoint of other branches of the automotive industry besides that of aircraft, there are other objections to the turbine besides low thermal efficiency. To judge by the various designs which have been worked out so far, very little flexibility can be expected from this type of prime mover, which is in reality a one speed machine. The high speed of revolution required for a fair thermal efficiency necessitates a very great gear reduction, which would involve additional losses of considerable importance, and undoubtedly appreciable noise as the gears became worn.

## Standards of Performance

GREAT benefits have accrued from the establishment of standards of performance, but untold difficulties have also arisen from the attempt to judge performance on the basis of inaccurate standards. Extreme care is always necessary in establishing a standard, for if it be set up as a measure of performance without being correct, it must of necessity warp the view of all the subsequent performances which are measured by it.

One important branch of merchandising seems to be afflicted by false standards. The true function and purpose of the publicity department of the automobile manufacturer has not been well understood.

In many cases it seems to be the policy of the management to judge the performance of their publicity man by the number of lines of "free publicity" he obtains, regardless of the quality of the material printed or the effectiveness of the mediums in which it appears.

In one case, for example, the management of a large company receives monthly reports from one of its publicity agents stationed in a city at a considerable distance from the home office. This report indicates the number of lines of publicity that have been obtained during the last month. When the number of lines shown in this report runs low, the publicity man is in for a "calling down." His natural reaction is to get more lines, regardless of how or where, since he is judged solely on that basis. Consequently he makes friends with the local newspaper men in the town in which he is located—a town comprising a small part of his territory. Through this relationship he puts over large quantities of publicity in these local papers, some of it good, some of it bad; all of it very limited in scope and effectiveness. But he is judged only by the quantity standard and gets praise for the number of lines.

A large part of the difficulty will be overcome when those in command fully recognize this fact, and set up sound standards of performance for publicity men.



# Sales Outlook Improves Steadily

## August Production Well Up with July

Better General Conditions Apparent—Farmers Coming Into Market

By JAMES C. DALTON

NEW YORK, Aug. 15—As the summer progresses the outlook for the automotive industry becomes increasingly encouraging. This applies not only to present but to future business. Manufacturers are not finding it necessary to curtail production schedules as sharply as had been expected and a considerable number of them have not reduced their output from the July schedules. Several companies are not able to keep pace with orders and their dealers are considerably behind on deliveries. Where it is not possible to meet the calls of all dealers, those coming from the agricultural districts, which were flat for many months, are met first.

It has become apparent that there is no dearth of purchasing power for automobiles either in the United States or other countries. The response which followed price reductions has amazed car manufacturers. They expected some stimulus to business, but nothing like what has followed. This is the reason why some of the more popular lines are behind in deliveries. They underestimated demand.

The effect of price reductions has been equally significant in England, which was much harder hit than the United States by post-war depression. One great American company which had its English warehouses filled with cars began to liquidate its stocks as soon as the prices were cut, and so heavy has been the demand in the short period which has intervened that new shipments are actually being made.

Reports from various parts of the United States are that August automobile sales promise to equal or eclipse those of July. A prediction to this effect would have been considered chimerical a month ago. Business is distinctly better in the agricultural sections and in the South. Crops are being harvested and the price of cotton has advanced. This promises well for the months to come when the harvest is completed.

It is known that reports received by the General Motors Corp. for the first week of August indicate that business for this month will exceed that of July. With cars in various price classes, this condition can be considered fairly representative of the industry. It is true of Dodge, Studebaker, Reo, Hupp and Ford. In fact, steady gains in employment are

being made in Detroit. For the week ended Aug. 2 the manufacturers there employed 1231 more men than the week before. Men are being taken on not only in the car factories but in the parts plants.

Five Cleveland companies—White, Chandler, Cleveland, Jordan and Templar—report larger production schedules. Winton, Peerless, Stearns and Grant state that their output is being maintained at the rate reached in June and July. White is selling more trucks than it is making.

Not only are car manufacturers finding August business beyond their expectations, but there are gratifying signs of life in the truck industry. With the general improvement in business and the consequent increase in freight movements there has been a substantial increase in truck orders, although they still are far below normal. Truck sales will move upward only as the general movement of goods expands in volume. As the need for motor transport increases, sales of new commercial vehicles probably will be retarded until the stocks of American-made trucks reimported from England and France are liquidated, but the number of such vehicles is not large enough to last long once business reaches anything like normal proportions. By that time it is probable congressional action will have curbed reimportations.

Close observers of conditions are more firmly convinced than ever that the truck industry really is in its infancy and that its expansion in the next few years will parallel that of passenger car development in the past decade. In spite of depression, there has been a surprising development in motor freight and passenger lines. In the passenger carrying end of this business the United States is lagging far behind Europe.

With the production of motor vehicles holding up surprisingly well, parts makers are beginning to feel the reflex, and the prospect for fall business is much brighter than it was two months or even a month ago. This is especially true of makers of unit parts. Probably the most encouraging feature of the situation is that both car makers and parts manufacturers have made very heavy reductions in the enormous inventories they had on hand when the slump came last year. This will necessitate soon a larger volume of orders from the vehicle factories and will send the parts companies into the market for materials.

Another trend of the industry which is arousing much interest and speculation is the demand for inclosed bodies. Indications now are that most companies will be flooded with orders for inclosed models in the next few months.

(Continued on page 342)

## Parts Sales Hold Up in Passenger Lines

Few Orders Booked from Truck Plants—Increases Expected in Fall

DETROIT, Aug. 15—Business with parts makers in the Detroit district is good or bad according to their degree of dependency on the truck industry. Those parts makers doing most of their business with passenger car makers find conditions holding up well; those relying chiefly upon truck orders for a large per cent of their activity are working along on a 50 per cent basis, some a little more, some less.

Truck parts makers do not look for real improvement in conditions until spring, though they expect a better business in the fall months due to farmer buying. Real improvement cannot come until industrial companies start using their trucks again, the parts makers citing their own cases to show that they are using only few trucks of their own fleets.

In the passenger car field business has been at a satisfactory if not normal capacity for the past three months. This same ratio is being maintained to-day and is expected to continue. Further than this it is impossible to forecast accurately owing to the prevailing tendency to hold orders to a thirty-day basis.

Practically all business now being done by parts makers is on the thirty-day basis. Though this has had a tendency to keep operations uncertain, it has resulted in a large amount of business being done and many standing orders have been greatly reduced, making certain a large amount of re-ordering soon to follow.

In quite a number of instances new orders are already being placed and many companies report inquiries which seem bound to develop new business. One condition which stands out prominently in the statements of parts makers, and which is the cause of genuine optimism, is that there are very few cancellations.

(Continued on page 340)

## STEPHENS FORCE NOW 400

FREEMONT, ILL., Aug. 16—July was the best month in the last 10 months, according to H. J. Leonard, general manager of the Stephens Motor Works, and prospects are that the August production will be 50 per cent greater than the July output. Four hundred men are on the payroll now and there are approximately 100 carloads of machines in advance of the present stock.

# Graham Bill Passes in the House

## Measure Important to Truck Industry

Reimports Legislation Said to Be Looked Upon Favorably by Senate

WASHINGTON, Aug. 15—From the viewpoint of motor truck manufacturers and dealers, the most important legislation acted upon in Congress since the war was the passage by the House by a vote of 186 to 83 of the joint resolution introduced by Representative Graham of Illinois which would impose an ad valorem duty of 90 per cent on all goods sent to France and England from the United States during the war and reimported for sale in this country.

Every effort will be made to get favorable action on the resolution in the Senate before recess is taken for the remainder of the summer. Senate leaders already have expressed themselves favorably on the measure.

While the resolution is not aimed specifically at reimportation of motor trucks, it will effectually end the unfair competition to which American makers and dealers have been subjected for the last six months. Sales, at practically half the list price, of reconditioned trucks which are new to all intents and purposes have made it difficult to find buyers for vehicles of the same type freshly made in this country.

### Sale Is Nation-wide

The Truck Company of America with headquarters in New York has gone into the sale of these trucks on a national basis and is appointing dealers in the larger cities as well as guaranteeing a supply of parts. This company alone is understood to have on hand approximately 2000 of these vehicles. Most of them were purchased from the Slough Trading Co., an English corporation formed to buy up surplus trucks from the British government.

The first of these trucks were placed on sale in Los Angeles and they are now to be found all along the Eastern seaboard. All of them are of standard make and in good condition. The average price paid for the trucks by the Truck Company of America is understood to have been \$1,000 and the company expects to make 100 per cent profit on each sale.

A considerable number of trucks of a similar character have been sent into the country from France and there is an enormous quantity of American made automotive equipment in that country which speculators have expected to sell in this country.

Early passage of the Graham resolution by the Senate would put an end to

**TRAILERS ARE VEHICLES, SAYS RULING, SO MUST CARRY LICENSES**

COLUMBUS, OHIO, Aug. 17—According to an opinion rendered by Attorney General John G. Price, trailers are classed as motor vehicles in the meaning of the registration law and must be provided with license tags in front and behind. This ruling was called forth because of the practice of some trailer owners of using but one tag on a trailer or none at all.

duty free reimportation of these supplies and imposition of a 90 per cent ad valorem duty would put them in a price class where established dealers could compete successfully for the business which will follow the gradual restoration of normal business conditions.

A clause inserted in the permanent tariff bill by Chairman Fordney of the House Ways and Means Committee was designed to cover the reimportation evil but with the passage of the tariff bill indefinitely delayed, the Graham measure will meet the situation much more effectively. Its passage by the House brings to a climax a long and sometimes discouraging fight made by some of the elements within the automotive industry.

### Scope Not Realized

For weeks after the first of the Slough trucks appeared on the Pacific coast, few persons within the industry seemed to sense the possibilities of this competition once truck sales again approached normal, but pressure finally was brought to bear upon Congress and leaders in both Houses began to see the seriousness of the situation.

The Graham resolution would cover vast quantities of war supplies of all kinds. The United States Liquidation Commission informed the House that this accumulation of materials was sold to France, England, Poland, Belgium and other countries for \$822,923,000. The original cost was \$1,739,189,302. Much of it was purchased by the governments themselves and later sold to speculators.

The bill will become effective as soon as it is signed by the President.

### STANWOOD PLANS TO GO ON

ELIZABETH, N. J., Aug. 16—Plans are being developed for the reorganization of the Stanwood Rubber Co., which now is being operated under a receivership. Although the plant has been placed on the market, it is understood that arrangements will be made for a resumption of business.

## Cameron Takes Over Greenville Factory

Implement Plant Will Be Used for Making Castings for Motors

NEW YORK, Aug. 15—Cameron Motors Corp. has taken over from Cass T. Wright the plant of the Greenville Implement Co. at Greenville, Mich., which will be used for the manufacture of castings for its motors and tractors. Cameron Motors recently acquired the plant at Sandusky, Ohio, of the Dauch Mfg. Co., making the Sandusky tractor.

Greenville is only about 200 miles from Sandusky and both towns are on the same railroad line, which will make the movement of castings convenient. The present capacity of the foundry at Greenville is 50 tons of castings daily and this output can be increased to 100 tons. Plans already have been prepared for an addition 80 by 150 feet. In addition to foundry work, Cameron Motors will use its new plant to make plows and other special equipment for the Sandusky tractor.

The consideration for the Greenville property is understood to have been about \$150,000. Charles A. Nevins, formerly of St. Johns, N. B., will be the engineer in charge of production at Greenville.

Cameron Motors has begun operations at the Sandusky factory and expects satisfactory business in the fall.

## Fisk Rubber Operating at 90 Per Cent Capacity

SPRINGFIELD, MASS., Aug. 18—With a production of nearly 10,000 casings and 13,000 tubes daily, the Fisk Rubber Co. is operating its Chicopee Falls plant at 90 per cent of its peak capacity, officials announce. At the bottom of the winter depression it was down close to a 30 per cent basis. The August production schedule upon which the factory is now working calls for 225,000 tires, an increase of 32 per cent over the July output of 170,000 tires, which, in turn, represented an increase of nearly 50 per cent over June. The May output was but 65,000 tires.

Every month since May has shown a sales increase over the previous month for Fisk. Not only that, but the last three months have been ahead of the same period in 1920.

Fisk is rapidly working off its high-priced inventory and on the readjusted basis of 20 cents per pound for crude rubber, it is predicted, ought soon to show some net profits.

## Japanese Motor Tax Hurts Orient Sales

**Business Confined Almost Entirely to 4-Cylinder Cars—See Complete Halt**

SEATTLE, Aug. 18—Until the excessive automobile taxes were initiated in April, six cylinder cars were the most popular type of passenger cars in use in Japan, while since April buying has been confined almost entirely to the four-cylinder, low horsepower cars, according to the latest information received here from the Orient. It is declared among motor dealers in Japan that there is no doubt but that the change has been brought about by the new taxes. Several of the largest importers of automobiles in Tokio report that they have sold no sixes since April.

The motor car dealers in Japan explain the attitude of the buyer as follows: A man may be willing to give eight thousand yen (\$4,000) for a motor car, provided that he believes this to be a fair price, but he will certainly strongly object to paying 850 yen (\$425) per year for the privilege of owning a motor car. Moreover, this tax does not depreciate with the value of the car, but continues at the same figure. Thus in three or four years, the tax is almost equal to the second hand value of the car, it is pointed out.

### 5000 Cars in Tokio

There are about 5000 motor cars in Tokio, a city of about 2,250,000 population. Tokio has fewer automobiles in proportion to its population than any other of the world's larger cities. Under ordinary conditions, an increase in the number of cars might be expected, but at present the number of cars is decreasing. It is feared that it will further decrease after the time when the first of the semi-annual tax payments is due, and motorists generally realize that the municipal authorities are in earnest about the tax.

Inasmuch as the vast proportion of the automobiles in use in Japan are of American manufacture, the feeling is growing among automobile importers in the country that American manufacturers, either individually or collectively, should launch an extensive campaign in that country to "sell" the general value of the motor car, as they are doing in the United States. Unless such a campaign is undertaken soon, it is believed that the movement of cars in Japan will be tremendously injured, if not halted.

### EDDIE HEARN WINS RACE

SANTA ROSA, CAL., Aug. 15—Eddie Hearn, driving a Duesenberg-Distil car, won the 150 mile automobile race which opened the Cotati Speedway here yesterday. His time was 1 hour, 21 minutes, 19.5 seconds. Roscoe Saries in a Duesenberg was second and Tommy Milton in a Durant Special was third.

### "OLD DOBBIN" FORMS BUT 1% OF TRAFFIC ON RURAL ROAD IN IOWA

WATERLOO, IOWA, Aug. 17—A count was kept of the traffic over Rainbow Drive, the paved road from this city to Cedar Falls for seven days from 6 a.m. to 9 p.m. and the number of vehicles was 14,032. It was estimated about 7000 passed over the drive later than 9 p.m., bringing the total to more than 20,000 for the week. The observations were made by Macy Campbell of the Iowa State Teachers College. He was assisted by members of his family in making the actual count. Ninety-nine per cent of the traffic was motor. "Old Dobbin" came in for the lone one per cent, which goes to prove that horse drawn vehicles in prosperous farming districts are fast becoming extinct. Only 164 horse drawn vehicles passed over the Rainbow Drive during that week. This drive is the first section of 85 miles of Black Hawk County roads for which paving has been voted. The cost was \$42,000 per mile, one-half of which was paid by the Federal Government.

## Monthly Inspections by Franklin Dealers

SYRACUSE, N. Y., Aug. 16—The H. H. Franklin Mfg. Co. of Syracuse announces that, effective at once, every one of the company's dealerships and sub-dealerships, 538 throughout the country in number, will make a monthly examination of all Franklin cars in their territory. This monthly inspection will, in the opinion of the officials of the company, go a long way toward placing in the hands of owners a correct understanding of the condition of their cars.

Particular attention will be directed to the fact that in many instances a trifling expenditure will correct minor mechanical ailments, which if allowed to run would sooner or later develop into serious defects, resulting in a large repair bill. Detailed plans for the operation of the inspection system have not been worked out but they will be perfected by a series of experiments.

### FRIEND MOTORS RECEIVER

DETROIT, Aug. 16—Friend Motors Corp. and Olympian Motors Co., both of Pontiac, have been placed in receivership by Judge Tuttle in United States District Court here. The Detroit Trust Co. has been named receiver in each case. Friend Motors has been in need of working capital and has been unable to dispose of stock in the recent market. The policy of the receiver has not been determined. Olympian Motors has not been functioning for a considerable length of time.

## Schools Purchase Many Motor Trucks

**International Harvester Orders Also Heavy from Laundries—Farmers' Sales Small**

SPRINGFIELD, OHIO, Aug. 18—Orders for the Springfield light speed motor truck, manufactured here by the International Harvester Co., are being received from various parts of the United States and also from several of the foreign countries. Shipments are going forward to boards of education and to laundry companies.

The demand for the high speed trucks are mainly from the cities and the rural school boards. Only a small amount of the business is coming from the farmers. It is stated that the farmers are unable to purchase trucks owing to the slump in farm products. In numerous instances farmers have two or three crops of grain on hand, and produce is only bringing a small price, compared to those of a few years ago.

The Springfield works of the International Harvester Co. recently shipped a fleet of trucks to Michigan for the use of laundry companies. A good sized shipment was also made to California, where the boards of education plan to operate bus lines this fall. The trucks for handling school pupils are mounted with special bodies having capacity of from 25 to 30 children seated. These trucks can be operated at the rate of speed from 25 to 30 miles an hour. It is stated that they can be run at a much faster clip, if necessary.

## Constantinople to See Tractor Trials Sept. 5

WASHINGTON, Aug. 16—Competitive tractor trials will be held at Constantinople on Sept. 5, under the direction of the Turkish Ministry of Agriculture. Assistant Trade Commissioner Gillespie, at Constantinople, reports to the Bureau of Foreign and Domestic Commerce that written application either in French or Turkish must be made to the Minister of Agriculture prior to Aug. 31. Sealed letters giving the approximate selling price, c.i.f. Constantinople, in Turkish pounds, must accompany the application. Working tests will consist of plowing at depths of 8, 18 and 25 centimeters, pulling harrows, seeders and empty or loaded trucks. All expenses are to be paid by the competitor.

### RECEIVERSHIP IS DECREED

INDIANAPOLIS, Aug. 16—Clarence Weaver has been appointed receiver for the Standard Automotive Corp. by Judge Moll in Superior Court here. The petition was filed by William E. Sanders, a creditor and stockholder. The corporation has a factory at Mooresville, where it is engaged in rebuilding automobiles.

## August Truck Sales Look Good for Coast

### July Totals Distinct Improvement Over June—Tractors Moving Steadily

SAN FRANCISCO, CAL., Aug. 16—The general condition of the motor truck distribution and selling business in northern California, from the Tehachapi Mountains to the Oregon boundary, showed a distinct improvement over that of June. Distributors and dealers in San Francisco, Oakland, San Jose, Sacramento and other centers of motor truck distribution estimate that sales were at least 20 per cent better during July than during June, and that July prospects, for purchases when the crops have been harvested and payment received for them, were 50 to 60 per cent greater than in the preceding month.

This increase in prospects means that sales will be considerably better along toward the end of August, and in September, than they have been during the months of the summer so far passed. August sales bid fair to be good, but the truck dealers are pinning their faith on the September business to make up for summer dullness. In general, in northern California, however, truck sales are not up to the standard the dealers and the dealers' organizations have set.

#### City Sales Are Best

Sales of trucks in the cities and larger towns have gained in proportion, on sales in the country. Six or eight months ago, about four times as many trucks were sold in the country, in proportion to potential users of trucks, as in the city. To-day, this ratio is only about three to two, instead of four to one.

Tractors are moving steadily, but slowly, and their sales seem to be lower than those of June only to the extent that these sales always fall off in the midst of the summer, when the farmer who could afford it has bought his tractor earlier in the year, and the farmer who is preparing to buy one is waiting, either to make a decision as to the one he will buy, or, more often, for the payment for his crops. All in all, however, the selling of commercial vehicles in northern California is in a fairly good condition, and the dealers are far more buoyant in spirit than they were eight to 12 months ago.

#### PLANT TO MAKE TRUCKS

TORONTO, Aug. 16—International Harvester Co. of Canada, Ltd., has announced that its wagon and sleigh plant at Chatham, Ont., is being equipped to take over the manufacture of International motor trucks. These trucks have hitherto been made in the United States and shipped into Canada. Demand now warrants their manufacture in the Dominion. First size to go into immediate production will be model "S" speed truck.

### FARMERS USING FORD CARS; FORD RAILROAD WOULD END LOCAL STOPS

SPRINGFIELD, OHIO, Aug. 17—Because motor cars are being extensively used by farmers, Henry Ford wants permission from the State Utilities Commission to discontinue stops at a number of small towns along his Detroit, Toledo and Ironton Railroad. Ford's railroad has been affected by his Ford motor cars, and as a result he desires permission to discontinue local service to these towns.

Shorter trains of freights, not exceeding 50 cars, are to be handled on this railroad under the efficiency plan adopted by Ford. Formerly much longer and heavier trains have been handled. Many trains handled on this railroad are made up of cars loaded with Ford automobiles. Lately the average has been five trainloads of automobiles daily from the Ford plant at Detroit.

### See 1000 a Month Ford Business for Mexico

DETROIT, Aug. 18—Ford Motor Co. shipments into Mexico are increasing at a rate which indicates that a business of 1000 cars a month will soon be realized by its Houston branch. All Mexican business is controlled by this branch with the exception of the States of Sonora, Sinaloa and Tepic. There are 180 dealers under the branch, which includes, besides its Mexican territory, the entire southern half of Texas.

Shipments from the Houston branch into Mexico were heavier in June than ever before. One trainload contained 248 cars and trucks. Most of the cars and trucks shipped by rail are knock-down. Cars going by way of Tampico by boat are shipped complete.

Representatives of the Ford company have just completed a survey through Mexico in which most of the important cities and towns were visited. Many dealers were appointed and the territory was thoroughly studied with a view to increasing sales and improving facilities in all parts of the republic. Many sections are fertile fields for tractors.

#### DODGE HAS NEW SEDAN

NEW YORK, Aug. 18—Dodge Brothers have made some changes in the design of the Sedan, the new models of which are just beginning to come through to dealers. The total height has been reduced 4 in., but the most conspicuous change is the use of steel disk wheels. The inside arrangements have been shifted somewhat, the divided front seat being eliminated and a solid seat used instead. This has resulted in a change in the door arrangement so that there are two doors and in addition to this the shape of the glass windows has been changed to a square type.

## Atlanta Will Have Novel Parts Depot

### \$2,000,000 Company Formed— Plans to Assemble Both Cars and Trucks

ATLANTA, GA., Aug. 17—With a capital stock of \$2,000,000 and headed by Walter T. Candler, vice-president of the Central Bank and Trust Corp., and one of the best known business men in the South, the Lullwater Co. has been organized and incorporated to establish an automobile industrial institute in Atlanta. Lionel J. Kahn, well known in automotive circles, has been named general manager of the corporation. Several prominent business men are connected with it as original incorporators.

The purpose of the company is to assemble under a single roof separate and individual industrial units of every kind connected with the automotive business. The idea is to make it possible to rebuild an automobile or a truck in this plant, or to repair any automobile or truck regardless of make. This plant will include complete paint shops, trimming and upholstering department, a silver and nickel plating department, and departments, each separate, for welding, boring, grinding, etc. In addition, the institute will accommodate tire, battery, accessory and automobile novelty dealers, and there will be a general parts department that will stock parts of every standard make of automobile in use in the southern States.

The new company has leased from Walter T. Candler one of the largest automobile buildings in Atlanta, which is located on Automobile Row and provides 114,000 sq. ft. of floor space. The building is five stories in height and preparations are under way to get the institute into operation at once.

#### RUBBER FIRMS BUY FABRIC

AKRON, OHIO, Aug. 17—Purchases of tire fabric are being made by virtually all the rubber companies in Akron except the "big four" which were caught with large inventories when the slump came. There is no expectation that fabric prices will be lower this year. The held over cotton crop in the South is of a quality not suited for tire fabric and the new crop is reported to be below expectations. The larger companies are ordering on their contracts but they will not work off their higher priced commitments before the first of next year and it will take Goodyear six months longer.

#### N. I. V. A. TO AID HOOVER

CHICAGO, Aug. 17—The National Implementation & Vehicle Association has appointed a committee of 12 headed by G. W. Crampton of the Deere & Mansur Works, Moline, Ill., as chairman, to co-operate with Secretary of Commerce Hoover on the standardization of farm equipment.

## Propose to Revise Liability Insurance

### Underwriters Call Conference— Reforms in Automobile Business Likely

NEW YORK, Aug. 16—General revision of automobile liability rates will be discussed at a conference to be held in the near future by members of the National Workmen's Compensation Service Bureau. The call for the meeting states that there are indications that coverages and rates are not properly adapted to present conditions. In this connection A. W. Whitney, general manager of the bureau, says:

"It has been evident for some time to the automobile committee and to us in the bureau that this season should see a thorough overhauling of our automobiling rating system. There are many indications that our coverage and rates are not properly adapted to the present conditions in the automobile field. We are working on the problem in this office and have, for one thing, participated in a recent joint conference in Detroit between the bureau, the Fire Underwriters' Conference and a committee from the National Automobile Chamber of Commerce. This meeting, which was for the purpose of discussing fundamental matters of common interest, was of considerable importance in itself and also because it paved the way for a relationship in the future which may do much to bring our practices into closer relationship with the needs of the business.

"We propose to start the work of the automobile committee about the middle of September with an intensive consideration of the general problem."

The call for this conference and the statement by Whitney would indicate that the insurance companies are beginning to take seriously the threat made by automobile interests through the National Automobile Chamber of Commerce that, unless radical changes are made in the present automobile insurance system, mutual companies would be formed for the protection of manufacturers, dealers and car owners.

Reports from various sections of the country show that insurance companies are beginning to take into account the "moral hazard" which has been disregarded in the past.

## Parts Business Good in Passenger Lines

(Continued from page 336)

Orders from manufacturers of light delivery trucks have gone a long way toward keeping business moving along as satisfactorily as it has. Parts makers feel that there is, for the present at least, a far greater opportunity in this field than in the heavy duty field, and expect a more general production of this class of truck than formerly. In their opinion too many truck manufacturers have neglected this opportunity in the past.

### HANSON SALES GROW

ATLANTA, GA., Aug. 16—Reductions in prices of all Hanson models announced Aug. 1 by the Hanson Motor Co. here, resulted in an influx of new orders the first week of the month following

the announcement, officials of the company reporting the sales record for the week exceeds that of any previous week of the past several months. Carload orders were received, some by wire, requesting immediate shipment, from New York, Boston, Pittsburgh, Louisville and Birmingham.

### KISSEL ADDS WORKERS

HARTFORD, WIS., Aug. 18—Since Aug. 1, the Kissel Motor Car Co. of Hartford, Wis., manufacturer of passenger cars and trucks, has increased its working force by 100 to 125 men who were laid off early in the spring. New business is developing so satisfactorily that it is believed possible to keep on increasing the force steadily.

### CADILLAC INCREASES FORCE

DETROIT, Aug. 16—Cadillac Motor Car Co. is increasing its working force to meet increased demand for its product from larger cities of the country. About 1000 men will be added, factory officials declare, bringing production up to 65 cars a day, or 75 per cent of normal output. New business is reported to be running about even as regards enclosed or open models, with the enclosed car a slight favorite. Though the principal source of the new business is from leading industrial centers, the company declares improvement is becoming general.

### DEMAND FOR NASH CARS

KENOSHA, WIS., Aug. 17—The Nash Motors Co. reports that the demand for its cars following the price cuts last month exceeded production by more than 50 per cent notwithstanding a considerable increase in the production schedule. Indications are that the heavy demand for cars will continue well in September. Dealers stocks generally are depleted and orders are being booked for future delivery. The demand for cars is divided almost equally between four and six cylinder models. Sales thus far in August have been fully as brisk as in July when Nash production was 2470 automobiles.

### INCREASE FORGE OUTPUT

INDIANAPOLIS, IND., Aug. 18—Announcement has been made by the officials of the Imperial Drop Forge Co. of Indianapolis to the effect that large orders have been received from the manufacturers of the Dort and Lafayette cars, which has enabled the company to increase its production to a point near maximum. Company officials say the orders are the largest that have been received since the peak of last year.

### HENRY L. INNES DIES

JACKSONVILLE, FLA., Aug. 16—Henry L. Innes, president of the American Motors Export Co. of this city, died here to-day. He formerly was connected with the Dodge Bros. Motor Co., the Chevrolet Motor Co. and the Parish & Bingham Corp.

## German to Handle Sales for Durant

### Leaves Olds to Join Ver Linden— Michigan Subsidiary Incorporated

NEW YORK, Aug. 16—Leon R. German, former comptroller and vice-president of the Olds Motors Division of the General Motors Corp., has been appointed sales manager for Durant Motors Corp. of Michigan, which is headed by Edward Ver Linden, former president and general manager of Olds. He will have charge of Durant sales in the territory between the Adirondacks and the Rocky Mountains and will assume his duties Sept. 1.

### Close to Ver Linden

German has been closely associated with Ver Linden since 1913, when the latter became works manager for Olds. When Ver Linden was appointed general manager in 1916, German was given a more responsible position and finally was elected vice-president. He has been in charge of operations at the Olds plant since the retirement of Ver Linden. Announcement that he would join his former chief was made in AUTOMOTIVE INDUSTRIES several weeks ago.

Incorporation papers for Durant Motors Corp. of Michigan have been filed at Lansing. The capitalization is \$5,000,000 in common stock with a par value of \$10. W. C. Durant, vice-president, holds 130,000 shares. The other incorporators are: Edward Ver Linden, president and general manager; Edmund C. Shields of Lansing, secretary and treasurer; Carroll Downes and C. F. Daly of New York, all of whom hold 100 shares. Downes is connected with the Durant Corp. and formerly held a responsible position in a Philadelphia bank.

### Plant Nears Completion

Work on the new plant at Lansing has progressed so rapidly that it is expected production of cars will begin by November. The Durant Four will be assembled in the meantime at the Long Island City plant.

Announcement is made at Durant headquarters that a complete line of six-cylinder automobiles, including five-passenger and seven-passenger touring cars, runabouts, coupes, sedans and limousines, will be made by the Durant Motor Co. of Indiana, which has taken over the Sheridan plant of the General Motors Corp. The directors of the Indiana company are Durant, T. W. Warner and D. A. Burke.

### OGREN CREDITORS MEET

MILWAUKEE, Aug. 17—At a meeting of 55 creditors of the Ogren Motor Co. a committee of five was appointed to ascertain the condition of the company and report at another meeting which will be held as soon as possible.



## Ford Plant in Japan Makes Speed Record

Car Assembled from 200 Parts  
Ready for Road in 1½ Hours  
in Yokohama

YOKOHAMA, July 30 (By Mail)—The Ford assembling plant established here by Sale & Frazar, who represent the Detroit manufacturer in Japan, has made a new speed record for the Orient. A complete car assembled from 200 parts is ready for the road in 1½ hours after the assembling begins. The work is carried on in a frame building 148 by 108 feet, where the crates containing the parts are unloaded direct from the docks to which they are brought by steamers from New York via the Panama Canal.

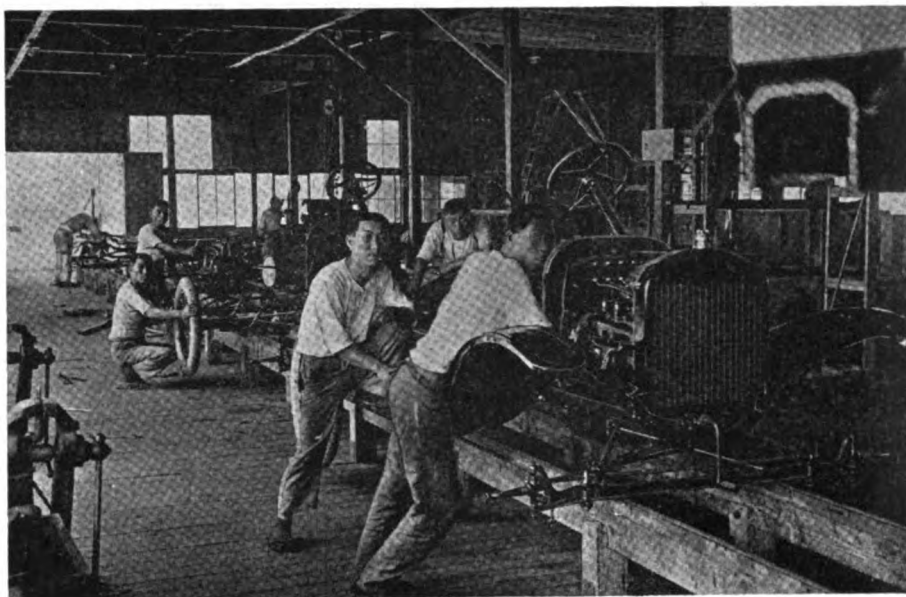
Once the Ford is uncrated it is handled by various shifts of workmen in the plant at Negishi, which was opened in July, 1920, and is in charge of H. F. Brett, who was connected with the Ford plant in the United States before he came to the Orient. His assistant is F. Bennett, who was in the Highland Park Ford plant for 15 years. Both men are enthusiastic over their present chief, E. W. Frazar, who has built up a huge importing and exporting business in the Far East. In the 15 acres which take care of his interests at Negishi he has the Ford assembling plant, a Fordson tractor demonstration field where Japanese army men buy tractors, a big storehouse for Ford parts and a lumber mill.

There are crews of men to handle each stage of the assembling of the car. This is a great departure from the way the work was handled a few years ago. The first step is to lift the body out of the big box, in which it is shipped, by means of ceiling chains. The frame, the rear springs, the running boards and brackets all come in order and the car passes up the assembly line on two rails very much like railway tracks and on the way takes on the control shafts, the front axle assembly, the rear axle and differential assembly. The motor has previously been tested and is in the car. The last step in the assembly is to lower the body on to the chassis.

Normally six cars a day may be assembled at the Negishi plant, which is the outpost of Ford efficiency in the Orient. Last month was a busy one and the workers at the Negishi institution were kept working at the highest rate of speed yet attained.

### LROYER MOTORS BUILDING

STOCKTON, CAL., Aug. 16—Completion of the Lroyer Motors Co. factory here will represent an investment of \$250,000, in 30 acres of ground and buildings, which are now well under way. The plant is to manufacture the Wizard four-pull tractor. Building has been stimulated noticeably in the Cherokee Lane section by the erection of this factory on that thoroughfare.



### Turning Out Fords at Yokohama

*Progress of Fords at the Negishi plant, Yokohama. The men are working on cars in comparative stages of assembly*

### British Makers May Cut Prices to Swell Sales

LONDON, Aug. 9 (By Mail)—Although there is some reason to be hopeful regarding the improvement of trading conditions in consequence of settlement of labor and other economic difficulties, it is doubtful whether the results of this year's trading and possibly even those of next year will be sufficient to wipe out the heavy losses suffered by some of the automobile manufacturers.

Before trade can be resumed on a substantial basis it will be necessary to mark down prices and further reductions are almost certain now that the engineers' union, embracing 1,500,000 men in various skilled and semi-skilled trades, has accepted a substantial reduction in the wage and piece rates. In view of this fact companies which have showed heavy losses probably will have all they can do to earn a covering profit on the coming year's turnover. Carry-over debts will have a serious effect on next year's net profit and may prevent the selling rate per car being made low enough to meet the reduced cost of U. S. cars.

### BRAZIL BUSINESS OFF

WASHINGTON, Aug. 15—According to reports from Sao Paulo, Brazil, conditions in the automobile market of that city are even worse than in Rio de Janeiro. Large consignments of cars are to be held by the banks by reason of the refusal of the consignees to meet the drafts covering their shipments. The latest statistics show that during December, 1920, 56 trucks and four chassis and 599 automobiles complete and three chassis were received in Brazil from the United States. During November of the same year 85 trucks and 15 chassis and 582 automobiles and 12 chassis were received.

### Australia Has Tentative Contract for Airplanes

WASHINGTON, Aug. 16—A tentative contract has been agreed upon for the construction in Australia of Australian parts of six airplanes to be used as training machines for the air force. The contract is to be let by the air council, according to Vice-Consul Ray Fox, and supervision and inspection is to be carried out by the arsenal branch of the defense department, while orders for the construction will be given to the Australian Aircraft & Engineering Co. of Sydney. At present steel of the required specifications is not manufactured in Australia, but it is anticipated that with the definite establishment of the airplane industry the necessary steps will be taken at the existing steel plants to comply with the special requirements. The company has been engaged in commercial construction of airplane parts and repairs for some time and proposes to undertake commercial as well as official construction work.

### GOODYEAR LAYS OFF 900

AKRON, Aug. 16—President Wilmer of the Goodyear Tire & Rubber Co. announces that 900 men will be laid off this week, but that the reduction in the factory force is expected to mean only a slight curtailment of production, because of the steadily increasing individual efficiency of factory operatives. Goodyear has been averaging 2500 tires a day for the last few weeks in the Akron plant and 3500 tires in the California factory. No further reductions are contemplated for the remainder of this month, although the usual dull season for the tire industry in September and October may mean a curtailment of production next month.

## Outlook for Sales Improves Steadily

### Truck Industry Only in Infancy Close Observers Say—Motor Freight Develops

(Continued from page 336)

The various plants of the Fisher Body Corp. has so much inclosed body work booked that they can accept no more orders for work of that character.

A dispatch to AUTOMOTIVE INDUSTRIES from its Cleveland correspondent says:

"Cleveland body companies, especially those making inclosed bodies, are gradually swinging toward normal production. Within the last 30 days orders have been booked in much larger numbers. A further increase is expected after Sept. 1, and there is every indication that business will continue good throughout the winter. Demand as a rule is far ahead of the pre-war record and in some cases it is running close to the record-breaking figures of 1920.

With business surprisingly good for midsummer, there is every reason to believe it will improve steadily as the year advances. Encouraging factors are coming more and more to the front. Railroad earnings are steadily climbing because of the larger freight tonnage. The crop movement at this time of the year is seasonal, but more freight cars are being used for the movement of general freight. The improvement noted in steel orders for the past three weeks is holding its own.

Harvesting is being done this year unusually early and farmers are eager to get their crops to market. The wheat harvest has stimulated business generally throughout the Kansas City district. The yield was larger than anticipated, and a big corn crop is practically assured. Wholesalers of various lines of merchandise report an increased demand, indicating that the farmers are coming into the market.

The Northwest, all the way to the Pacific Coast, has been pretty thoroughly deflated and the worst is over in that section. While business will not return to normal for several months, the trend will be gradually upward and there are signs that the turn has begun already.

A distinctly better feeling is apparent in the South with some degree of stabilization in the cotton market. There was a sharp curtailment in cotton acreage this year and the crop is not as good as normally. It is becoming apparent that the hold-over in warehouses is not as large as has been generally believed. For these reasons cotton growers are certain to get better prices for their crop than they expected. Increased diversification of crops in the South is another favorable factor.

Altogether, the outlook for the automotive industry is growing brighter day by day. Apparently it is going to escape the worst of the usual seasonal slump.

## Future Looks Bright, Is General Report

### LOUISIANA GAINS DUE

NEW ORLEANS, Aug. 15—Business conditions in Louisiana this fall will show an improvement over the first nine months of the year, although sales are not expected to reach the volume of last fall. The general impression seems to be that farmers in this section will be required to liquidate their bank indebtedness to such an extent that they will have little money with which to purchase automotive equipment but the country banker probably will assist worthy dealers in clearing actual sales although discouraging the dealers from stocking excess vehicles.

These bankers will handle some deferred payment paper but it will be more closely scrutinized than ever before and they will have to be assured that the purchaser is financially responsible outside the car itself. They also will require larger cash payments.

General business conditions show a slight improvement and inventories are gradually being worked down. Merchants are taking their losses and cutting expenses. There is confidence that better times are coming but the process of readjustment is slow.

### CHARLOTTE HOPES HIGH

CHARLOTTE, N. C., Aug. 15—Automobile business next fall and spring in this section is expected to be practically double that of a year ago. It is not likely however, that farmers who raise tobacco and cotton will be able to do much buying after they have liquidated their indebtedness. Indications are that country bankers will be very conservative in regard to handling automobile paper for the small town dealers. These bankers are loaded with notes given by farmers on last year's crops, which have not yet been sold and there is very little money in the smaller centers.

### NEBRASKA PICKING UP

LINCOLN, NEB., Aug. 18—Automotive equipment jobbers of this city who have been making a survey of business conditions report a slight but steady upward turn in buying and indications from most parts of the State that this will be continued. Farmers have begun to sell the new crop and are also disposing of some of last year's crops held with the hope of higher prices and they are starting in to spend the money. Retailers in the automotive equipment field are reported to be feeling more cheerful than for several months.

### IDAHO GAINS SLOWLY

BOISE, IDAHO, Aug. 16—Business conditions in Idaho are slowly beginning to pick up according to a survey made by Guy Flenner, secretary and manager of the Idaho Automotive Trade Associa-

tion. The State was hard hit by failure of last year's crops to bring profitable prices and some of the automotive men have suffered considerably through the transactions of dishonest dealers. With the turning of present season's crops into cash, buying again is on the upward grade.

### TEXAS OUTLOOK FAIR

HOUSTON, TEXAS, Aug. 15—While conditions in southern Texas still are bad, the outlook for general business for the next year is reasonably encouraging. Prospects are that it will be slow for the next six months but that after that there will be a marked improvement which will carry it rapidly toward normal. Few of the farmers in this section will have funds to purchase automobiles or tractors when they have finished paying off their indebtedness this fall but with the harvesting of another crop they will be back in the market for automotive equipment.

### CENTRAL OHIO GAINS

COLUMBUS, OHIO, Aug. 18—A slight improvement in the demand for trucks is reported in Columbus and central Ohio territory. This has been most noticeable since Aug. 1 and is especially marked in the lighter trucks and delivery wagons. Heavy trucks ranging from 2½-ton to 5-ton vehicles are still rather slow. Truck dealers are of the opinion that with a slow revival of business which is promised during the fall there will be continued improvements in the truck business. A better feeling is developing in farming communities as crop prospects have been improved by recent heavy rains. It is now believed that the worst of the slump in the truck business is now over and that business will show a gradual improvement.

### CARL VON POETTGEN DIES

DETROIT, Aug. 18—Carl S. Von Poettgen, senior member of C. S. Von Poettgen, Inc., advertising counsel of this city, died here this week. In his life he had an active part in the development of the automotive industry, his firm handling the accounts of many leading manufacturers of cars and parts.

### A CORRECTION

NEW YORK, Aug. 17—In a description of a new 1-ton Larrabee-Deyo truck in the August 4 issue of AUTOMOTIVE INDUSTRIES, through a typographical error this appeared as a six speed job where as a matter of fact the truck is a six cylinder model designed especially for higher speed.

The use of the hyphen instead of the comma completely changed the meaning of the sentence.

## Kansas City Plans Keen Bid for Sales

### Intensive Campaign Proposed— Farmers Are Liquidating Their Debts

KANSAS CITY, MO.—Two factors are operating to retard motor car and truck sales during August. One is the failure of the harvest returns to cover liquidation needs for farmers and merchants, and the other is the temporary depression into which retailers, and especially jobbers, have fallen, since reviewing the business of the first six months of this year.

The first factor is not as serious as it sounds, although it is generally admitted that the circulation of money has not reached the extent that had been anticipated for this month. Optimists had declared that the harvest returns would enable farmers to meet most of their back bills, and consequently merchants would be able to pay up their back bills, too. But this has not been the case. Many merchants will have to be carried over till winter on their 1920 overhanging indebtedness. They and the farmers are paying current bills promptly, but somehow the 1920 residue seems to stick in the unpaid files.

Wheat is not yielding the total revenue expected, but corn is turning out far better than expected, and other forage crops are in unusually good condition and volume. The total revenue of farmers, therefore, will be large for the year and eventually the volume of money will be adequate for normal present business and for the liquidation of the 1920 balance. There may be a few failures during the coming four months—but at last the readjustment is in sight.

The depression of merchants is due to their discovery that they have not made as much money this year as last.

In some cases the discovery has been of a very small profit for the six months or for the fiscal year. It has been a

strenuous period, with the necessity for extraordinary effort to secure a volume in money equal to last year, involving turnover of a great deal more merchandise. The merchants have been under a strain, and they have relaxed, often into melancholy, but an unusual number of them are on vacations, from which they will return with new vigor.

It is certain that merchandising in this community will be unprecedentedly vigorous this fall. Many merchants are known to have left orders for the preparation of big programs for selling, and it is notable that these programs do not involve special sales of bargains so much as special means of attracting attention to merchandise.

Merchants are swarming into Kansas City to buy merchandise, and it is obvious that about the same program of aggressive merchandising will be carried on throughout the territory in the fall. Motor car and truck dealers who adopt the "merchandise emphasis," who adorn their display windows, concoct original means of attracting attention, and get the spirit of pushing merchandise aggressively, on the assumption of a large purchasing power that minimizes price, will doubtless report later that trade has been wonderfully good this fall.

### Advisory Board Will Run Supreme Motors

WARREN, OHIO, Aug. 17—Creditors of the Supreme Motors Corp. have decided that the affairs of the company can best be conducted by the appointment of an advisory committee of creditors to act with the officers of the company. F. B. Whitlock, vice-president of the Interstate Foundry Co. of Cleveland, has been appointed chairman of this committee. An agreement has been formulated contingent on the stockholders raising at least \$125,000 to be disbursed under the direction of the advisory committee. Payment of all claims would be extended to Oct. 1, 1922, with acceptance by the creditors of 7 per cent notes for the amount due them.

## Coast Gas Cuts May Mean Labor Trouble

### California Expects Disturbances to Follow Coming Wage Reductions

LOS ANGELES, Aug. 16—The 2-cent a gallon cut in the retail price of gasoline in California may be followed by serious labor disturbances in the oil fields, according to predictions now being made. Gasoline now retails at 23 cents a gallon. The Standard and Union companies were the first to make the cut and independents naturally followed at once. It has been known for some time that these companies had an over-supply of the fuel on hand and were getting ready to enter into more severe competition against several organizations that have been shipping gas here from the Oklahoma and Texas fields.

It is being predicted that once again California will see a gasoline war. In the big producing fields there is much less activity than one year ago. When these producers were unable to keep up with the demand enormous supplies were brought in from eastern fields. Some companies have kept on importing and have built up a large trade. It is a self-evident fact that the California producers can market their product cheaper than it can be brought from eastern states if they see fit, and with an overstock on hand it is very likely they will take this opportunity to make it hard for the importers, according to views expressed by those in position to know.

Acting upon the claim of over-production and slackened demand, the cut in price of gasoline has been followed by an announcement that oil field workers will have to stand for a cut of \$1 per day in wages beginning Sept. 1. The workers will resist this cut bitterly, according to reports, and if they do it is not improbable that there will be some very interesting and serious developments.

## Statistics Given Hoover Show Increase in Rubber Tire Production

WASHINGTON, Aug. 15—The survey of current business for July issued by the Department of Commerce contains for the first time data on the production of rubber tires. This data was supplied by the Rubber Association of America. It takes November, 1920, as the basic month and shows a large increase each month since then except for December of last year, when there was a falling off in production. The table follows:

[Base Month in Bold Type.]

Pneumatic Tires.				Inner Tubes.			Solid Tires.			Raw Material Used.	
YEAR AND MONTH.	PRODUC-TION.	STOCKS.	SHIP-MENTS—DOMESTIC.	PRODUC-TION.	STOCKS.	SHIP-MENTS—DOMESTIC.	PRODUC-TION.	STOCKS.	SHIP-MENTS—DOMESTIC.	FABRICS.	CRUDE RUBBER.
	Number.	Number.	Number.	Number.	Number.	Number.	Number.	Number.	Number.	Pounds.	Pounds.
<b>1920.</b>											
November ..	<b>649,742</b>	<b>5,880,016</b>	<b>806,023</b>	<b>742,815</b>	<b>6,131,935</b>	<b>920,938</b>	<b>21,355</b>	<b>298,875</b>	<b>34,217</b>	<b>1,801,750</b>	<b>6,563,258</b>
December ..	506,111	5,508,380	1,327,153	508,446	5,786,929	1,481,285	16,297	303,473	40,828	1,649,772	4,259,746
<b>1921.</b>											
January ....	703,430	5,319,605	965,417	740,824	5,586,163	1,042,617	21,220	303,753	29,116	2,598,143	6,625,435
February ...	819,892	5,193,018	1,073,756	916,627	5,415,464	1,129,881	23,355	304,374	29,599	2,952,058	7,823,657
March .....	1,163,314	4,597,103	1,614,651	1,346,483	5,044,861	1,643,690	28,710	283,800	43,926	4,474,965	12,075,298
April .....	1,651,418	4,527,445	1,785,951	1,762,122	4,916,772	1,983,571	28,859	269,985	42,080	6,524,668	17,191,149
May .....	2,100,917	4,451,668	2,085,882	2,210,040	4,751,880	2,342,567	35,156	264,633	40,122	7,863,738	21,050,554

## Automotive Industry to Bear No New Tax

### Additional Imposts Not Included in House Bill—"Stigma Tax" Remains

WASHINGTON, Aug. 16—No additional taxes were proposed for the automobile industry in the tax bill as reported by the House Committee on Ways and Means. The Federal flat tax of \$10 per car and other modes of assessment on automobiles suggested by the Secretary of the Treasury were not mentioned in the committee bill. However, the committee failed to remove the discriminatory excise taxes which are known in the industry as "stigma" taxes.

An amendment to the excise taxes relating to accessories, merely changed the wording of the subdivision. The amendment would make subdivision 3 of Section 900 of the Revenue Act of 1918, read as follows:

"Tires, inner tubes, parts, or accessories for automobile trucks, automobile wagons, other automobiles, or motor cycles sold to any person other than a manufacturer or producer of any of the articles enumerated in subdivision (1) or (2) or in this subdivision, 5 per centum."

#### "Depressing Influences"

Chairman Fordney stated that the committee was of the opinion that "the exacting of the present excessive sums of taxes from the country contributes in no small degree to the depressing influences under which business and industry in general are staggering as an aftermath of the World War. The reduction of the tax burden is essential to business recovery and such reduction can only be based on a rigid enforcement of a policy of the strictest economy in the running expenses of the Government."

There is strong evidence that the House bill was drafted more for political expediency than for practical purposes. The belief exists that the yield contemplated in the House bill will fall far short of the revenue necessary to maintain the Federal Government. There is a feeling that the House bill will be revised in the Senate in order to provide sufficient funds.

The Republican conference changed the proposal of the House Committee on Ways and Means in order that the repeal of the excess profits tax and the reduction of the surtax and the 2½ per cent increase in corporation taxes should become effective January 1, 1922, instead of January, 1921. This change means that merchants will be obliged to pay taxes on the calendar year, a period which has been characterized by depression.

The House committee had originally proposed that if a corporation made a return for a fiscal year beginning 1920, and ending 1921, the war profits and excess profits tax for the portion of the year falling within the calendar year of

### TRAILER PLANT SET AFIRE; BLOODHOUNDS ON TRAIL OF FIREBUGS

MILWAUKEE, WIS., Aug. 16—Wisconsin State fire insurance and fire prevention authorities are of the opinion that an incendiary is working to wreck the plant of the Highway Trailer Co. at Edgerton, Wis. On the night of July 4 fire destroyed an assembling building and warehouse, 190 x 960 ft. in area, causing a loss of more than \$250,000. Investigation developed suspicions of incendiarism. A short while ago another mysterious fire occurred causing a loss of \$25,000. Blazes were found simultaneously in several parts of the building. Officials of the Highway company immediately summoned the State fire marshal and several inspectors and provided bloodhounds, but the trail was lost on a road leading out of the city of Edgerton.

1921, would be an amount equivalent to the same proportion of a tax for the entire period computed under the revenue act of 1918, the portion of such period falling within the calendar year 1920, as of the entire period. They had also intended to credit any payments on account of the tax or refund but this will not be necessary under the agreement reached among Republican leaders of the House.

Because of the depression in the automobile industry during the latter part of 1920, and the early months of this year, the question of taking credit or deduction for losses against net profits is of the utmost importance. The House bill proposes to revive the net loss allowance in modified form by providing that if for any taxable year beginning after Dec. 31, 1920, it appears upon the presentation of evidence satisfactory to the commissioner that any taxpayer has sustained a net loss, the amount thereof shall be deducted from the net income of the taxpayer for the succeeding taxable year; and if such net loss is in excess of the net income for such succeeding taxable year, the amount of such excess shall be allowed as a deduction in computing the net income for the next succeeding taxable year.

Under a special rule, the bill will be passed Saturday and forwarded to the Senate, but the recess of the Congress until late in September, will delay the final enactment until October, and the same is true of the tariff bill.

#### TRAYLOR TRUCKS CUT

CORNWELLS HEIGHTS, PA., Aug. 17—Lower prices for all models of its trucks have been put into effect by the Traylor Engineering & Mfg. Co. The prices follow:

Model	Old Price	New Price
B—1½ ton	\$2500	\$2390
C—2 ton	3000	2850
D—3 ton	3500	3300
E—4 ton	4700	4450
F—5 ton	5100	4700

## Hudson-Essex Makes Third Cut in Prices

### Changes Take Effect Immediately —Hudson Coupe Drops from \$3,125 to \$2,770

DETROIT, Aug. 17—The third reduction in price since the readjustment process began is announced by the Hudson Motor Car Co. The prices, which are effective immediately, follow:

Hudson:	New Price	Old Price
Touring car.....	\$1895	\$2250
Coupe .....	2770	3125
Sedan .....	2895	3250
Essex:		
Touring and roadster..	1375	1445
Coupe .....	1880	1950
Sedan .....	2230	2300

Prices of the other Hudson models are: Cabriolet, \$2,495; touring limousine, \$3,120, and limousine, \$3,495.

## Pierce-Arrow Reduces Passenger Car Prices

BUFFALO, Aug. 15—Following is the price schedule on Pierce-Arrow passenger cars, effective Sept. 1 as compared with the old prices:

	New Price	Old Price
Touring cars.....	\$6500	\$7500
Roadster .....	7000	8000
Coupe, 3 passenger.....	8000	(new)
Coupe-sedan, 4 passenger	8000	8500
Town brougham.....	8000	8500
Sedan, 4-door, 4 passenger	8250	(new)
French limousine.....	8250	(new)
Limousine, 7 passenger...	8250	8750
Landulet .....	8500	9000
Sedan, 6 passenger.....	8500	9000

## General Motors Cuts Prices on All Trucks

PONTIAC, MICH., Aug. 17—General Motors Truck Co. announces price reductions, effective Aug. 17, on all its models. The largest cut is on the one-ton. The prices follow:

	New Price	Old Price
Model K 16 1 ton.....	\$1495	\$1995
Model K 41 2 ton.....	3000	3250
Model K 71 3½ ton.....	4250	4500
Model K 101 5 ton.....	4650	5100

#### KOEHLER TRUCKS CUT

BLOOMFIELD, N. J., Aug. 17—Price reductions averaging about \$500 on its trucks and tractors have been announced by the H. J. Koehler Motors Corp. The prices follow:

	New Price	Old Price
Model D 1½ ton.....	\$1885	\$2285
Model M 2½ ton.....	2875	3365
Model MCS 2½ ton.....	2975	3450
Model F 3½ ton.....	3985	4450
Model MT 5 ton, road tractor .....	2975	3450

#### REDUCE KING CARS

DETROIT, Aug. 17—The King Motor Car Co. has made substantial reductions in its prices. The list follows:

	New Price	Old Price
4 and 6 passenger touring	\$2225	\$2725
Roadster .....	2140	2740
Coupe .....	3125	....
Sedan .....	3235	4035

## Ver Linden Answers General Motors Suit

**Amplifies Statement of Counsel,  
Claiming \$709,037 by Way  
of Recoupment**

DETROIT, Aug. 16.—The answer of Edward Ver Linden to the suit for recovery of \$490,000 brought by General Motors Corp. as filed in United States District Court here, consists of a complete rebuttal of the allegations of the corporation, and announces that he will claim the sum of \$709,037 by way of recoupment. The case will be moved for trial when court convenes, but is likely to be long delayed owing to the heavy calendar of cases preceding it.

In setting forth his claims, Ver Linden amplifies the statement made by his counsel, Thomas, Shields & Silsbee, following the first filing of the suit by General Motors. The terms of his contract made under the Durant régime on Aug. 1, 1918, are set forth in the answer, showing that he was to receive \$100,000 a year salary and a percentage on earnings in excess of \$2,000,000.

Outstanding features in the contract quoted are:

On earnings up to \$5,000,000, the general manager to receive 5 per cent.

Earnings from \$5,000,000 to \$10,000,000, the general manager to receive 3 per cent.

Earnings \$10,000,000 to \$20,000,000, the general manager to receive 1 per cent.

In case corporation's earnings exceed or fall short of 30 per cent on the total capital invested, exclusive of good will, 2 per cent is to be added or deducted for each 1 per cent of excess or deficiency.

The amount of net earnings as determined by the corporation and set forth in its books shall be final.

Among other deductions or allowances from gross earnings shall be all necessary or proper reserves for losses, bad debts, insurance and other contingencies, suitable amounts for depreciation, besides all taxes, State, Federal or local, including Federal income and capital stock taxes, but excluding Federal war profits taxes and excess profits taxes.

Net earnings of division to be modified by rate of net earnings of the corporation.

One-third of the percentage earned at the end of the first year to be paid one-third in corporation's bonus stock, and in succeeding years two-thirds to be paid in bonus stock.

The aim of this form of compensation was to effect a large and continuing investment in General Motors stock by general managers.

Stock forfeiture clauses in the event of discharge or voluntary leaving were waived, the answer declares.

Money declared retained by the company to pay for bonus stock is as follows: 1918, \$108,080; 1919, \$234,230. Claim is made to \$166,727.33 as due for 1920 on basis of contract. An interest demand of \$2,916 on balance of 1918 salary held for two years is also made. To this is added \$100,000 as salary due for 1921, as per contract, and \$100,000 is added for probable share of earnings in 1921. Leave is asked to plead for such money as represents percentage on profit of Olds for 1921, when such can be ascertained.

## July Shipments of Cars and Trucks 61 Per Cent of July 1920 and 7 Per Cent Less Than June 1921

NEW YORK, Aug. 16.—Reports made to the National Automobile Chamber of Commerce show that July shipments of cars and trucks by its members were 61 per cent of July, 1920, and 7 per cent less than for June of this year. Last year shipments were 4 per cent less than in June. Shipment figures by months thus far this year are:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
January .....	25,057	6,486	29,283	3,186	.....	93
February .....	25,505	9,986	43,719	7,597	.....	99
March .....	29,326	16,287	57,273	9,939	.....	75
April .....	17,147	20,187	64,634	14,197	.....	1,619
May .....	21,977	18,608	74,286	15,193	.....	2,381
June .....	22,516	20,269	60,746	18,834	8,350	3,947
July .....	23,082	19,470	52,342	15,320	8,702	3,725

## F. W. Warner Directs Durant Stock Sales

DETROIT, Aug. 17.—Fred W. Warner, former president and general manager of the Oakland Motor Car division of the General Motors Corp., has been placed in charge of the selling of stock for the Durant Motors Corp. of Michigan. Warner was the first of the General Motors executives to retire after the formation of Durant Motors, but he remained a director of the corporation, although it had been understood he intended to join Durant. He went with the Oakland company in 1914 as general sales manager from Chicago, where he had been manager of the Buick branch since 1911.

Warner is a native of Chicago. He began his business career with a retail hardware store in McPherson, Kan., where he remained until 1890, when he went with the John Deere Plow Co., Kansas City, as a salesman. When he left in 1904 he was sales manager. His next business venture was with a wholesale implement and vehicle house in Dallas, Tex., where he remained until he went with the Buick company.

## HOUSE REJECTS DYER BILL

WASHINGTON, Aug. 16.—Though the Senate passed the bill known as S. 2272 to amend the National Motor Vehicle Theft Act imposing a fine of \$5,000 or five years' imprisonment, the House failed to approve the so-called Dyer bill which proposes to amend the act by putting in the word "embezzlement" to prohibit interstate transportation of stolen vehicles. Congressman Garrett, Democrat, of Tennessee, has been the chief opponent of the measure and his objection defeated it in the House. Congressman Dyer, the author of the House bill, stated that automobile manufacturers, dealers and users were in favor of the legislation as it would fortify and make the automobile theft act stronger.

## SEAHOLM CHIEF ENGINEER

DETROIT, Aug. 17.—E. W. Seaholm has been appointed chief engineer of the Cadillac Motor Car Co., succeeding B. H. Anibal, who resigned to become chief engineer with the Collins Motor Car Co. Seaholm had been assistant chief engineer at Cadillac since 1913.

## Commission Proviso Out of Highway Bill

WASHINGTON, Aug. 17.—As the result of an eleventh hour change of front on the part of Senate leaders, the provision of the Townsend highway bill authorizing establishment of a Federal highway commission to direct highway construction and maintenance was defeated to-day.

It was this principle of control for which the automotive industry has consistently fought. The parliamentary movement proved a surprise to Senator Townsend as well as southern senators who had heretofore opposed any change in the distribution of Federal aid funds. It is stated that the majority leaders abolished the commission proviso because of the fact that reorganization of Government departments will be considered soon and the highway bureau would become a part of the Department of Public Works.

For a time it appeared that the "agricultural bloc" in the Senate had taken control of the highway bill but attacks of Senator Wadsworth and Senator Lodge indicated that it was a drive of eastern States against the Federal aid program as it passed the burden to States already owning improved roads.

Senator Lodge directed his attack on the amount of the appropriation and stated that in accordance with the economy program of the Administration, savings should be made at this time in highway expenditures as it was only fair. The Senate leaders want to keep Federal expenditures down to reduce taxes and as a consequence it is believed they will insist that the proposed appropriation of \$100,000,000 annually be cut in half. The bill will be passed this week with minor changes.

The commission plan was agreed to by unanimous vote of the Senate postoffice committee when it was reported out to the Senate as a compromise measure. It probably would have passed Tuesday night if Senator Pomerene of Ohio had not objected to a vote because he lacked knowledge of the bill's effects.

The Senate leaders decided on a thumbs down policy in the interim. It is understood that their action means transfer of the bureau of public roads from the agricultural department to the proposed department of public works.



## Receiver Named for Signal Truck

### Decree Issued for Dissolution of Maine Corporation—Assets Exceed Liabilities

PORTLAND, MAINE, Aug. 17—Federal Judge Hale has appointed Philip G. Clifford of this city receiver for the Signal Motor Truck Co., a Maine corporation, with its plant at Detroit. Judge Hale also issued a decree for the dissolution of the corporation. The action was taken on complaint of Milton B. Hoagland, vice-president and general manager. He began proceedings in accordance with a vote of the stockholders. While business depression resulted in the closing of the plant, it is asserted that the assets exceeded the liabilities.

The company was incorporated in 1916 with a capital stock of \$600,000 in common and \$200,000 preferred. There is outstanding \$348,000 in common and all the preferred. All the common stock was deposited in a five year voting trust expiring this year. The voting trustees are Hoagland, C. P. King and A. C. Burch. The company has a funded debt of \$190,000 in 7 per cent bonds and \$220,000 in 7 per cent gold notes. J. G. Heaslet is president and H. H. Emmons is secretary.

The company has manufactured five models of trucks ranging in capacity from one ton to five tons. The capacity of the Detroit plant is 1500 trucks a year.

## Colonel Colt, Rubber Chief, Dies of Stroke

PROVIDENCE, R. I., Aug. 13—Colonel Samuel T. Colt, chairman of the board of the United States Rubber Co., died to-day at his home in Bristol after a severe stroke of paralysis which he suffered a week ago. He was born in Paterson, N. J., in 1852. He was named after an uncle who invented the Colt revolver. His mother's family was one of the most prominent in Rhode Island in Colonial days.

Colonel Colt was graduated from the Massachusetts Institute of Technology at 21. He then entered Columbia law school and received a degree in 1876. He began practice in Rhode Island and soon became prominent in the politics of that state. In 1887 Colt founded the Industrial Trust Co. of Providence and while president of that company he entered the field of rubber manufacturing as a legal advisor and reorganizer.

The National Rubber Co. of Bristol was in bankruptcy when he took control and started the plant going again in 1888. Four years later the National company was merged with the United States Rubber Co., which had been formed by Joseph Bannigan. Colt took the presidency of the combination which he retained until 1918, when he became chairman of the board. He was a director of about 40 other corporations.

### MANUFACTURERS ORGANIZE "SAFETY CLUB" AT JACKSON, MICH.

JACKSON, MICH., Aug. 8—A safety club has been organized in this city with H. D. Fisher of the Hayes Wheel Co. as president. Practically all manufacturing companies of the city are included in the membership, which, in addition to planning safeguards in factory operation, will also look to decreasing street accidents. E. H. Ehrich of the Sparks Withington Co. is treasurer, the other officers including city officials and men representing other industrial interests.

## Seek Quick Action on Fisk Reorganization

NEW YORK, Aug. 15—Urgent notices are being sent to stockholders of the Fisk Rubber Co. calling their attention to the necessity for immediate action on the proposed reorganization and recapitalization plan. Another meeting will be held in the near future at which it is hoped definite action will be taken. Apathy on the part of stockholders was apparent at the meeting held last week at Chicopee Falls where the factory is located. The consent of 75 per cent of the preferred stockholders is necessary before they can consider the plan whereby the Fisk Co. would take over all the assets of the Federal Rubber Co. and the Ninigret Co.

It is understood that a banking syndicate headed by Dillon, Read & Co. is ready to underwrite a \$10,000,000 loan in the form of 20 year, first mortgage 8 per cent bonds.

## Willys Predicts Big Car Sales Next Year

TOLEDO, Aug. 17—Activity in the automobile industry will be greater in 1922 than ever known before, declares John N. Willys, president of the Willys-Overland Co., in a résumé of the condition of his company issued this week.

He points out that splendid crop prospects and relief for the railroads promises more in the way of prosperity for next year than we have had this.

"Many people who have been getting along with old cars will purchase new ones, while others who have never owned a car will be numbered among purchasers when the returning period of prosperity puts them in position to buy," declared Willys.

In analyzing the work of the company this year he points out that the production of motor cars for Willys-Overland for the second quarter of the year exceeded that of the first quarter by 150 per cent. Shipment of cars during the second quarter was two and one-half times what it was the first quarter.

He anticipates the usual slackened production for a few months, but is confident that 1922 will set new records.

## Stockholders Win in Standard Parts

### Judge Westenhaver Refuses Creditors' Plea for Sale of Assets —Orders Dividend Paid

CLEVELAND, Aug. 16—Stockholders of the Standard Parts Co., which has been in the hands of receivers nearly a year, won a victory to-day when Federal Judge D. C. Westenhaver ordered that the receivership be continued. Creditors of the company had petitioned the court for an order to sell the corporation's assets at once.

Under the creditors' plan they would buy in the plants, form a new company to operate them and the stockholders of the present corporation would be given the privilege of subscribing for a limited amount of stock in the new concern. The creditors would retain control.

The court also allowed the request of the receiver, Frank Scott, for permission to pay a 10 per cent dividend to creditors. Approximately \$1,000,000 will be paid out under this order. The company will have \$500,000 in the treasury after the dividend is paid.

Judge Westenhaver declared that the actual physical value of the Standard Parts Co. is between \$17,000,000 and \$19,000,000 as compared to the \$12,000,000 to \$13,000,000 value fixed by the creditors. Commenting on the earnings of the company, the court expressed the opinion that operating losses during the receivership were less than \$60,000.

He said he believed the plant was being operated economically and that to turn the properties over to the creditors would be inequitable. The court further said that probably none of the plants could be sold at this time, and that if opportunities developed in the meantime, the properties could be disposed of as efficiently through the receiver as under the creditors' control.

The company, under the receivership, has made money in recent months. August business is holding up better than the average August in the past, and the management expects even better business during the fall months.

### MERCER PLAN RATIFIED

NEW YORK, Aug. 16—Stockholders of the Mercer Motors Co. have ratified plans for the reorganization of the company as they were outlined two weeks ago. Theodore E. A. Barthel was elected vice-president and treasurer and George L. Catlin, assistant treasurer and secretary. W. A. Smith will be general sales manager. Reorganization of the company will be put into effect as soon as working capital becomes available through the new financing. The stock and bond issues proposed have been largely subscribed already, and it is not expected there will be any further hitch. Under the reorganization Mercer will be divorced entirely from Hare's Motors and will be operated as a separate entity.

## \$12,533,909 Profit for General Motors

Statement Shows Gain of \$10,-  
858,507 in 2d Quarter—  
Balance Sheet Filed

NEW YORK, Aug. 16—Net profits of the General Motors Corp. for the second quarter of 1921 were \$12,533,909 as compared with \$1,675,492 for the first quarter, indicating the remarkable increase in business which followed the first three months. Total profits for the first half were \$14,209,402, but this amount is cut to \$9,659,531 by a reduction of \$4,549,870 to take care of refunds given purchasers of automobiles under guarantees against price declines. The amount reserved for this refund shows the effect on sales of lower prices.

The statement of earnings and a consolidated balance sheet, filed with the New York Stock Exchange, was accompanied by a letter from Pierre S. du Pont, president of the corporation, in which he told of the progress made in reduction of inventories and current liabilities.

Inventories, which amounted to \$222,098,805 in October, have been reduced to \$147,502,086. Of this reduction, however, \$25,776,112 was accomplished by the writing down of inventories.

### President du Pont's Letter

During the same period of depression accounts payable, which had reached \$40,736,127, have been reduced to \$19,852,581, and notes payable from \$87,596,076 to \$68,808,250. In his letter, President du Pont says:

"The readjustment of financial affairs has been coupled with like improvement in the manufacturing part of the business. All factories have improved the quality and design of cars, so that the General Motors line is quite abreast with or in advance of the best construction practices of the day. The company is unique in its ownership of factories for the making of parts and accessories necessary for quality production at lowest price. Each part may be fitted exactly in workmanship, thus giving to General Motors cars a distinct advantage not enjoyed by cars built up of parts assembled from numerous uncontrolled factories.

"General Motors Corp. maintains a research laboratory that is without equal in the motor world. Here every part and assembly of parts is subjected to most rigid test and criticism, so that General Motors products, even when newly introduced, have been subject to practical proof. In this laboratory many new devices are being tested and much experimental work is being done toward maintenance of General Motors quality."

The consolidated balance sheet shows current and working assets of \$234,179,805, including \$49,363,653 in cash, \$5,547,867 in sight drafts against bills of lading, \$9,133,387 in notes receivable, \$21,042,606 in accounts receivable and trade acceptances and \$147,502,086 in inventories.

Current liabilities amount to \$110,060,804, including \$19,852,581 in accounts payable and trade acceptances, \$68,808,250 in notes payable and \$20,381,334 in taxes, payrolls and sundries accrued but not due.

## General Motors' Remarkable Gain

The income and surplus account for the six months ended June 30, follows:

	First Quarter	Second Quarter	Total Six Months
Net earnings.....	\$3,707,944.49	\$14,551,516.41	\$18,259,460.90
Less: Provision for Employees' Investment Fund .....	510,605.00	580,455.00	1,091,060.00
Interest on notes and trade acceptances.....	1,501,215.60	1,426,109.62	2,927,825.22
Employees' Housing Development.....	2,500.00	300.00	2,200.00
	\$2,014,320.60	\$2,006,264.62	\$4,020,585.22
	\$1,693,623.89	\$12,545,251.79	\$14,238,875.68
Less: Provision for Federal taxes and extraordinary expenditures.....	18,131.26	11,341.89	29,473.15
Balance equals Net Profits before deducting refunds made to customers under agreement of October, 1920, which agreement guaranteed customers against price reductions before July 1, 1921.....	\$1,675,492.63	\$12,533,909.90	\$14,209,402.53
Deduct total liability incurred under aforesaid agreement on account of 1921 sales due to price reductions made previous to July 1, 1921...			\$4,549,870.99
Balance .....			\$9,659,531.54
General Motors proportion thereof.....			\$9,605,675.60
Surplus, December 31, 1920.....			121,273,217.00
			\$130,878,892.60
Less: Preferred and Debenture stock dividends—6 mos.....			3,137,125.43
Common stock dividends—6 mos.....			10,230,975.25
			\$13,368,100.68
Surplus, June 30, 1921.....			\$117,510,791.92

## Britain Expects Trade with Russia again Soon

LONDON, July 30 (By Mail)—There is now definite evidence that general trading with Russia will again become possible in the near future. The great stumbling block has been the reluctance of the Soviet authorities to recognize the financial obligations contracted by Russia under the old regime. It is now reported on official authority that a conference will be held soon to determine the amount of the debt and that when this has been done a plan will be promulgated under which Russia will undertake to resume payments in 1925.

In the meantime business has been developing for the last year or two in the countries which broke away from the former Russian empire and now form the independent states of Finland, Estonia, Latvia, Lithuania and Poland. These states form the threshold of Russia and when Russia begins trading these border states will assume the function of the middleman.

### KENWORTHY FILES PAPERS

INDIANAPOLIS, Aug. 18—A schedule of assets and liabilities was filed in the Federal Court to-day by the bankrupt Kenworthy Motors Corp., of Mishawaka, showing assets amounting to \$124,433.38, and liabilities amounting to \$174,859.49. The concern recently admitted bankruptcy in answer to a creditors' petition, filed against it July 11 by the Auto Cape Top Co., the Western Brass Manufacturing Works of Chicago, and the Cleveland Pneumatic Tool Co. The Kenworthy corporation lists its excise tax due on automobile sales at \$6,980.77 and open accounts at \$119,652.14. Of the assets \$40,000 is in real estate and \$65,683.28 is in stock in trade.

## Registrations Drop in Southern California

LOS ANGELES, Aug. 17—July showed a loss over June of almost 1000 in the number of new car registrations in Southern California. The total for the month was 4290, while June reported 5223, according to figures that have just been made public. As an indication of conditions in the outlying territory, 3078 of the new cars registered were from Los Angeles County. There are 10 counties in what is known as Southern California. The number of trucks and commercial cars registered during the month was 405. The totals to Aug. 1 for the year are 24,788 passenger cars and 3251 vehicles.

### CANADIAN GARY FORMED

DETROIT, Aug. 17—The Canadian Gary Co. has been organized at Fort William, Ontario, to assemble and distribute Gary trucks in Canada and all British possessions. The company will take over the plant of the Canadian Steel Co. and expects to be in operation by Oct. 1. Officers of the company are: President, M. J. Neville; vice-president and general manager, C. Tremblay; secretary and treasurer, J. P. Kenney. The company is capitalized at \$500,000 and hopes to ship enough trucks before navigation closes on the lakes to keep the plant in operation all winter.

### ELGIN, ILL., GETS TRUCK FIRM

ELGIN, ILL., Aug. 16—The Elgin Association of Commerce has accepted a proposition from the Duty Motors Corp., Greenville, Ill., manufacturer of motor trucks, to remove its plant to the former city. A site has been donated to the corporation and suitable buildings will be erected this fall.

## METAL MARKETS

THE time appears to have arrived when the steel market is deserving of greater confidence on the part of buyers and this in their own interest. There are at this time in sight only two possible avenues leading to further downward revision of prices of more than fractional character. One of these is a reduction of freight rates which will come eventually but no one ventures to say when. The other road to a further cut in steel prices, lies along the path of a sufficiently enlarged demand to warrant the assumption on the part of producers that another reduction in prices will bring out a sufficiently large quota of orders to more than make up for such a concession to buyers by the thus augmented rate of mill operations and the corresponding reduction in the overhead per ton of steel produced. Present prices for most descriptions of steel are scraping bottom, especially if prevailing costs are taken into consideration. What relatively slight price movement is in evidence just now is largely a matter of a more rational readjustment of quotations for certain classes of semi-finished and finished steel on the basis of the recently established levels for the raw steel from which they are made. Not only are conversion costs always more or less debatable, depending upon individual plant equipment and management, but, in the present circumstances, there is also quite a range between minimum and maximum wage scales and, in addition, some sheet mills are rolling \$30 sheet bars, others \$35 bars and still others are striving to reduce their losses on \$40 stock as much as possible. Some of the more farsighted captains of the steel industry aver that the time has come to forget costs of high priced material and to proceed even now on the basis of the enlarged demand and lessened overhead costs expected to result from a sagacious price policy as the most efficient means toward bringing about such a condition. In the case of smaller mills with only moderate resources it is natural, however, that they are loath to operate unless an immediate return is in sight. While there is virtually no danger at this time of a prolonged reaction in the steel market's trend, it will be well for the steel buyer to bear in mind that if present endeavors on the part of steel mills to broaden the demand and thus increase operations this fall should prove abortive, a short-lived price rally is not beyond the range of possibility. Such a recoil is now being witnessed in the pig iron market.

**Pig Iron.**—A much firmer tone pervades the pig iron market. Two steel mills operating blast furnaces and being periodical sellers of pig have declared \$20 to be the minimum price at which they will sell No. 2 foundry and, as a result, concessions by merchant furnaces have disappeared. The resale market is also much less attractive to bargain hunters.

**Steel.**—Intensive competition prevails for what automotive sheet orders are hanging over the market. No really large tonnages are being contracted for, even those passenger car builders whose schedules call for relatively heavy tonnages of sheets splitting their orders up into small "trial orders." These are placed with the understanding that if material and deliveries are satisfactory additional orders will be forthcoming. At that, a few sheet mills claim to have a comfortable amount of automotive

sheet business for September shipment on their books.

**Aluminum.**—New Orleans advices state that the Aluminum Line of steamships operated by the American Bauxite Co. will cease on November 1 to bring bauxite from Dutch and British Guiana and that the sole American aluminum producer's bauxite requirements will be met from the Arkansas mines until after a tariff preventing the "dumping" of German aluminum products has been enacted. The market for aluminum ingots, alloys and sheets continues flat. American warehouse stocks of foreign aluminum are estimated at 15,000 to 20,000 tons.

**Copper.**—Although sentiment is slightly improved, the avalanche of supplies precludes anything like genuine recovery at this time.

**Tin.**—Speculative ups and downs feature this metal which continues attractive in price to consumers.

**Lead.**—Automotive battery makers are buying in routine tonnages. The market is fairly steady.

## INDUSTRIAL NOTES

**Modern Die & Tool Co.**, manufacturers of motor bearings, Indianapolis, reports business better than normal, and the plant of the company operating at the limit of its capacity, with production at the highest mark in the sixteen years the company has been in business. "We are booked into the future and are running at full capacity. In our particular line business never was better than it is right now."

**Biflex Products Co.**, Waukegan, Ill., manufacturers of the Biflex spring bumper, has announced its removal into a new and larger factory. It has twice the capacity of the former plant.

Portage Tire Asks for  
Federal Protection

**AKRON, OHIO, Aug. 17**—With the adjudication of the Portage Tire & Rubber Co. of Barberton as bankrupt by Judge D. C. Westenhaver of the United States District Court at Cleveland, officials of the bankrupt company have filed a bill asking protection guaranteed bankrupt companies by Federal insolvency statutes.

The Portage Rubber Co., parent company to the Portage Tire & Rubber Co., also has been thrown into bankruptcy, but creditors have not as yet selected a trustee. George D. Bates has been named temporary receiver of the Portage Tire & Rubber Co., which lists assets at \$1,795,262.39 and liabilities at \$1,031,286.24. These proceedings have halted the receivership of the Portage Rubber Co., which last week was placed in the hands of W. T. Akers as receiver.

According to M. S. Long of Akron, president of both companies, attempts were made last fall to refinance the Portage Rubber Co. and negotiations were proceeding satisfactorily when receivership was petitioned for and obtained by the Adamson Machine Co., the Wellman-Seaver-Morgan Co. and the Factory Oil Co. The claims of these three creditors aggregated about \$47,000.

## FINANCIAL NOTES

**International Motor Truck Corp.** reports for the three months ended June 30 last net profits of \$523,639, compared with a net of \$4,396 during the March quarters, when operations were recovering from the depression of December and January. The balance sheet as of June 30 shows cash of \$3,464,743, against \$3,125,694; accounts and notes receivable \$5,000,519, against \$3,472,348 on Dec. 31, 1920; inventories \$12,013,262, against \$15,599,848. Accounts payable are \$1,005,258. On Dec. 31, 1920, they were \$1,663,843. Surplus is \$10,406,546, against \$10,379,393.

**Denby Motor Truck Co.** proposes to increase its capital stock from \$750,000 to \$1,400,000 by the issue of 65,000 shares of 8 per cent non-accumulative first preferred stock at \$10 per share. A special meeting of the stockholders has been called for Aug. 26 to pass upon the matter, as well as upon \$300,000 first mortgage five-year 7 per cent bonds, \$100,000 Class A and \$200,000 Class B.

**Durant Corp.**, which is handling the distribution of the capital stock of the Durant Motors, Inc., has increased the price of the stock to \$24 a share. The company quickly disposed of the original allotment of 500,000 shares at \$12. But as the demand increased the price was gradually raised to \$18, then to \$20, \$21, \$22, and now to \$24. The stock is selling for \$27 on the New York curb market.

**Stewart-Warner Speedometer Corp.** for the three months ended June 30 reports operating profits before Federal taxes of \$601,945, compared with \$740,843 in the corresponding months of 1920. For the first six months of 1921 profits amounted to \$652,892, against \$1,470,147 in 1920. For the first half of this year the company charged \$440,000 to surplus for inventory readjustment.

**Federal Corp.** of Westfield, Mass., has filed a voluntary petition in bankruptcy in the United States Court at Boston after a vote of stockholders. Liabilities are \$282,908 and assets \$62,544. The concern manufactured automobile accessories.

**Maxwell-Chalmers Co.'s** committee on reorganization has sent a letter to stockholders of the Chalmers Motor Co. who have not deposited their securities which offers them another opportunity to do so without penalty prior to Sept. 15.

**McCord Mfg. Co.** has paid off 10 per cent of its \$4,500,000 bank and merchandise indebtedness, totaling, with interest, approximately \$600,000. The remaining 90 per cent will be extended to Feb. 11.

**Stevenson Gear Co.**, Detroit, has offered \$500,000 preferred and \$50,000 common stock in units of 2 shares each for \$25. It is a \$10,000,000 corporation.

Olds Plans 12,000 Output  
of 1-Ton Economy Truck

**LANSING, MICH., Aug. 18**—Olds Motor Works has outlined a production of 12,000 annually of its new 1-ton Economy truck. Increased sales possibilities have been opened by the remodeling of the truck to 1-ton capacity, officials declare, and business is on the upward trend. Car sales are moving at the rate of 70 to 80 daily, holding to the June and July production figures, while only optimism reigns concerning prospects for the future.

## MEN OF THE INDUSTRY

Norval A. Hawkins, sales director of the General Motors Corp., and previously sales manager of the Ford Motor Co., has been elected a director of the new Northwestern Casualty & Surety Co., of Milwaukee, organized with \$1,000,000 capital and \$750,000 surplus to write accident, health, workmen's compensation, liability, automobile, fidelity, plate glass, surety, steam boiler, burglary and theft, and casualty insurance, including property damage. It will begin business about Oct. 1 and for the present will specialize in Middle West and Northwestern territory.

W. E. McCarthy, formerly sales manager of the Owen Tire & Rubber Co., has joined The Dayton Rubber Mfg. Co.'s sales organization in the capacity of branch manager at Los Angeles, California. Since McCarthy has taken over the branch, the sales force has been increased materially. C. F. Faro, formerly Dayton branch manager, will direct the activities of the Kansas City and Denver branches. H. K. Simmons, formerly New York branch manager, will direct the activities of the Boston, Brooklyn and Philadelphia branches.

Lon R. Smith, vice president, directing sales and advertising manager of the Midwest Engine Co., Indianapolis, has left on his annual business trip to California. Although going to the Coast primarily to get in personal touch with the Utilitor dealer organization and to make an extensive investigation of markets, Smith also is making the trip in the interests of the Midwest heavy duty truck and tractor engine, at the request of truck and tractor manufacturers located on the western coast.

Harry A. Grubb has been appointed assistant sales manager of the Star Rubber Co., Akron, O. Grubb has long been associated in the tire industry with A. G. Partridge, newly elected vice president and sales manager of the company. Grubb's previous position was vice president and general manager of the Oldfield Tire Co., and prior to that he occupied various sales positions in the Firestone organization.

Capt. Eddie Rickenbacker has returned to Oakland to close up his affairs with the Sheridan Motor Co. of California and then return to Detroit, where he will make his headquarters. Rickenbacker is disposing of his interests in the Sheridan coast organization to R. C. Durant, son of W. C. Durant, who, with C. M. Steves, has been associated with Rickenbacker in the Sheridan enterprise since last fall.

E. A. Haertlein has been appointed sales manager of the Gemco Mfg. Co., Milwaukee, manufacturer of automotive equipment and garage fixtures. He succeeds George H. Treviranus, who resigned to become associated with a new concern now in process of organization in Milwaukee to engage in the manufacture of rowboat motors and other small internal combustion engines.

Wm. H. Herbert has been appointed general sales manager of the Denby Motor Truck Co., succeeding L. B. Graham, resigned. Herbert is one of the oldest members of the Denby organization, having filled such posts as special field representative, assistant sales manager, and more recently as manager of the company's Detroit branch.

Fred E. Castle, of the Fred E. Castle Co., Detroit, announces the termination, by agreement, of his contract with the Hayes Wheel Co., of Jackson, Mich. Castle is known to

the industry as one of the veteran sales representatives in the motor car equipment and accessory field. He has not made known his plans.

Guy W. Vaughn, who has resigned as general manager of the Van Blerck Motor Co., Monroe, Mich., will be the new vice-president and general manager of the Standard Steel & Bearings Co. of Philadelphia. He will remain as vice-president and a director of the Van Blerck company.

George Stowe, former manager of the New York branch of the Mitchell Motors Co., has been appointed general manager of the Reo Motor Car Co. of New York to succeed James J. Hunt. Stowe was New York manager for the Chalmers Motor Car Co. before going with Mitchell.

C. A. Brownell, former advertising manager for the Ford Motor Co. has returned from a long vacation in California and has assumed his position as vice president in charge of sales, distribution and advertising of the Wildman Rubber Co., Bay City, Mich.

C. P. Flisen of Racine, Wis., has resigned as district manager of the Burroughs Adding Machine Co., to accept the position of district manager of retail sales in Racine and Kenosha counties for the Mitchell Motors Co. of Racine.

Dr. Joseph W. Roe, secretary of the Railway Car Manufacturers Association and executive engineer of the Pierce-Arrow Motor Car Co. of Buffalo, has been appointed professor of industrial engineering of New York University.

J. E. Roberts has resigned as general sales manager of the Cole Motor Car Co. of Indianapolis to become effective October 1. He has not made known his plans.

Mason Tire and Rubber  
Working 24 Hours a Day

AKRON, OHIO, Aug. 17—The Mason Tire & Rubber Co. of Kent, near Akron, has increased its production from 1800 to 2000 tires daily and is now operating on a basis of 24 hours a day. In units, Mason sales are running four to one over the same month of last year, while the month of July showed an increase of 50 per cent over July of last year.

"Production of solid truck tires is heavy and increasing steadily, and owing to the fact that even now consumers and dealers are buying only current requirements, we look for business to hold up steadily throughout August and September and possibly October, which is a distinct reversal of sales conditions of recent years, when the peak has been reached in the spring rather than in the fall," said a company official.

## INSOLVENCY IS ALLEGED

INDIANAPOLIS, Aug. 16—A petition has been filed at Sullivan, Ind., for the appointment of a receiver for the Mutual Truck Co., with a plant in that city. The petitioners are the Electric Steel Co. of Indianapolis and Sherman & Pomeroy, Inc., advertising agents in Chicago. It is alleged that the company is insolvent and that it owes \$85,000. The capital stock of the corporation is \$500,000 and nearly all the stock is owned by residents of Sullivan County.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Aug. 16—As a result of unfavorable weather during July, there has been a material reduction in the estimates of the crop yield published by the Government as of August 1. The wheat crop, both winter and spring, estimated at 757,000,000 bushels, which is now practically harvested, shows a decrease of 52,000,000 bushels from the July 1 estimate, and of 73,000,000 bushels from the last five year average. The estimate of 1,137,000,000 bushels of oats is slightly higher than the July 1 estimate, but 296,000,000 bushels below the five year average.

The yield of corn on August 1 is estimated as 3,032,000,000 bushels against the July 1 estimate of 3,123,000,000 bushels, which may be compared with the five year average of 2,798,000,000. The decreases in the estimates for other grains are in proportion to that of wheat and corn. The decrease in the estimate for potatoes, however, is very large, 316,000,000 bushels on August 1, against 377,000,000 on July 1, but this estimated yield is considerably above the five year average of 271,000,000 bushels. These estimates, as a rule, are much lower than the yields of recent years since war demands stimulated agricultural activity.

Liquidation continues in our financial position at a rapid pace. The report of the Federal Reserve System for August 10 shows a decrease of \$90,000,000 in bills discounted (loans), while bills bought in the open market increased \$15,000,000, making the total bills on hand \$1,570,000,000. Discounted bills held by the Boston, New York and Cleveland banks include \$53,000,000 of bills discounted for the Richmond, Atlanta, Minneapolis and Dallas banks, compared with \$57,000,000 in the previous week.

A decline of \$18,000,000 took place in the deposits of the member banks' reserve account, and \$21,000,000 in Government deposits, which brought total deposits down to \$1,662,000,000. Note circulation declined \$16,000,000 to \$2,520,000,000. Gold holdings increased \$23,000,000, but other reserves declined \$6,000,000, total reserves being \$2,720,000,000. As a consequence of these changes, the ratio of total reserves to deposit and Federal Reserve note liabilities combined increased from 63.7 per cent on August 3 to 65 per cent on August 10, and the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, increased from 83.1 per cent to 84.9 per cent. Since Jan. 1 of the present year, the Federal Reserve Banks have gained a total of \$513,000,000 in gold and lost about \$46,000,000 in other cash reserves.

All classes of money hardened last week, which preceded large Government mid-month financial operations. Call money remained stationary at 6 per cent through the week, with very little activity in the market.

# Calendar

## SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28-Oct. 8—New York, Electrical Exposition, 71st Regt. Army, Electric Equipment, Machinery and Vehicles.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville

Automobile Dealers Association.

Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment. La Pabellon de las Rosas. Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery. Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 5, 1921—Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

Sept. 14-15-16—Detroit, Credit Convention Motor and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## RACES

Labor Day—Uniontown, Pa., Autumn Classic.

## Aircraft Industry Is Sound, Declares Chief

NEW YORK, Aug. 17—J. K. Robinson, Jr., president of the Manufacturers Aircraft Association, Inc., reporting on the condition of the aircraft industry, stated to-day:

"The readjustment of the aircraft industry to a substantial basis, from which it can begin to build a solid and profitable commercial business, has been practically accomplished. The achievement is regarded as unique and should provide considerable encouragement to long established lines in other fields of transportation which have been suffering from temporary depression.

"This year, which has seemingly been marked by industrial depression generally, has witnessed an upturn in the aircraft industry. The 15 or 20 manufacturing plants have been readjusted to a sound operating basis. Experimental engineering has greatly improved the usefulness and safety of aircraft. The thousand or 1200 airplane operators have definite assurance in the President's message, that, before many weeks, an aerial code will be passed, thus giving the entire art a legal status.

"With this constructive legislation actually in sight, the aircraft industry is making renewed efforts to exploit commercial aviation and there is gratifying indication that the public is ready to accept aircraft as an expeditious means of transport supplementing the railway, steamship and motor car, and that forestry, agriculture, mining, banking, photography, surveying, fishing, advertising, etc., will pay liberally for the improved and unique service which the commercial airplane offers."

## Permanent Receiver for O'Bannon Corp.

NEW YORK, Aug. 16—Richard Le Baron Bowen, vice-president and general manager of the O'Bannon Corp., who has been acting as temporary receiver

of the company, has been appointed permanent receiver. The company manufactures artificial leather and rubber fabrics for automobile tops at West Barrington, R. I. It has outstanding \$1,000,000 in common stock and \$494,000 in preferred. It has no funded debt and its present difficulties are due to the general business depression. Dividends on both classes of stock were paid up until last year. The plant and equipment are valued at \$938,749 and trade-marks and patents at \$700,000. The balance sheet as of Dec. 31, 1919, showed total assets of \$5,348,905. T. M. Reynolds of Boston is president of the company. E. V. R. Thayer, New York banker, is one of the directors.

## Willys Subsidiary Changes Directors

NIAGARA FALLS, N. Y., Aug. 17—Four changes in the directorate of the United States Light & Heat Corp., a Willys subsidiary, were made at the annual meeting. The new directors elected were H. I. Shepherd and W. B. Stratton of New York, D. H. Kelly and R. H. VanNest of Niagara Falls. They took the places of J. R. Harbeck, J. A. Roberts, J. A. Smith and C. L. Lane. Lane was a vice-president and general manager. The directors elected Kelly a vice-president and Shepherd was made treasurer in place of H. H. Knapp. John N. Willys continues as chairman of the board. Confidence in the future was expressed in the report submitted by President C. O. Miniger. The financial statement soon will be distributed to stockholders.

## KALAMAZOO SEDAN TO GO ON

KALAMAZOO, MICH., Aug. 16—The stockholders of the Kalamazoo Sedan Co. have voted to continue the business. Sufficient funds will be available to pay all obligations and give sufficient working capital for immediate needs. The plant has been idle for the past four months.

## \$1,500,000 in Notes to Pay Seiberling Debts

AKRON, OHIO, Aug. 17—Under the terms of a \$1,500,000 mortgage recorded here and executed and delivered by the Prudential Securities & Realty Co. to the Union Trust Co. of Cleveland, 1500 \$1,000 notes maturing July 31, 1923, will be issued to liquidate the debts of F. A. Seiberling, founder and former president of the Goodyear Tire & Rubber Co. The Prudential Securities & Realty Co., recently was organized with George Steele of Cleveland as president, and A. W. Cannon of Cleveland as secretary, to act as trustee of the assets and liabilities of Seiberling.

The mortgage negotiated covers Seiberling's real estate, his personal property and his various corporate holdings. The mortgage lists 32 parcels of real estate in Summit County and several in Florida and Michigan, 125,701 shares of Goodyear common stock and 520 shares of Goodyear preferred stock, 9998 shares of stock in the Ladysmith Smelting Corp. of Seattle, Wash.; 3214 shares of stock in the Wellman-Seaver-Morgan Co. of Akron; 1696 shares of stock in the Whitman & Barnes Co. of this city and 1270 shares of stock in the Ohio Savings & Trust Co. The mortgage also lists 2,010,000 lbs. of raw rubber stored in warehouses and said to be pledged to secure the indebtedness of the Newcastle Rubber Co. now reorganized and known as the Lehigh Tire & Rubber Co.

Liabilities of Seiberling's estate are listed at \$6,000,000. According to the agreement between Seiberling and his creditors, the creditors have agreed to extend time of payment on their claims for two years.

## FORD PLANT IN FRANCE BURNS

DETROIT, Aug. 17—A message received by the Ford Motor Co. states that its plant at Issy-les-Moulineaux, a suburb of Paris, has been virtually destroyed by fire with a loss estimated at between 6,000,000 and 7,000,000 francs.



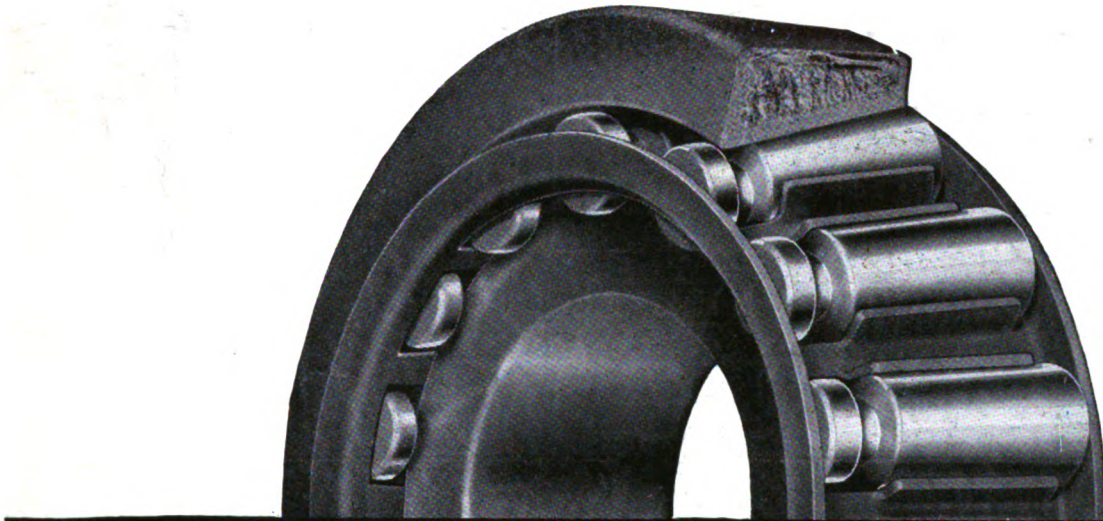
# AUTOMOTIVE INDUSTRIES

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અમેરીકામાં જ નહીં પણ  
દુનિયાનાં સર્વે નાગોમાં જ્યાં  
અમેરીકન અને લેલાએની  
મોતોકારો અને મોતોરજૂકો  
તથા ટ્રેક્ટરો વગર એ  
ત્યાં તીમકન તેપરડ રોલરબેરિંગ્સ  
થા ધડગો ફાયદો થાય છે.

Not only in the United States  
But in every country where  
Well built American and European  
automobiles  
—and motor trucks  
—and tractors operate  
Timken Tapered Roller Bearings  
In an ever ascending majority  
Are consistently conserving power

The original Parsi, and the American translation, of a Timken Bearing  
advertisement appearing in *Jam-e Jamshed* of Bombay

THE TIMKEN ROLLER BEARING CO, CANTON, OHIO

Timken Tapered Roller Bearings for Passenger Cars, Trucks, Tractors,  
Trailers, Farm Implements, Machinery, and Industrial Appliances

# TIMKEN

## Tapered

# ROLLER BEARINGS





# CONCENTRATION IN BUYING MEANS

## *Standardization of Product*

Every executive in the automotive industry knows that "standardization of product" is the big essential today.

Motors have been standardized; axles have been standardized; so have transmissions, radiators wheels, even bodies are built to a certain standard.

But automobile body hardware never has, up to the present. It has been necessary to go here for window regulators, there for door hinges, somewhere else for windshields, and so on, constantly changing, constantly substituting and redesigning.

Now, however, it is entirely different. Ternstedt, with its new and immensely greater facilities, is in position to supply hardware equipment *complete* for all automobile body work, permitting the body builder to maintain a *uniform* standard of quality in each and every body built.

Window Regulators, Curtain Rollers, Sunshades, Door Panels, Door Bumpers, Anti-Rattlers, Windshield Wipers, Windshields, Window Sash, Strap Hinges, Concealed Hinges, Piano Hinges, Rear Deck Locks, Rear Deck Hinges, Rear Deck Lid Braces, Screw Machine Products, Channel and Shapes, Die-Castings, Open and Closed Body Door Locks, Other Miscellaneous Automobile Hardware. All Kinds of Stampings.

From the comprehensive Ternstedt line it is a simple matter to choose the *complete* assortment of hardware required for any type of body. In fact, Ternstedt engineers have carefully arranged a series of hardware groups to exactly conform with bodies for either the low, medium or higher priced cars. This service is purely for your convenience and may be entirely disregarded when making a selection, if desired.

Ternstedt Hardware is found as *exclusive* equipment in a large number of the foremost motor cars. Its worth is definitely established and needs no further mention here.

Consider carefully this idea of concentrating your entire body hardware purchases in Ternstedt. Buying *standardized* hardware will save you time, trouble, annoyance and money. Fundamentally right, the idea is good, sound business sense.

TERNSTEDT MANUFACTURING COMPANY—DETROIT

LARGEST BUILDERS OF AUTOMOBILE BODY HARDWARE IN THE WORLD

# TERNSTEDT

## *Automobile Body Hardware*

... BUILT • BETTER • FOR • BETTER BODIES ...

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, AUGUST 25, 1921

No. 8

## Practical Data Gathered for Use in Selling Cars

N. A. C. C. survey gives facts of special value. Car buyers are chiefly influenced by practical performance features. Here is presented a critical analysis of results and their bearing on present practice.

By Norman G. Shidle

**T**HE need for more facts in connection with car merchandising is gaining recognition throughout the industry. In several instances, individual manufacturers are spending large sums of money and are making extensive efforts to obtain such facts and to correlate and interpret them correctly. The task of analyzing markets and of determining with some degree of accuracy how to sell to them is really only in its primary stages so far as automobile merchandising is concerned.

The interest taken by manufacturers, however, in every recent attempt to analyze the selling situation and to accumulate real merchandising facts indicates that definite progress is to be expected. Perhaps the most important recent effort along this line is the attempt of the N. A. C. C. to learn from car owners what factors influence the owner most in buying a car. More than two thousand replies were received from all parts of the country in answer to a questionnaire which asked the owner to indicate his preferences "in selecting an automobile, in order that the manufacturers may be guided by the advice of the consumer in building and marketing cars."

The general scope of the questionnaire is familiar to manufacturers. It covered the following points:

Appearance  
Appointments  
Comfort  
Economy  
Endorsements  
Endurance

Flexibility  
Hill Climbing  
Price  
Service  
Specifications  
Speed

The owners were also asked to indicate whether or not they were interested in slogans and whether or not their choice was influenced by emphasis upon some special feature, such as axles, engines, etc.

The digested replies give some interesting data upon which to base advertising and merchandising plans. In utilizing the replies for this purpose, however, the scope of the inquiry, its advantages and defects, and its limitations must be carefully considered. The usefulness of the results is unquestioned, however, provided they are used with a proper evaluation of the various factors involved.

The chart shown in Fig. 1, which was prepared by the N. A. C. C., indicates the importance given to the various factors by owners of cars in three price classes. Taking all the replies together it appears that automobile buyers, as typified by those replying to the questionnaire, are more interested in the endurance qualities of the car than in any other

characteristic. Economy of upkeep comes second, while the item of price takes third place.

Then follow in order comfort, appearance, service, hill climbing, flexibility, endorsements, specifications, speed and appointments.

Only a few aspects of this general analysis, however, are of much importance from a merchandising standpoint. Selling a middle priced car involves different methods and different variables than selling a high-priced car or a Ford.

But the great significance of endurance is attested by the fact that each of the three class of owners, as well as all the owners together rate it as the most important in influencing their choice of a car. The majority of men having money to invest in an automobile, whether the sum be \$415 or \$15,000, are chiefly interested in how long the car is going to last. At nearly every other point there is some divergence of opinion in each of the price classes.

This would indicate that greater selling emphasis should be placed upon endurance qualities than upon any others. The value of such studies as this is indicated by the apparent failure of car merchandisers to properly evaluate the various selling points in the past. A casual survey of some forty different passenger car advertisements, for instance, shows that in only one case was endurance the predominant theme, while it appeared as a subordinate point only two or three times.

This example in itself is an excellent indication of the need for some accurate data upon which to evaluate selling points; some standards by which to judge the selling appeal. Such data is not at present available except to a very limited extent. Every intelligent effort to compile such information is a step in the right direction. Exceptional results cannot be expected in a short time, because the accumulation of material of this kind involves the analysis of many human and psychological factors which cannot be readily determined and estimated. Considerable study and experimentation will be necessary before anything like accurate results can be obtained.

But definite, though limited, progress can be expected and can be made in each instance. The N. A. C. C. survey under discussion can be made immediately useful in a merchandising way. To do this, however, the limitations of the survey must be considered and its real scope defined. Then it will be possible to discuss specifically the relation of the results of this survey to past practices and to future methods.

The questionnaire was sent to 20,000 persons picked in blocks from automobile registration lists in every State in the Union. Replies were received from about 10 per cent of this number. The replies, however, were distributed in such a way as to be representative of the country as a whole. Ten per cent of the replies received were from Ford owners.

It was discovered, moreover, in analyzing the returns, that the law of averages began to work rather accurately after the first one hundred replies had been received: that is, the results obtained from the first 100 scattered replies were changed but little in the final returns. This would indicate that the survey represented fairly well a typical cross section of American automobile buyers. This assumption is further strengthened by the fact that one individual car manufacturer recently sent out a similar questionnaire to a different list of owners and the results were almost identical.

On the other hand, too much significance should not be attached to the actual position of the various factors in the list, because the predominance of one over an-

other was so close in several instances as to have little meaning. Returns from 20 States, covering more than 30 makes of cars, on the index basis of 100, for instance, give the following emphasis to the different points:

Endurance .....	15	Hill Climbing .....	7
Economy .....	14	Flexibility .....	6½
Comfort .....	9½	Endorsements .....	6½
Price .....	9½	Specifications .....	6
Appearance .....	8	Speed .....	5½
Service .....	7½	Appointments .....	5

These percentages are for the total group, and are significant chiefly as showing the importance given to endurance and economy in comparison with the other features.

The other factors necessary to consider when using this survey for merchandising purposes are more difficult to evaluate. The psychology of those answering the questionnaire must undoubtedly play a large part, however, in estimating the value of the results. A man does not always know accurately just what things do influence him strongly. Sometimes he is influenced by certain things, because he knows he can take others for granted.

Hill climbing, for example, takes seventh place in the total list. This low place may well be the result of the general opinion on the part of buyers that practically all American-made cars are capable hill climbers so far as average service goes. Such reactions on the part of the man answering the questionnaire must be considered. Then, too, a man does not always act in practice as he states formally he believes in acting.

With these and other similar limitations and variables in mind, the detailed results of the questionnaire can be adapted to present selling problems.

We have mentioned a casual survey of owner advertising of some forty different passenger cars. Though not scientifically accurate, this survey may serve as a typical cross section of present automobile advertising. To compare the points emphasized in these advertisements with the points considered important by typical owners, as shown in the N. A. C. C. survey will be an interesting commentary on present methods.

The matter can best be discussed by price classes as noted previously. Since Ford is the only car in the "below \$500 class," it is hardly worth while to attempt a discussion of this class in the present article. For comparative purposes, however, we may list the influence of the various factors as they appealed to Ford owners. The order was as follows:

	Per Cent		Per Cent
1. Economy .....	17	7. Hill climbing .....	6
2. Price .....	16	8. Flexibility .....	5
3. Endurance .....	15	9. Endorsements .....	5
4. Service .....	11	10. Speed .....	3
5. Comfort .....	9	11. Specifications .....	3
6. Appearance .....	7	12. Appointments .....	2½

The cars in the "over \$3,000" are also limited in number as compared with those in the middle price class as the latter is defined by the N. A. C. C. for purposes of this analysis. It is interesting to note, however, that the owners of this class, which has sometimes been considered largely a luxury class, are more insistent upon endurance than any other group, 19 per cent of those replying placing this quality first.

This high-priced group, moreover, rates economy as of practically the same importance as comfort, a point which apparently has not been fully recognized in the past in merchandising this type of car.

It will be noted, also, that the buyers of high-priced cars place about the same value upon appearance as middle-priced car users. A study of the results in connection with the replies of the owners of these high-priced cars, in fact, indicates that even this wealthy class of buyers is primarily interested in the practical and utility phases of the car they buy.

The results in this class are as follows:

Per Cent	Per Cent
1. Endurance .....19	7. Price ..... 7
2. Comfort .....11	8. Flexibility ..... 7
3. Economy .....10	9. Endorsements ..... 6
4. Appearance ..... 9½	10. Specifications ..... 6
5. Hill Climbing ..... 7½	11. Appointments ..... 5
6. Service ..... 7	12. Speed ..... 5

themselves to general statements concerning quality, wonderful performance, etc., the number in that class would exceed that of any other group. This point in itself is significant.

The replies to the N. A. C. C. questionnaire indicate one fact very definitely. Car buyers are interested in specific things when they consider buying a car. In this middle price class they evidently want to know how long they can expect the car to last and the reasons for such expectations.

The definite way in which the owners checked the N. A. C. C. query shows that they are fully aware of the things to be considered in buying a car. They are not specially impressed with the fact that a car is a "thorobred"; they want to know how long it will last, how

much it costs, and what are its riding qualities. They are not specially interested in being told how beautiful a car is; they can see that for themselves. They want to know what service they may expect from their investment.

It might seem that manufacturers have been dwelling too much on economy features. This is probably not true, despite the fact that economy ranks fifth in the middle price class list. It must be remembered that this survey has just been completed. The recent decline in gasoline prices has doubtless had a psychological effect upon owners. Men in the industry, thoroughly familiar with the petroleum situation, realize that economy of operation is to be one of the big problems of the near future. These facts are not apparent at present, however, to

the general run of automobile buyers; their thoughts are affected more by present price reductions than by thoroughgoing analyses of the gasoline situation.

The emphasis of speed and power which appears in many advertisements is out of proportion to its importance as estimated by the potential buyers. Speed is tenth in the list of buyers' opinions, while hill climbing is eighth. The buyer knows that he can buy practically any car on the market and be assured of enough power to fill all his ordinary transportation needs. As a result, he subconsciously relegates the power consideration to the background in considering a particular car.

Limited classes of the potential buying market, of

The line for middle-priced cars is the most interesting for merchandising discussion. To compare past performance with the standards set up by the results of this N. A. C. C. survey, we may list in parallel columns the relative selling importance of these various factors as estimated (1) by those answering the questionnaire and (2) by the survey of some forty different passenger car advertisements appearing during recent months. The line-up is as follows:

#### N. A. C. C. Buyers' Survey

1. Endurance
2. Comfort
3. Price
4. Appearance
5. Economy
6. Service
7. Flexibility
8. Hill Climbing
9. Endorsements
10. Specifications
11. Speed
12. Appointments

#### Survey of Car Advertisements

- |                  |                    |
|------------------|--------------------|
| 1. Economy       | 8. Endurance       |
| 2. Appearance    | 9. Flexibility     |
| 3. Price         | 10. Service        |
| 4. Speed         | 11. Appointments   |
| 5. Hill Climbing | 12. Specifications |
| 6. Endorsements  |                    |
| 7. Comfort       |                    |

Only very general deductions, of course, can be drawn from such a comparison. In some of the advertisements analyzed, for example, it was difficult to determine the predominant note. Many of them claimed perfection for the car in every particular.

If an additional classification had been made to include those advertisements which really emphasized nothing whatever of a specific nature; which confined

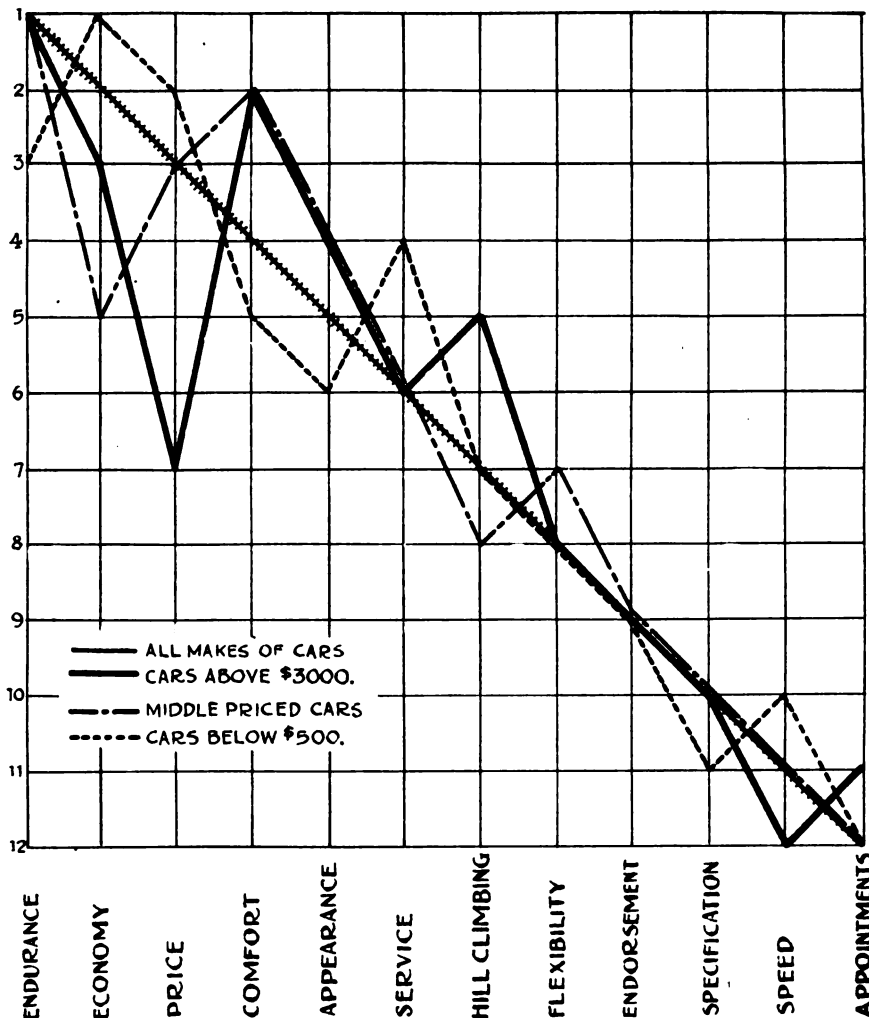


Fig. 1—Figures at left of chart represent the order of importance of the twelve buying factors—1 being of first importance; 2 of second importance; etc., i.e. the largest number of buyers placed endurance first. Classification by price class



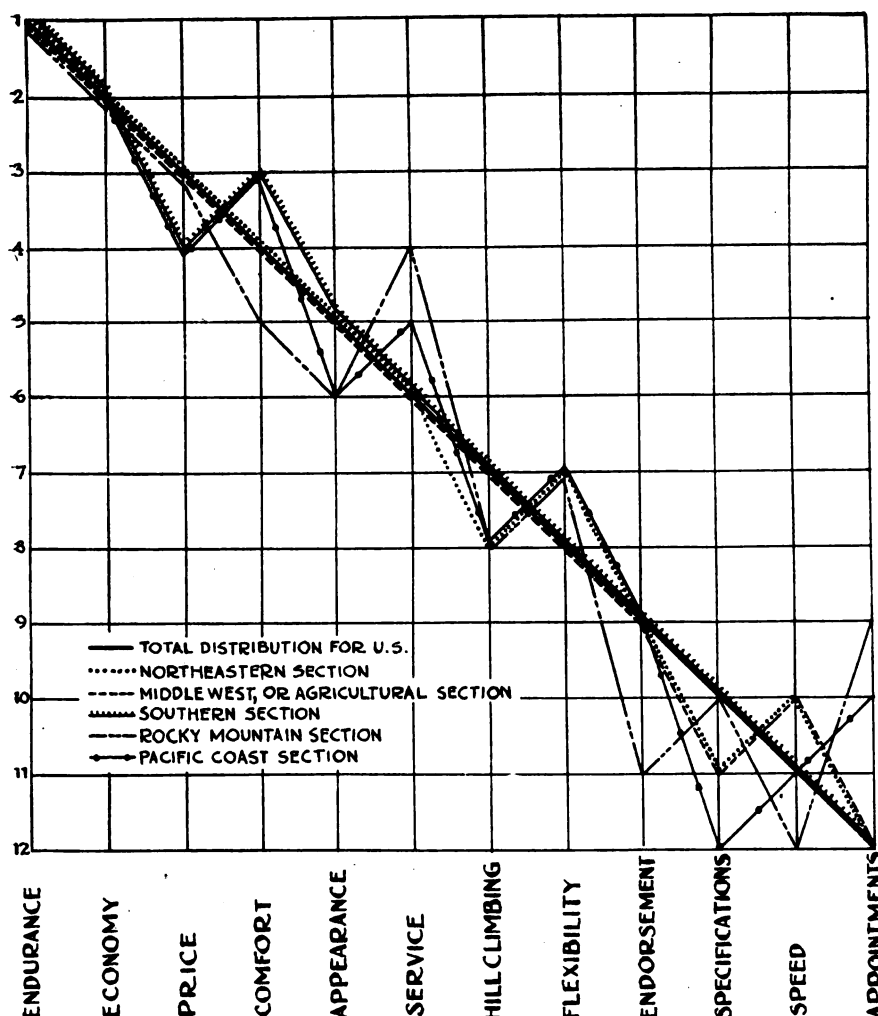


Fig. 2—Figures at left of chart represent the order of importance of the twelve buying factors—1 being of first importance; 2 of second importance; etc., i.e. the largest number of buyers placed endurance first. Classification by geographical sections

course, is specially interested in exceptional speed and power, but the results of this questionnaire indicate very strongly that this class constitutes only a small part of the total of automobile buyers and owners.

That slogans and catch words have very little effect in selling cars is also indicated by the replies. Fifty-one per cent of those replying said they were not interested in slogans, while 40 per cent failed to reply to this part of the questionnaire at all. The other 9 per cent said they were interested in general motor transport slogans, such as "Drive Carefully," etc.

As regards special features, such as engines, axles, etc., 23 per cent expressed interest in such features, while 48 per cent said they were not. Twenty-nine per cent were non-committal.

The reaction of the owner on this point is specially interesting in view of the extended efforts that have been made to "sell" him along this line. The manufacturer and the dealer, of course, are vitally interested in the qualities and characteristics of the different units which make up the finished product, but the average car buyer is interested chiefly in the performance of the finished car. This fact is emphasized by a re-examination of the list for middle-priced cars.

The buyer of this type of car is interested chiefly in endurance, comfort, price and appearance in the order named—and his interest in economy will be a rapidly growing one. All of these factors effect the performance of the finished product.

There are several interesting points in connection with the N. A. C. C. chart shown in Fig. 2. The answers to the questionnaire were divided according to the sections of the country from which they came and the curves drawn accordingly. For the most part there is a striking similarity of opinion recorded from all parts of the country, but a few definite divergences do stand out. The Pacific Coast States, for instance, think more of appearance than of price, an opinion with which the Southern States seem to agree. The buyers in the Northeastern States agree with the general opinion until it comes to flexibility, which they rate above hill-climbing ability. This group also is influenced more by speed than by specifications.

In the case of the Northeastern States, however, the divergence from the average is scarcely marked enough to be of any special significance in any instance.

The relative importance given to service by the Rocky Mountain States, however, is worthy of note. While service stands sixth in the general average, it is considered as fourth in importance by owners in these States. This may be an indication that service is not up to par in this section, and that special efforts should be made along this line. Data of this kind, at any rate, are valuable in planning selling campaigns for specific territories. As accurate information is accumulated along these lines, the cost of merchandising can be ultimately reduced and one of the big factors of sales resistance overcome.

It would be extremely difficult—and perhaps dangerous—to comment upon the low rating given to endorsements of other owners by the people of the Rocky Mountain States. The Rocky Mountain line also takes a startling jump in rating appointments ninth instead of twelfth as does the rest of the country.

While the results of this questionnaire cannot be taken as final and accurate data concerning the points covered, they can well be utilized as a strong indication of which way the wind is blowing. The features of chief interest to the automobile buyer are rather strongly indicated, and the ineffectiveness of certain types of merchandising effort pretty well established as a result of the analysis. Thus the data accumulated from this questionnaire should be of definite sales value to the industry at the present time, if studied carefully and used with a full understanding of the limitations involved in its gathering and compilation.

Moreover, the significance of the survey as an illustration of what may be done along the lines of merchandising research should be fully recognized. Further data of this kind should be accumulated, correlated and analyzed.

Too much cannot be expected within a short time. Rome was not built in a day, nor can the intricate problems of merchandising be completely solved in a short time, since they involve so many intangible, as well as variable, factors. Immediate benefits can be derived from such research which will do far more than pay for the cost of research, while the ultimate benefits to be derived are very great.

# Crossley Building Chassis with Smaller Four-Cylinder Engine

225 cu. in. engine has several interesting features. Generator and fan are combined in one unit and driven by V-belt from pulley on magneto drive shaft. Convenient adjustment for both hand and foot brakes.

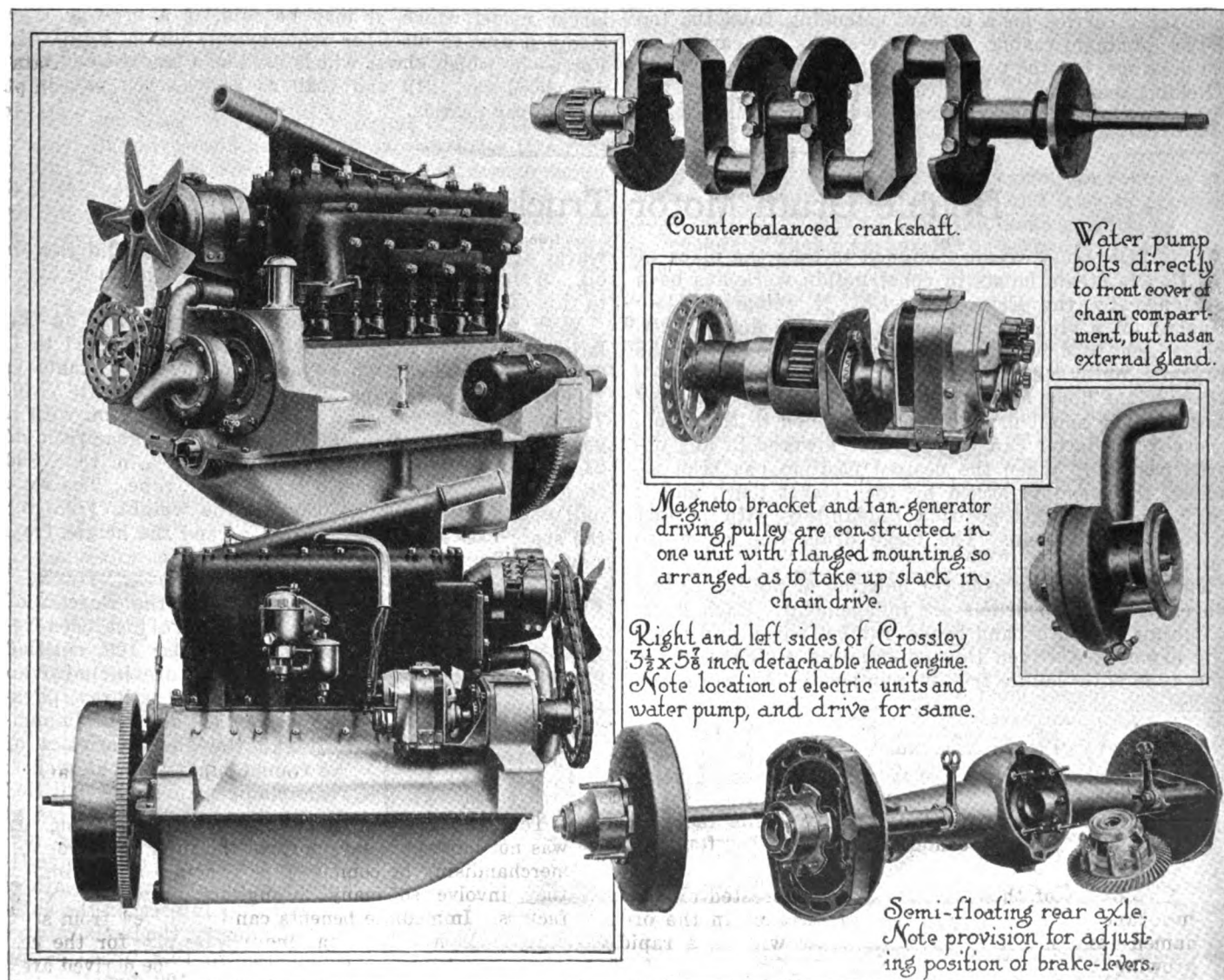
By M. W. Bourdon

**C**ROSSLEY has introduced an entirely new model which is put forward as a lower priced five-passenger to supplement the older four-cylinder chassis, which has a bore and stroke of 4 x 5½ in. (279 cu. in.) as compared with 3½ x 5⅞ in. of the new engine (225 cu. in.).

The new type has block cast detachable L-head cylinders. The usual head gasket is required to serve as a compression joint only, the water joints being made by double V-section rubber rings which are employed between side

passages formed in head and cylinder block, the bulges in the sides of the castings for this purpose being very slight. The cylinder block is separate from the aluminum crankcase, which is divided at the crankshaft center line, the upper half supporting the three bearing counter weighted shaft and having four point suspension from the main frame with integral webs between the arms to eliminate the need for an underpan.

Hollow shaft lubrication is used with a gear-type pump submerged in the oil in the sump and driven by skew gear-



ing from the camshaft on the left. The latter has an adjustable silent chain drive.

The connecting rods are H-section drop forgings. The hollow wrist pins float in the bosses of the cast iron lanterned pistons and in the rod end. Pump water circulation and a tubular radiator are used. The pump is driven by a forward extension of the camshaft. It is bolted to the front face of the distribution casing, but has an external gland.

On the right of the crankcase is the magneto. Its shaft is also chain driven and has the fan driving pulley at its front end. The magneto bracket, driving shaft, sprocket and fan pulley are mounted as a unit movable laterally for chain adjustment. The fan itself is mounted on the front of the armature shaft of the generator which is arranged high up in front of the cylinder block.

The five-jet Smith carbureter is also on the right, fed by the vacuum system and bolted to the flanged face of a transverse passage leading to a detachable manifold on the left, which is arranged close to but not actually in full contact with the exhaust manifold. The latter has its outlet branch at the front end, the pipe to the muffler passing down vertically through a hole in the crankcase web extensions.

Engine and gear-set are separate units. The latter is supported by a short subframe at four points and is connected to the cone clutch (which has a ball bearing pilot) by a coupling shaft with a pair of flexible disk joints. The gearbox has four speeds and is provided with a right-hand lever carried on a bracket extending from the top of the aluminum casing. The gear shafts are carried on ball bearings, but the pilot bearing is of the roller type.

Behind the gear-set is a contracting shoe type brake with face cam actuation. The drum has attached to it the

casing of the enclosed star universal at the front end of the open propeller shaft. The last named is solid and has a sliding block joint at the rear with renewable steel plates in its casing, the phosphor bronze blocks being backed by springs to prevent rattle.

The back axle is a steel casting with integral taper extensions. The detachable rear plate allows the spiral bevel gearing to be easily withdrawn when the driving shafts have been removed. The final drive ratio is 3.57 to 1. Drums for the expanding rear brakes have pressed steel hollow spoked detachable wheels attached to them on the semi-floating axle ends, the hubs running on parallel roller bearings with thrust races. Ball bearings are used to carry the differential. The brake camshafts at their inner ends have side-toothed plates attached to them, engaging with actuating levers having similar teeth at one side of their bosses, this arrangement allowing the angle of the levers to be reset as brake wear occurs, though a service wing-nut adjustment is provided at the ends of the pull rods.

Semi-elliptic springs are used back and front. The worm and complete wheel steering gear has its worm shaft mounted on eccentric bushes for mesh adjustment. Parallel roller bearings and ball thrust races are used for the front hubs, and ball bearings for the swivel pins. Oil cups are used throughout in lieu of grease cups.

The chassis weight is 2070 lb., the wheelbase is 124 in., and the track 55 in. Normal British practice is followed, though in detail it is more of a production job than the larger model which, it may be said, is a pre-war type modified first to meet the requirements of the Royal Air Force—by which it was widely used as a tender—and then remodeled for 1919 and 1920 as a five-seven passenger private car chassis.

## Double Drum Motor Truck Power Winch

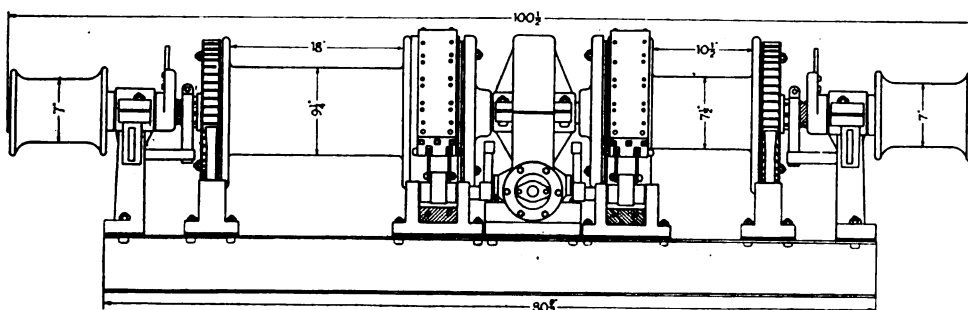
**A** MOTOR truck winch designed to take the place of heavy steam hoists in construction work has been developed by the Erie Hoist Co. It comprises two winches on a single frame, with a single drive shaft. The winch is driven from the power take-off on the transmission by means of a chain and sprockets. Installation of the hoist back of the cab is said to be an easy matter. The small drum rope is fastened to the boom, whereby the latter can be raised or lowered to any desired position. When the desired position has been attained, the boom is locked by the ratchet pawl, and it can be held in this position indefinitely with perfect safety, it is claimed. The large drum line serves to handle the load.

This winch can be used for hoisting or pulling in two places, as the two drums are independent. Each drum is equipped with a band brake, ratchet wheel and pawl. The drums are driven through friction clutches of the cone type with double friction surfaces. The worm and

wheel are inclosed in a dust-proof housing and run in oil. A three-speed and reverse transmission can be fitted to this outfit, giving three additional speeds.

With a gear ratio of 42 to 1 the rope speed on the large drum is 34 ft. p. m.; with a gear ratio of 21 to 1, 68 ft. p. m. The drum capacity of the large drum is 1500 ft.  $\frac{3}{8}$ -in. wire rope; 1000 ft.  $\frac{7}{16}$ -in.; 900 ft.  $\frac{1}{2}$ -in. The small drum has rope speeds of 30 ft. p. m. with a gear ratio of 42 to 1 and 60 ft. p. m. with a gear ratio of 21 to 1; its rope capacity is 1100 ft. of  $\frac{3}{8}$ -in. rope, 850 ft. of  $\frac{7}{16}$ -in. rope and 650 ft. of  $\frac{1}{2}$ -in. rope. The rope pull of a single line is 7000 lb.; the weight, 1725 lb.; the space back of the seat, 19½ in., and the height from center of drum shaft to chassis, 19 in.

**T**HE two following publications of the Bureau of Standards, Washington, D. C., have just been released for general distribution: Circular 100, entitled "Nickel," contains 106 pages in which are included an account of the metallurgy, physical properties, effect of impurities, and the characteristics of the commercial alloys of nickel; Technologic paper 188 entitled "White Metal Bearing Alloys at Elevated Temperatures" describes the results of an investigation on bearing metal alloys of particular interest in the automotive industry, the temperatures considered in this investigation running up to 100 deg. C.



A double drum winch for motor trucks

# Some Factors Affecting Carbureter Design and Operation

Deductions drawn by a carbureter designer from the results of tests conducted by O. C. Berry at Purdue University, lay stress upon need for enriching the mixture as throttle closes and load decreases.

By W. H. Weber\*

**A** FEW years ago Prof. O. C. Berry of Purdue University conducted a series of tests on "Mixture Requirements for Automobile Engines," the results of which are extremely interesting and important to carbureter designers. Although the results of these tests are not given in the most desirable form for the prospective designer, yet many valuable conclusions may be drawn from them. In fact, it is possible to design an efficient instrument from a serious study of mixture requirements.

Carbureter literature in general is not very enlightening. We are told by the makers that the law of liquid flow prevents the use of the combination of the simple suction controlled fuel and air jets, for the reason that the fuel flows faster in proportion to the air as the suction increases. We are further told of the successful manner in which each manufacturer overcomes this tendency through his special device, the inference being that the perfect carbureter is an instrument which will deliver a constant proportion of fuel and air under all conditions. As a matter of fact, this latter is not true.

There is a certain definite field which represents all conditions which a carbureter must meet. We may indicate the limits of this field by the graph, Fig. 1, in which the line OY represents the load carried from nothing to maximum and the line OX represents the engine speed, also from zero to maximum. The field formed, OYZX, embraces all conditions under which an engine may operate. It is this field which Professor Berry has very conscientiously covered. His tests may be briefly given in résumé thus:

1. Determination of best mixture at 1000 r.p.m., half load, for (a) best power; (b) best thermal efficiency.

\*Engineer, Claudel Carbureter Co.

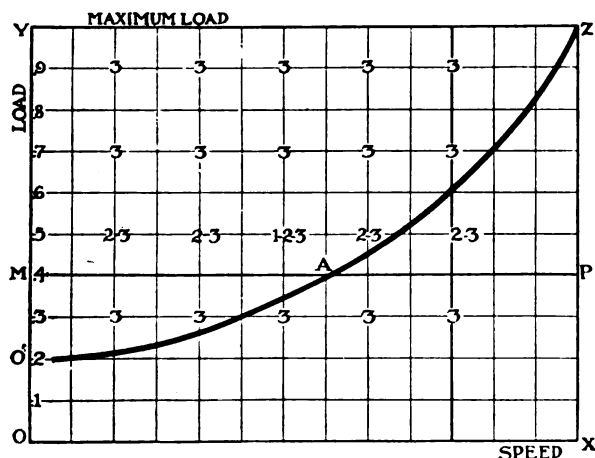


Fig. 1

Results: Best power secured with .0775 lb. fuel per pound air; best efficiency secured with .063 lb. fuel per pound air. This test considered but one point in the field is marked 1.

2. Effect of speed on mixture requirements at half load, for (a) best power; (b) best thermal efficiency. Results: Best power secured with .0775 lb. fuel per pound air; best efficiency secured with .063 lb. fuel per pound air. The points considered in this test are marked 2.

3. Effect of load on mixture requirements at various speeds, for (a) best power; (b) best thermal efficiency. Results: Best power secured with .0775 lb. fuel per pound air; best efficiency secured with .0775 lb. fuel per pound air, at light loads; .062 lb. at heavy loads.

From test No. 3 we may immediately draw the following conclusions:

First—No fixed air, fixed fuel carbureter can be adjusted to deliver maximum power and operate at maximum thermal efficiency with the same setting.

Second—If such a carbureter be adjusted for maximum efficiency, some extra means must be taken to enrich the mixture for light loads.

Before laying down any rules for carbureter construction let us consider an actual engine in a passenger car. The maximum possible load is represented by the line XZ (Fig. 1). Points along this line will, of course, have different values dependent entirely upon the load the engine can carry at various speeds. Furthermore, this line must represent the maximum possible boundary within which the carbureter must function and is obtained with wide-open throttle, mixture adjusted for best power at all speeds. It is obvious, however, that the engine is not always operating under such conditions in the passenger car; as a matter of fact, we only touch this line when we want a maximum of some sort, such as quick acceleration, heavy pull, high speed, etc. If we now calculate the power necessary to propel the vehicle in which the engine is placed, along a level road with minimum resistance from lowest to highest speed, we can find the load necessary under this condition and plot it in Fig. 1, such as line O'Z. O'Z will then represent the low boundary within which the carbureter must function. Any point in the field below O'Z need not be considered, since the power developed at such a point is not sufficient to produce vehicular motion at that engine speed. We now have a new field, O'ZX, for carbureter consideration.

Professor Berry's test, marked 3, tells us that maximum thermal efficiency requires .0775 lb. fuel per pound of air under light loads and .062 lb. fuel per pound of air under heavy loads; we may draw an arbitrary line, MAP, dividing the field as shown, the region below MAP

representing light loads and above MAP heavy loads. The area O'AM, then, represents that section in which maximum efficiency accompanies .0775 lb. fuel per pound of air, and the area MAZY the section in which maximum thermal efficiency accompanies .063 lb. fuel per pound of air, and the combined area, O'AZYM, that section in which maximum power accompanies .0775 lb. fuel per pound of air. We need not consider the actual figures .063 and .0775, but rather their relation to each other to the extent that one helps to make a lean and efficient mixture, whereas the other helps to make a rich and powerful mixture. Different gear ratios will affect the curve, O'AZ, to the extent that A will move toward M when we lower the ratio or toward P when we increase the ratio, the point being that we need consider only a small part of the field OXPAM.

The following general statements regarding carbureters in actual use may be made: First, during much the greater part of his driving time the car owner is operating his car with the throttle not wide open. The throttle opening scarcely exceeds one-half of the maximum open position. Second, when the driver opens his throttle wide, he does so for a maximum: Maximum speed, maximum power on hills, maximum acceleration from low speeds, etc. Third, he wants good gasoline economy at all times, but he is willing to sacrifice a little in economy for the sake of maximum power during the small portion of time he demands power. On the other hand, during the greater part of his driving he is using only partial throttle opening, and he is willing to sacrifice a little power which he will never miss. These generalizations are rational and allow us to lay down some definite requirements for a carbureter which

will be a so-called "maximum" instrument in so far as we can mechanically make it so.

The fixed air, fixed fuel carbureter may be adjusted for either maximum efficiency or power or for a mean, but never for both extremes. We may then lay down the rule that to make as nearly perfect a carbureter as possible we must start with an instrument capable of delivering a constant mixture of fuel and air at all engine suction. This carbureter will satisfy either maximum efficiency or maximum power conditions in the field MAZY. A fuel jet placed near the throttle—such as an idling jet—so arranged that its flow will gradually diminish as the throttle is opened, will take care of the field O'AM when the carbureter is adjusted for maximum efficiency. Finally, it is desirable to add a mixture quality control to remain fixed for either of two conditions—namely, variable throttle and wide-open throttle. In operation we will be then able to obtain the following results:

Variable throttle (average driving) carbureter adjusted for maximum efficiency. When throttle is in idling position, mixture is enriched by idling jet. As throttle is gradually opened, mixture thins out until point A is reached, when mixture becomes constant until throttle is nearly wide open. The point at which idling jet cuts out may be varied to suit different engines, depending upon the position of point A.

Wide-open or nearly wide-open throttle (maximum demands), carbureter automatically becomes adjusted for maximum power. Idling jet is not in operation, and, since carbureter is capable of delivering a constant ratio of fuel and air, mixture will be set for maximum power throughout the entire range of speed.

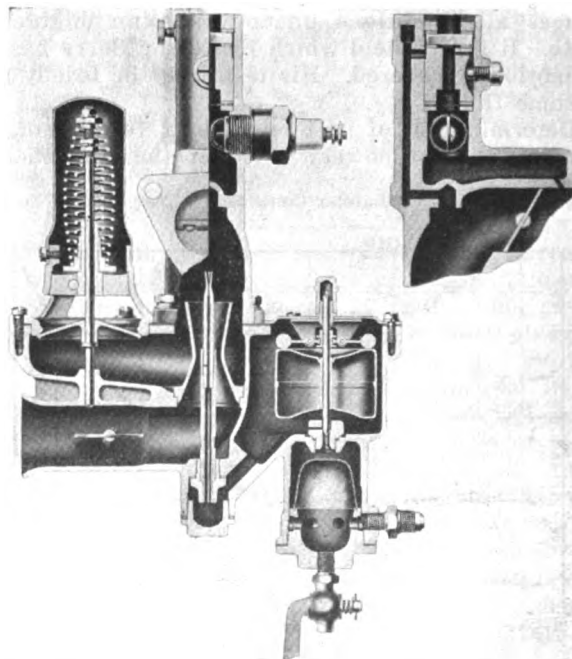
## Improved Carbureter on Packard Cars

**T**HE Packard single sixes are now coming through with a two-range or double jet carbureter. Used in combination with the fuelizer, it is claimed that this carbureter greatly increases the gasoline mileage possible with the single six cars. The carbureter is designed to give automatically a mixture to suit the needs of either heavy or light pulling. The new two-stage carbureter is being supplied on all the single sixes at present, and is being provided without charge as rapidly as possible for cars already in service.

The two-stage jet carbureter is designed to give a rich mixture when it is needed and a leaner mixture for ordinary driving. This is accomplished by having two jets. The one for the richer mixture is placed so far above the float chamber level and the throat of the venturi that it will not work during ordinary running, but will respond to high suction from the engine which is created by a heavy pull. Referring to the sectional view of the carbureter herewith, the main jet used for general driving is the annular passage located at the throat of the venturi. The secondary jet is the central tube which extends upward into the mixing chamber of the carbureter above the venturi. This being away from the venturi, naturally the velocity head around it is considerably lower, and consequently the jet is not in operation at ordinary speeds. Furthermore, the jet being considerably above the level of gasoline in the float chamber, it is necessary for considerable pull to be exerted to lift the gasoline from this jet.

When a high vacuum exists in the mixing chamber, as, for instance, when the engine is pulling heavily, or when the velocity head increases to a high degree due to running at extreme throttle openings on a level road, the secondary jet will cut in. It is claimed that a considerable

saving in fuel is effected by the use of this carbureter, and in the testing room at the Packard plant, no engines are being passed until they can show an economy equivalent to 20 miles to the gallon under favorable conditions. The Packard fuelizer, which is put out as standard equipment, is an integral part of this new carbureter.



Sectional views of improved two-stage carbureter used on Packard single six engine



# A French Twin-Engined Armored Biplane

Lioré & Oliver plane is designed to protect pilot and gunners but is relatively light and maneuverable. Rotary engines and duralumin fuselage are employed. Can be operated with one engine disabled.

By John Jay Ide

**I**N designing the Lioré & Oliver armored biplane the principal purpose of the constructors was to fill the need for an airplane that was properly armored and at the same time light and maneuverable. It was not possible to inclose all vital parts in armor, as this would have resulted in a very heavy machine having a ceiling of about 5000 ft. and poor control. The designers were content to protect the pilot and gunner with armor and to use Lanser leak-proof fuel tanks. Rotary engines were adopted on account of the fact that during the war they had made the reputation of running even when hit by bullets.

The fuselage, which is of rectangular section, is constructed entirely of duralumin. A series of tubes forming Warren trusses is riveted to the longerons of the fuselage. The fuselage is calculated to withstand six times the normal load.

The pilot and gunner, who are in one compartment, are protected by steel plates 0.276 in. in thickness, riveted together. The weight of the armor alone is 661 lb. The gunner can either remain in his gun ring or seat himself behind the pilot and take control of the machine. To facilitate this the gun ring is mounted on slides and can be moved backward.

The engines are supplied from a main tank having a capacity of 72 gal., mounted in the nose of the fuselage, and by two gravity tanks in the top wing. All tanks are leak-proof. There is a pump for each of the gravity tanks. If one pump is damaged the other pump can be used for supplying both tanks by turning a tap in the pilot's cockpit. If both pumps should be put out of action the gravity tanks contain enough fuel for half an hour's flight.

A nine-cylinder 180-hp. Le Rhone rotary engine is mounted in a streamline nacelle on each side of the central fuselage. A fairing incases the central part of each propeller and masks most of the engine. Cooling is effected by an opening in the nose of the fairing, which permits air to enter and cool the crankcase and cylinder bases. The exit for the air is past the cylinder heads and also out of the tail of the nacelle. Each engine is held in place by duralumin tubes attached to the interplane struts and landing gear.

The method of truing up the wings is rather ingenious. At the base of each strut there is a system of double



The Lioré & Oliver armored biplane equipped with two nine-cylinder Le Rhone engines of 180 hp. each

screws with opposite threads so that adjustments can be made without any disassembling.

In the ordinary twin engine aeroplane having one power unit on each side of the center line, the stoppage of one engine necessitates holding the rudder hard over in order to keep on a straight course, granting that the machine can fly at all on one engine. In the Lioré & Oliver the angle of the fin is adjustable with reference to the longitudinal axis of the machine. This is accomplished by pivoting the whole stern of the fuselage. As shown in a sketch herewith there is a screw (a) controlled by a cable (b) and a handwheel (c). On this screw moves a bronze nut (d) integral with the fork (e), which forms part of the fin structure. In general a jointed tail does not inspire one with confidence, but in this case the fin has resisted a load twelve times normal.

The stabilizer has a variable angle of incidence and is controlled by a cable and handwheel in a similar manner to the fin. Referring to the sketch, the two halves of the stabilizer (a) and (b), connected by means of a sleeve and conical pins, form with the two tubes (c) and (d), the cross piece (e) and the two tubes (f) and (g) an absolutely rigid structure. The movement of the stabilizer is limited by the slides (h) riveted to the sides of the fuselage longerons. The variable angle of inci-

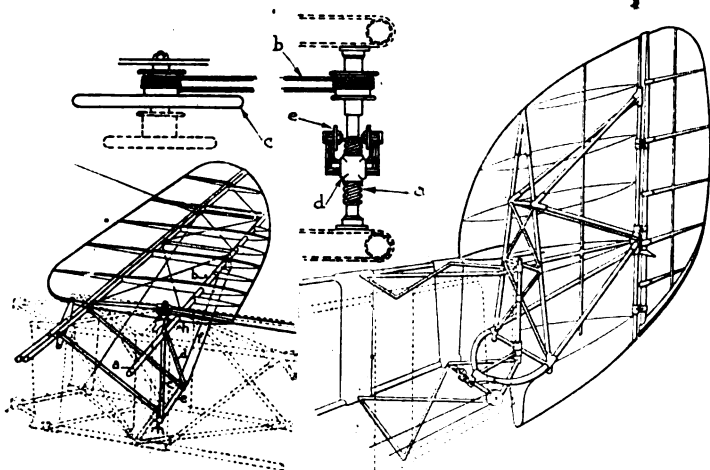


Diagram showing construction and control device for stabilizer and pivoted stern structure and control mechanism of Lioré & Oliver biplane

dence stabilizer allows the pilot to adjust the angle according to the load. The tail can even be made slightly lifting without danger as the pilot can always bring it back to 0 deg., or to a negative angle if the airplane glides too steeply.

The landing gear has been designed to have the least possible head resistance. Each wheel with its shock absorber is covered by a cowling and the axle is used as a spar for a small wing. The axle is composed of two forks, one sliding within the other. Each wheel cowling forms a mudguard and is quickly removable.

The skid has been designed to avoid fuselage strain. The vertical and horizontal stresses are absorbed by springs in a piston placed in the direction of the resultant of the stresses. The transverse stresses are taken up by leaf springs fixed to the stern of the fuselage to which the piston is attached.

The characteristics of the machine are:

Span .....	47.1 ft.
Length .....	27.2 ft.
Height .....	11.0 ft.
Wing area .....	509 sq. ft.

Stagger of upper wing.....	2.1 ft.
Wheel track .....	13.8 ft.
Weight empty .....	2,866 lb.
Useful load .....	1,322 lb.
Total weight .....	4,188 lb.
Total horsepower .....	360
Weight per sq. ft.....	8.2 lb.
Weight per horsepower.....	11.6 lb.
Speed at ground level.....	114 m.p.h.
Speed at 9,840 ft.....	108 m.p.h.
Climb to 3,280 ft.....	4 min.
Climb to 6,560 ft.....	8 min.
Climb to 16,400 ft.....	39 min.
Service ceiling .....	18,040 ft.
Theoretical ceiling .....	19,680 ft.

With one engine the machine has made a series of figure eight turns without losing height. In this test the full load of 1322 lb. was carried and a horizontal speed of 62 m.p.h. was made.

Without armor the useful load can be increased from 1322 to 1984 lb. That is 47 per cent of the total weight, a high figure for an airplane of this type.

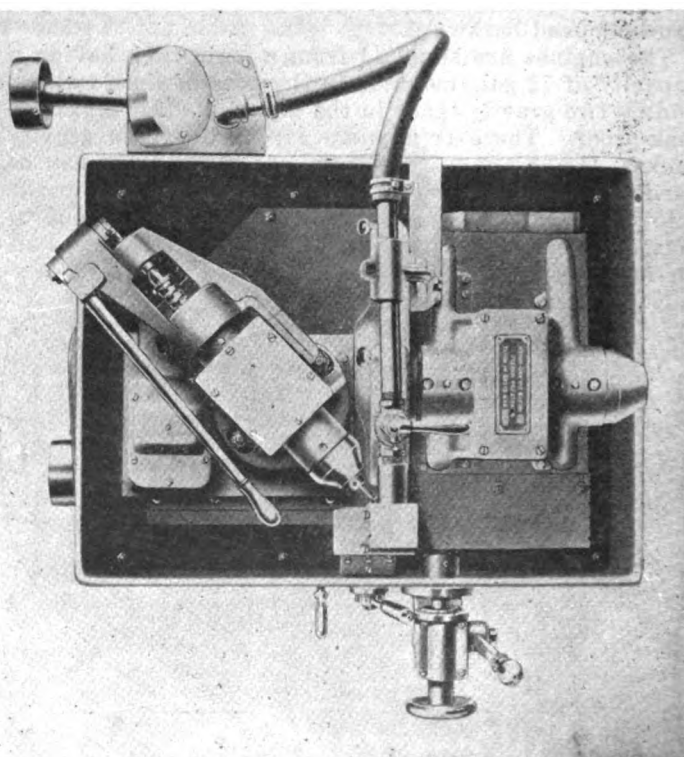
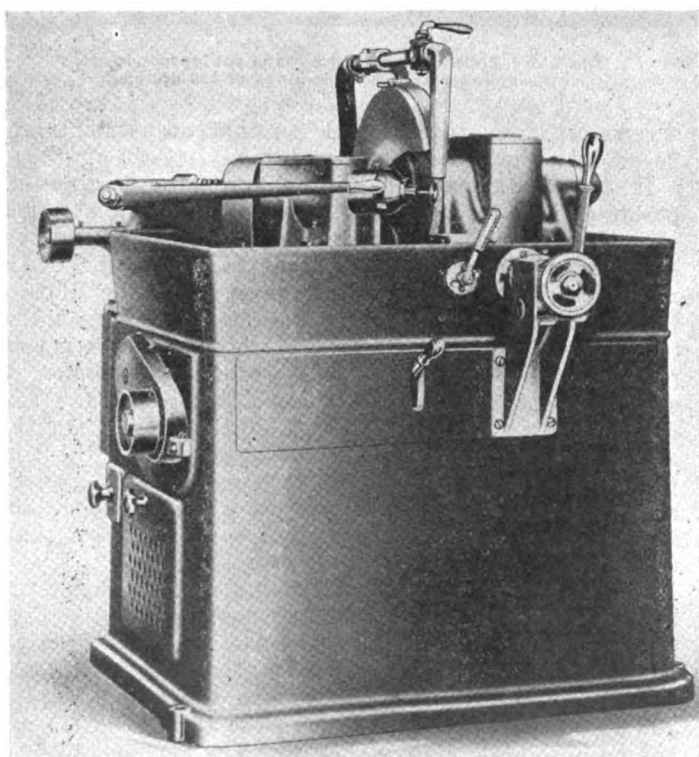
## Poppet Valve Seat Grinding Machine

THE accompanying photographs show two views of a new grinding machine arranged for grinding the seats of poppet valves. The valves are held by a collet chuck which is operated by the lever shown at the side of the work head. The machine can also be furnished with a work head for grinding valve seats on centers. The work head can be set at any angle, to suit the angle of the valves to be ground, and has an automatic movement parallel to the wheel spindle, which can be set to move the required distance for the valve being ground.

The wheel head has a cross movement and is operated by the vertical lever directly in front of it. The hand wheel on the cam bracket is for taking care of the wear

of the wheel. It is provided with a micrometer reading. The lever to the left is for operating the diamond tool for truing the wheel; the lower lever to the left of the cross feed bracket is for stopping and starting the work head. A 3-hp. motor in the base of the machine furnishes the power. The weight of the machine, including the motor, is approximately 2500 lb.

The general construction of this machine is such that it can be arranged for grinding a large variety of small parts in factories where large production is required and the machine can be kept busy on one particular part. The machine is manufactured by the Fitchburg Grinding Machine Co.



Side and top views of Fitchburg valve grinding machine

# Adjustable Spring Shackles Take Up Wear and Prevent Rattle

Two methods employed by well known car manufacturers prevent noise which otherwise occurs when spring shackles become worn. In one case a coil spring automatically takes up side play and in the other an adjustable threaded collar enables convenient hand adjustment.

By J. Edward Schipper

**A** POINT which the majority of designers have overlooked is proper provision against rattle of spring shackle bolts. Experience has shown that on the majority of cars the first point at which rattle begins is the shackle bolt. This is particularly noticeable in a great many cars with the Hotchkiss drive, wear resulting in rattle begins at the spring pivot bolts in the front end of the rear spring.

This bolt receives stresses of a nature which are comparable in some ways to the stresses on the piston pin. It is an oscillating bearing subjected to shock as well as to static load, and consequently subject to rapid wear unless adequately lubricated. The road shocks are transmitted directly to this bolt, and wear is also caused by oscillation due to the deflection of the rear spring. The torque, due to braking the car, and as well as to acceleration, is also absorbed in the Hotchkiss drive through the bolt at the front end of the rear spring.

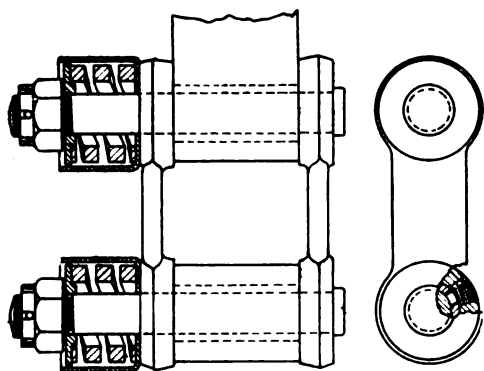
It is true that the oil cups, or grease cups, or pressure lubricating attachments now employed as stock equipment on up-to-date cars are more accessible at this point than they were in previous years, but even so it is unusual for this bearing to receive proper attention from the owner, consequently it is sure to be one of the most rapid wearing parts on the chassis, and bound to develop a rattle which is especially noticeable over cobble or wood block roads, or other surface which causes numerous small oscillations in the springs.

There are two ways of preventing rattle. One is by a method which automatically compensates for wear, and the other is by making the bearing adjustable. The

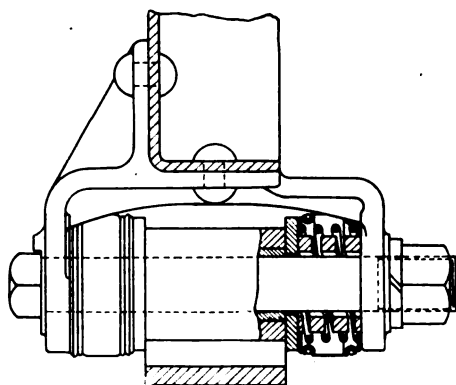
Jordan Motor Car Co. has adopted a method by which the shackle bolts are put under considerable spring pressure, thus automatically taking up wear which takes place between the sides of the shackle and the end of the spring eye or shackle bushing. Experimental cars have been driven in the neighborhood of 50,000 miles with this spring device without developing any rattles. The device was first incorporated on the front end of the rear spring where, due to the higher stresses of torque as well as suspension, wear was bound to develop. This proved to be so successful at this point that it has now been adopted for the rear shackles also.

The assembly at the rear spring front bracket differs somewhat in detail from the rear shackle assembly, although identical in principle. Drawings of each installation are shown herewith. A heavy coil spring of 250 lb. tension is fitted between the brackets and the bearing. This is contained in a cup or boot. The earlier installations were housed in a leather boot, but a metal cup has now been substituted. The drawing of the front bracket assembly shows a leather boot construction with a light spring to hold the boot in position. The rear installation has a metal cup, which acts as a dust housing and grease container.

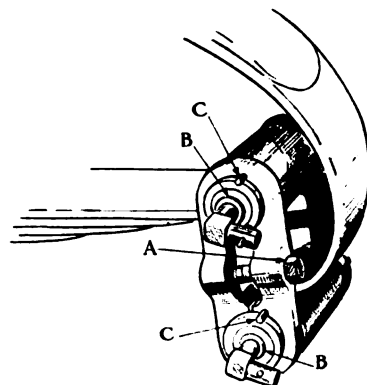
On the front bracket assembly, springs are mounted on each side of the center line, while in the rear the springs are on one side only. This type of installation was made on a trial basis, as it was thought that the spring pressure might cause excess wear rather than prevent it. It has been found, however, that after running the chassis over thousands of miles of all kinds



Rear spring rear shackle assembly on the Jordan car, showing the coil spring installation for taking up wear and preventing rattles



Rear spring front bracket assembly in the Jordan car, showing the eye of the leaf spring between the two 250-lb. coil springs



Adjustable shackle on the Locomobile car. This clamp screw A is loosened and the adjusting washers B can be turned up. These are prevented from turning by the locking pins C

of roads, it has been impossible to detect wear. The coil springs are all interchangeable and are ground to a flat surface for good contact all around.

On the Locomobile car an adjustable collar, which is held in place by a clamp screw, is employed. When wear has occurred in the shackles with this arrangement adjustment can be made by loosening the clamp screw and turning up a threaded collar to another stop on a locking pin, which holds the collar in place and prevents it from rotating. The clamp screw is then tightened, locking the adjustment in place. This brings a new wearing surface into play and brings the shackle into closer contact with the end of the spring acting in a similar way to the coil spring utilized on the Jordan installation.

It is interesting to note the thought that is being given these detail parts, as it is a regrettable fact that we have not been up to European practice in this respect. American design has caught up to and passed European in a great many of the essential features of motor car design at the present time. This has been particularly true of

progress made since 1915, and if serious attention is going to be given to these detailed features, which have a great deal to do, not only with the life of the car, but the comfort of the owner, another step forward will have been made.

There are a number of these small points about the chassis which can be given attention with remarkably welcome results. The small item of spring shackle wear is only a minor problem as compared to many which have been solved, and yet, when no attention is given to this detail, the car is likely to become noisy after 5,000 or 6,000 miles. In some makes of cars it has become noticeable that spring shackle rattles occur after the first three or four thousand miles of driving, and there is no means whatever of removing the rattles except by re-bushing the shackles and probably fitting new shackle bolts.

With the self-lubricating bushings employed in the spring shackles by many manufacturers, some adjustable or compensating device for maintaining tightness at this point will prove a valuable addition.

## A Straddle Milling Machine for Facing Crankshaft Bearings

THE accompanying illustrations show a specialized type of machine for facing the crankshaft bearings of engine crankcases and at the same time milling the oil slinger groove. The bearing caps are removed while this operation is going on. The machine is of the rise-and-fall table type, being loaded and unloaded while at the top of the stroke, when it is in line with the conveyor system. The table is provided with hardened steel jib plates and with locating pins which are raised and lowered by the lever seen in front of machine, so that there is no obstruction to the free entrance and removal of the casting, clamping being done by the hand wheel clamps illustrated.

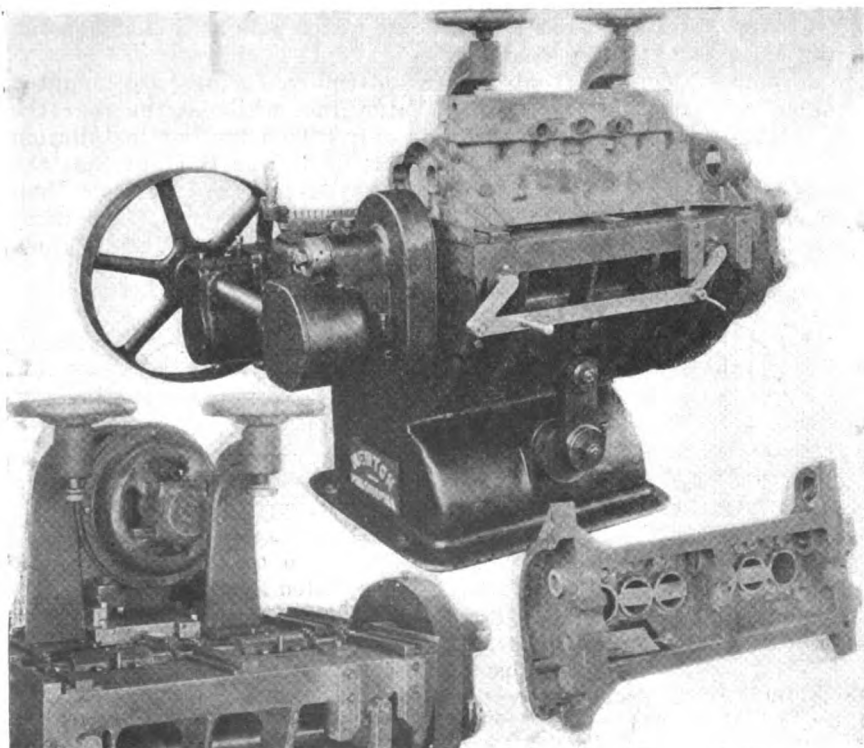
The cutter mandrel is driven from both ends and supported by bearings between cutters. The table is raised

and lowered by a cam providing slow feed and quick return.

The casting illustrated required eight cutters, all three bearings faced being machined on both sides, and there being an additional cutter for oil slinger groove and a small cutter for finishing the bore of the oil slinger groove. The production of the machine is 25 pieces per hour.

A larger machine of the same general construction is used for the same operation except with the caps in place. Spacing collars to give a variation of 0.002 in. are provided to hold the dimensions of the cutters. Provision is also made so that the rate of feed can be changed according to the use of the machine for cast iron or aluminum.

The straddle milling machine above described is manufactured by the Newton Machine & Tool Works.



Newton straddle milling machine for facing off ends of crankshaft bearings.

## A New Assembled Truck

THE Independent Motor Co. has brought out a new line of three trucks rated at 1½, 2½ and 3½ tons capacity. These trucks are all equipped with standard units including the Continental engine, Zenith carburetor, Eise-mann magneto, Fuller transmission, Ross steering gear, etc. The axles are Shuler in front and Timken rear for the two smaller types and Wisconsin rear on the 3½ ton. All of these trucks are worm driven and the present line is the result of developments by this concern since 1911. The engine sizes are 3¾ x 5 on the 1½; 4½ x 5¼ on the 2½ and 4½ x 5½ on the 3½ ton truck.

The trucks are supplied in chassis form only, the body equipment being optional and extra. The wheelbases for the three models are 148 in. and 160 in. The chassis are all of semi-flexible pressed steel construction with rigid cross-members. The trucks are designed to fill a wide range of transportation service and are being put out by this concern as suitable for mercantile, farming or manufacturing lines.

# The Development of the Roller Chain Drive

An outline of changes which have taken place in the design and construction of chains and sprockets, with special reference to standardization of the roller chain and of a new form of roller chain sprocket tooth which has many advantages over tooth forms employed heretofore.

By G. M. Bartlett\*

THERE was a time when gear teeth were nothing but "cogs" of indefinite form, and the fact that it was desirable to give them a particular shape in order to decrease the noise and increase their wearing qualities, was realized by only a few. It was many years before engineers and university professors discovered that the problems of odontics were of a high order, and well worth the attention of the keenest minds. When such men as Willis, Herrmann, Olivier, McCord, Bilgren and Lewis devoted themselves to this science the result was a succession of advances in the theory and practice of gear design and gear cutting machines which have played a most important part in mechanical history during the last half century. Gear teeth are no longer mere "cogs." Their outlines are curves mathematically determined and accurately cut by highly specialized machine tools; and many a genius has burned the midnight oil pondering over the fascinating problems that have presented themselves in this field.

The roller chain drive is a comparatively new mechanism and is still in its infancy. The exploration of the field of its possible applications has scarcely begun. A scientific study of the kinematics and dynamics of the chain drive has been pursued by but few men up to the present time. The literature on the subject is very meager, and while it cannot be said that the problems yet to be solved in the design of sprockets are of the same nature or as varied as those connected with gearing, they are as real, and they certainly require a type of analytical mind found more often among university professors than among practical engineers.

The chain drive belongs to that class of mechanical movements known as power transmission machinery, and it belongs to that particular sub-class designed to transmit power between two *rotating shafts*, and to that still more restricted sub-class confined to the transmission of power between two parallel rotating shafts. In accomplishing this result it is usually desired that the angular velocity ratio shall be maintained as nearly constant as possible.

The problems of transmitting power between two parallel rotating shafts and maintaining a uniform angular velocity ratio has been solved in four ways: (1) by the parallel crank mechanism, as in locomotive drives, (2) by flexible belt drives, (3) by spur gears, and (4) by chain drives. The parallel crank mechanism is applicable only to cases where the velocity ratio is 1:1.

The belt drive is applicable to cases where the center

distance is necessarily great, where noise is objectionable, and where a positive drive is either not necessary or not desirable. The spur gear drive is applicable to cases where the center distance is short, and where a positive drive and a very close approximation to a uniform angular velocity ratio is desired.

The chain drive is applicable to a variety of center distances between that required by spur gears and that required by a belt drive. It may be as noisy as gears or as quiet as a leather belt drive, depending upon the installation, the speed, and the type of chain used. The angular velocity ratio is constant for entire revolutions, and for parts of a revolution corresponding to the passage of a whole number of teeth; but there is usually a slight deviation from uniformity during the passage of a single tooth. The one exception to this being the case where the velocity ratio is 1:1, and the center distance is an exact multiple of the pitch. While it is desirable that sprockets should be in accurate alignment the drive will perform very satisfactory service when the two sprockets do not lie exactly in the same plane. Advantage has been taken of this flexible feature in connection with final drives for trucks and tractors, and formerly for passenger automobiles, where the chain accommodates itself very nicely to the sprocket misalignments which vary with the contour of the road or of the plowed field.

The action of a chain and sprocket is not like that of an ordinary belt and pulley. But if we conceive the pulley to be a polygon with as many sides as there are teeth in the sprocket, the comparison will be more nearly correct. The action of a chain as it travels over a sprocket with 8 teeth may be compared with the action of a non-slipable belt traveling over an eight sided prism. The action would not be as smooth as if the prism had 16 sides, nor would the action about a 16 sided prism be as smooth as that about a 40 sided one. This is the reason that sprockets with less than 12 or 14 teeth are usually discouraged by chain drive engineers.

The conditions which cause fluctuations in angular velocity are illustrated in Figs. 1 and 2; and the remedy is shown in Fig. 3, where the center distance has been so adjusted as to cause the rollers A and B at the two ends of the straight portion of the chain to rise and fall in unison. This condition may be stated as follows:

Maximum uniformity in angular motion, and hence maximum efficiency, requires that the span of the tight side of a chain must be an exact multiple of the pitch.

Actual efficiency tests have shown that in a drive in which 14 toothed sprockets were used the efficiency was increased 5.6 per cent by changing from 30¾ in. centers to 30 in. centers, the pitch being 1¼ in. The same experi-

\*Slightly condensed from a paper presented at the Fifth Annual Meeting of the Gear Manufacturers' Association. The author is connected with the Diamond Chain & Mfg. Co.



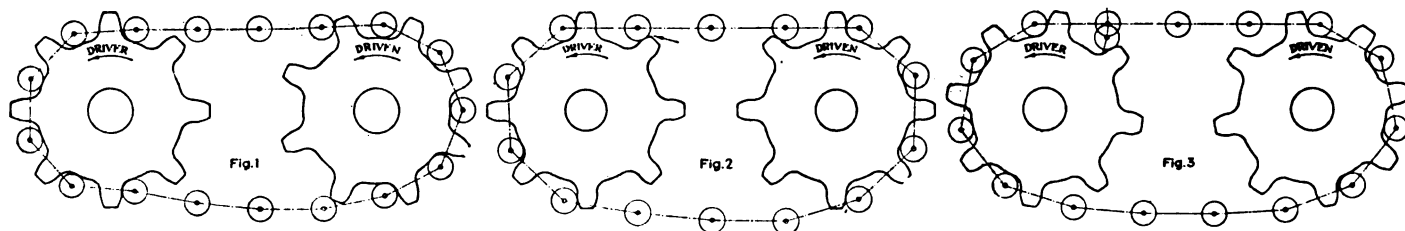


Fig. 1—Old tooth form. Pitch of chain too small. Proper action on follower impossible. Pitch line clearance greater than necessary for driver. Fig. 2—Old tooth form. Chain pitch length too great. Clearance not sufficient. Fig. 3—Old tooth form. Chain elongated. Clearance ample. When roller No. 1 is released No. 2 comes against the tooth with a snap. The motion of the sprocket will be jerky

ment performed with sprockets having 64 teeth showed an increase in efficiency of one-half of 1 per cent.

The following table shows the variations in angular velocity for various combinations of teeth and indicates the importance of avoiding sprockets with a low number of teeth as well as the effect of an adjustment of center distance:

Per Cent Variation of Angular Velocity with Change in Number of Teeth on Driving Sprocket

	6	9	14	21	30	45
Teeth on Driven Sprocket						
6	00.0 33.3					
9	8.5 22.9	00.0 13.2				
14	12.6 18.4	3.7 9.1	0.0 5.2			
21	14.3 16.6	5.3 7.5	1.5 3.6	0.0 2.0		
30	14.8 16.1	5.8 7.0	2.0 3.1	0.4 1.5	0.0 1.1	
45	15.2 15.7	6.2 6.7	2.3 2.8	0.7 1.3	0.3 0.8	0.0 0.5

The upper figure represents the percentage of variation in the angular velocity of the driven wheel when the span of the chain is an exact multiple of the pitch. The lower figure represents the percentage of variation when the span is an odd multiple of one-half the pitch.

Formula:

For upper figures—

$$100 \left\{ \frac{\cos \frac{180^\circ}{N}}{\cos \frac{180^\circ}{n}} - 1 \right\}$$

For lower figures—

$$100 \left\{ \frac{1}{\cos \frac{180^\circ}{N} \times \cos \frac{180^\circ}{n}} - 1 \right\}$$

Another method which has been used to counteract the variations in angular velocity due to a low number of teeth is the use of the so-called "equalizing gears" which consist of an elliptic pinion driving a gear whose pitch line contains as many waves as there are teeth in the attached sprocket.

Hans Renold of Manchester, England, is probably the father of the chain drive and the Nestor among chain manufacturers. So far as we are able to learn the first practical application of the chain drive was to the propulsion of bicycles and tricycles; and the first factory for the manufacture of chains was built in 1879 by Hans Renold at about the time the so-called "safety" bicycle began to supersede the high wheel. The type of chain then used, and still used to-day to some extent, was the *block center type*, consisting of a series of "B" shaped blocks which form the center links of the chain, these blocks articulating with side links by means of pins passing through holes in the blocks, and riveted to the side plates.

This chain was modified at a later date by substituting two rollers and two bushings for the solid center-blocks, thus forming a *twin roller chain* which could operate over the same sprockets, and which has been supposed to be

much more efficient than the solid block type.

The *standard type of roller chain* as used to-day differs from the twin roller type in that the pitch of the inside links is the same as that of the outside links, instead of being related as 6:4.

This allows a sprocket tooth for every chain link instead of one tooth for every two links, and the action is somewhat smoother.

In adapting the roller chain to drives other than the bicycle it is necessary to make a decided advance in design in order to meet the new requirements with respect to load carrying capacity and high speed. Parts had to be greatly strengthened without an undue increase in weight. This necessitated the use of alloy steel in pins; and where special conditions require it, as in the motorcycle, alloy steel is also used for rollers and side plates. The motorcycle chain is now the most highly specialized and the most carefully designed of all types of roller chains; the reason being that the power to be transmitted requires a very strong chain, while the high speed forbids a heavy chain. It is necessary then to keep the tensile strength high, the pitch short, and the weight low.

In the early years of the passenger automobile many cars were chain driven, and it was not until about 1911 that this type of drive practically disappeared from motorcars as a final drive. The main reason for abandoning it was the objectionable noise. Motor trucks and farm tractors use the chain drive to a considerable extent, and for trucks of over 3½ tons capacity it is undoubtedly the most efficient and effective of all types of final drive at present in use.

While formerly the chain business depended almost solely upon the automotive industries for its existence, this is no longer true, as the chain drive has found applications in hundreds of fields where belts and gears were formerly used.

With the increase in the variety of applications of chain drives there came a demand for a great variety of designs, until, about four years ago, one chain concern found itself with upwards of 130 models of various pitches, widths and roller sizes, exclusive of the many special chains for particular applications. A study of the situation showed that all practical requirements could be satisfied by reducing the total number of regular chain models to less than thirty, and standardizing with respect to the essential dimensions.

In 1917 the Council of the American Society of Mechanical Engineers appointed a committee on the Standardization of Steel Roller Chains, which held its first meeting on Sept. 14 of that year. Shortly afterward the Society of Automotive Engineers appointed a Roller Chain Division for the same purpose. These two committees held a joint meeting in December, 1917, since which time all of the work of the two committees has been co-operative.

Shortly after the first meeting in New York the British chainmakers formed themselves into an organization known as the Association of British Driving Chain Manufacturers, appointed a permanent secretary resident in

London, and immediately began the work of standardizing chains and sprockets. The British and American Committees corresponded for some time with a desire to arrive at common standards, and while not successful in reaching an agreement on all points, the approved standards of the two countries are the same in most cases, and where differences occur they are not sufficiently great to prevent American chains from operating over British sprockets.

Last year the Sprocket Committee of the American Gear Manufacturers' Association was invited to join the others in the work of standardizing a sprocket tooth form, and this committee met with the others at their last meeting in New York City.

The purpose of chain standardization is threefold:

(1) Interchangeability of chains of different makes on the same sprockets.

(2) Interchangeability of connecting links and spare parts.

(3) Reduction in the number of models, and hence reduction of costs.

The purpose of standardizing the sprocket tooth form is:

(1) To put the stamp of disapproval on tooth forms of the old type which provided for excessive pitch line clearance and encouraged hooked teeth, noise, and undue wear on the chain.

(2) To reduce the number of different types of sprocket cutters now being made by putting the stamp of approval of the engineering societies on one type which conforms to principles of good practice.

In order that roller chains of different makes may be interchangeable on the same sprockets it is necessary that

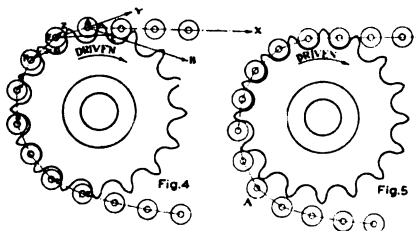


Fig. 4—Action of new chain on undersized sprocket. Fig. 5—Action when sprocket is cut too large, or when chain is too short

the pitch, the width, and the roller diameter should be standardized. And in order that connecting links shall be interchangeable on chains of different makes it is necessary that the pin diameters and the thickness of the inside plates should be standardized.

In order to bring about the standardization of these five dimensions the committees first adopted standard of reference, for each dimension in the shape of a formula, and endeavored to make the new standards conform to this as closely as existing practice would permit. These standards of reference were as follows:

**Pitches:**  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ ,  $1\frac{3}{4}$ , 2,  $2\frac{1}{2}$ , 3, 4 in.

**Roller Diameter** =  $\frac{5}{8}$  P.

**Widths**, (defined as the exact distance between the inside plates) =  $0.41$  P and  $0.61$  P.

**Pin Diameter** =  $\frac{1}{2}$  roller diameter.

**Thickness of Inside Plates** =  $\frac{1}{8}$  P.

The standard proportions actually approved differed from the above in a few cases where present well established practice naturally had the preference over considerations more strictly classed as ideal.

In addition to the heavy series of roller transmission chains adopted by the S. A. E. a medium weight series has also been approved in which the same sizes of rollers, bushings and pins are used as in the heavy series, but assembled with lighter side-plates of the next higher pitch.

Thus a medium weight  $1\frac{1}{4}$  in. P chain would be  $\frac{5}{8}$  in. wide and have rollers  $\frac{5}{8}$  in. in diameter.

A study of chain and sprocket action during recent years has led to the discovery of some important facts:

(1) A light weight chain is more efficient than a heavy one.

(2) A chain drive is more efficient under a heavy load than under a light one.

(3) Increasing the number of teeth in the sprockets increases the efficiency.

(4) A chain drive is more efficient when the small sprocket drives the large one than vice versa. This is true also of gears.

(5) Other things being equal, increasing the pin diameter decreases the efficiency.

(6) Removing the rollers from a chain makes almost no noticeable change in the efficiency.

(7) High chain velocity is not as destructive to the drive as high sprocket speed.

Roller breakage is usually caused by high sprocket speed.

The maximum number of revolutions per minute that it is advisable to run the smaller sprocket is

$$\text{Max. R.p.m.} = \frac{2000}{P} \sqrt{\frac{L \times D}{W \times P}}$$

Where  $P$  = pitch;  $L$  = length of roller;  $D$  = diameter of roller;  $W$  = weight of one foot of chain. The constant 2000 was determined from tests.

(8) The design of the sprocket tooth affects the amount of noise and wear on both sprocket and chain. The old style sprocket tooth form so long in use in this country is rapidly giving place to one or another of the newer types which have been developed during the last eight or ten years.

The essential difference between the old and the new types is in the provision made for an elongated chain. Every chain begins to elongate as soon as it is put into operation. This elongation, due to the wearing of the rivets and bushings, continues as long as chain is in use.

To provide for this continual lengthening of the pitch the tooth gap in the old style sprocket is cut with clearance on the pitch line, thus allowing the rollers on an elongated chain to creep around the pitch circle without interference with the backs of the teeth. The result of this is that the whole load is carried by one tooth at a time; and when the load is transferred from one tooth to the next the chain comes against the new tooth with a snap, making the action jerky.

In the newer type of sprocket tooth the pitch line clearance is eliminated, and at the same time the angle of the tooth gap is increased so that when the chain begins to elongate the rollers will tend to climb the teeth a slight amount. The result of this is that the load is distributed among a number of teeth, the action in transferring the load to new teeth is smooth and quiet, and the tendency of the teeth to wear hook-shaped is greatly reduced. (See Figs. 4 and 5.)

The principle of this new tooth form brings up the subject of *pressure angles*, and the questions as to what pressure angle is best, and whether the same pressure angle should be used for a small number of teeth as for a large number. British chain drive engineers have decided in favor of a constant angle of tooth gap (space angle) of 60 degrees and a consequent variable pressure angle which is determined by the formula

$$\text{Pressure Angle} = 30^\circ - \frac{180^\circ}{N}$$

This gives 28 deg. for a 90 toothed sprocket and 0 deg. for a 6 toothed sprocket.

In the United States this system has not met with much favor, as it does not allow sufficient pressure angle for a low number of teeth. One system which has been widely used in this country for the past seven years employed a uniform pressure angle of 30 deg. for all numbers of teeth with excellent results.

During the past year the standards committees of the A. S. M. E., the S. A. E., and the A. G. M. A. have taken up the work of designing a sprocket tooth and a set of sprocket cutters which have been recommended for adoption as an American standard. This tooth form, as it now stands, is designed to combine the desirable features of the Renold, the Diamond, and the Link-Belt types. The pressure angle is 11 deg. for 6 teeth, increasing to 15½ deg. for 9 teeth, and to 24 deg. for 100 teeth. The salient features of the new standard tooth outline (Fig. 6) are as follows:

(1) A seating curve, consisting of a circular arc whose diameter is  $1.005 D + 0.003$  in. ( $D$  being the nominal diameter of the chain roller.)

(2) A working curve whose radius is 1.3 times the diameter of the chain roller and which is concave to the roller.

(3) A straight line portion.

(4) A topping curve which brings the tooth approximately to a point.

The object of making the working curve concave to the roller is to produce a softer contact between roller and tooth and to reduce the rapidity of wear.

Five cutters will be required to cut a range of sprockets from 7 teeth to infinity, graded as follows: 7-8; 9-11; 12-17; 18-34; 34 and over. Each cutter is based upon a number of teeth intermediate between the highest and lowest number to be cut, and the topping curve is such as to form a pointed tooth for the largest sprocket of the group, and a slight flat or "land" for others.

The outside diameter of sprockets are to be calculated from the formula

$$\begin{aligned} \text{Outside Diameter} &= \text{Pitch Diameter} + P \left( 0.7 - \tan \frac{90^\circ}{N} \right) \\ &= (\text{Approx.}) P.D. + P \left( 0.7 - \frac{1.592}{N} \right) \end{aligned}$$

The action of a chain running over sprocket teeth of

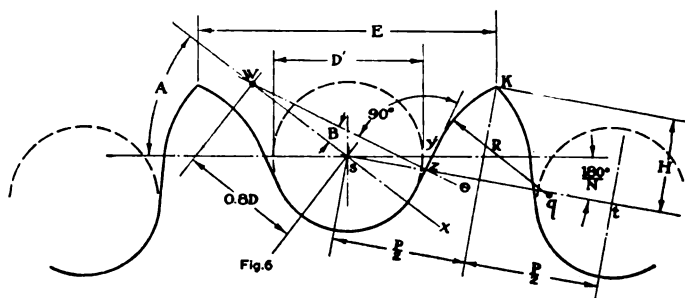


Fig. 6—Design of proposed American sprocket tooth

the new design is approximately as follows: When the chain is new and the pitch of the chain is exactly equal to that of the sprocket, all of the rollers will be seated. The load will be distributed among somewhat more than half of the teeth in mesh, with the greatest pressure on the first tooth, and the pressure on the succeeding teeth decreasing approximately in geometric progression until a point is reached where the slight pull on the slack strand of the chain produces a balance, and the pressure shifts to the opposite sides of the teeth. The pressure on the first tooth is

$$\frac{T \sin \frac{360^\circ}{N}}{\sin \left( 31^\circ + \frac{27^\circ}{N} \right)}$$

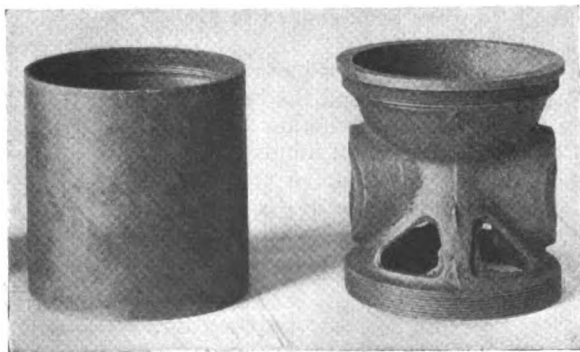
For an 18 toothed sprocket this formula gives a pressure of 63 per cent of the chain tension on the first tooth, 38 per cent on the second tooth, and 23 per cent on the third tooth, etc.

When the chain has elongated from wear there will be one and only one roller which will actually be seated at the bottom of the tooth space. This is called the "bedding down" roller. From that position the chain rollers take higher positions on the successive sprocket teeth in each direction, and in so doing not only distribute the load among a number of teeth, but also distribute the wear on the acting faces of the sprocket teeth and thus reduce the tendency to form hook-shaped teeth.

## A Ringless Piston

A PISTON which is said to have worked satisfactorily without rings is now undergoing tests calculated to determine its value for general automobile use. The piston, shown in the accompanying cut, consists of two parts, a central casting which includes the head and piston pin bosses, and a shell of cylindrical shape which forms the bearing surface in contact with the cylinder wall. The two parts are connected by a thread. The shell, it is

claimed, has no tendency to go out of round under the influence of heat and, according to those interested in its development, shows no sign of leakage when made with 0.003 to 0.004 in. or more clearance. The oil film, it is said, maintains the necessary seal. The head of the piston is made either convex or concave to minimize change in diameter with change in temperature. The piston is made by the Ringless Piston Co., Inc.



Tisler ringless piston

ACCORDING to Arthur Williams of the New York Edison Company, there are 52,128 commercial vehicles registered in the New York Metropolitan District, and 30,356 are on Manhattan Island and in the Borough of the Bronx. During the year 1920, the number of commercial vehicles in these two boroughs was increased by 6,000. There are 9,157 electric commercial vehicles in the country, of which 5,000, or about fifty-two per cent, are in the Metropolitan District. During 1920, 536 were added, or something less than ten per cent of the total of motor vehicles added here that year. It is estimated that 30,000,000 kilowatt hours are now sold annually in this territory for vehicle charging from which revenues of between \$750,000 and \$1,000,000 are now derived.

# Defining the Elastic Limit

The term "elastic limit" is used in more than one sense by various engineers. From a practical viewpoint it should mean the limit at which the proportional elasticity ends and the unproportional elasticity begins.

By William Ernest Dalby\*

THE difficulty of defining the elastic limit is due to the fact that the term is used in more than one sense by engineers. Without traversing the various uses of the term, it will be generally agreed that the term elasticity, in its broad sense, means the power of a material to recover its primitive form after loading has been applied and removed. Recovery may be partial or complete. The power of complete recovery is lost when the stress produced by loading has once passed beyond a certain limiting value peculiar to the material.

Below this limiting stress the extension of a steel test-piece is proportional to the load producing the extension. Above this limiting stress the extension increases at a greater rate than the load. This limit, therefore, is called the limit of proportionality, and the term elastic limit is often used to define this point. This use of the term, the most general one, would seem to convey that the elastic power of the material is exhausted when once the stress has passed beyond the elastic limit, and the material has passed into a plastic state. This is by no means true. The material possesses elastic properties right up to the instant of fracture.

If a test-piece, loaded nearly to the point of fracture, is watched in the testing machine, and the load is quickly removed, the test-piece will spring back and to all appearances behaves as a perfect spring. Definite measurement shows, however, that the relation between stress and strain is unproportional. The test-piece shrinks toward its primitive dimensions unproportionally and fails to get to its primitive dimension by the amount of the permanent set. I have used the term unproportional elasticity to describe the state of the material in these circumstances.

To illustrate this point and some others, I throw on the screen a diagram, taken automatically in one of my recorders. The test-piece was new material and in the proportionally elastic state. Starting from zero the spot of light moved along a straight line to the point marking the limit of proportionality. The line then bent away and then the material yielded. The inner state of the material alters as the stress passes through the limit

of proportionality. One state merges into the other.

If the loading be stopped at any point after this limit has been passed, and then removed and afterward reapplied, the process involves the doing of work on the inner structure of the material, and the record of the process is a loop, the area of which represents the work done. The curved boundaries of the loop record the act that in reloading the strain increases at a greater rate than the stress. And in unloading the material shrinks at a greater rate than the reduction of the load. The first elastic hysteresis loop described by the process of unloading and reloading is the first step toward the breakdown of the material by fatigue.

From a practical point of view, therefore, the term elastic limit should mean the limit where proportional elasticity ends and unproportional elasticity begins. Unloading from any load below this limit and reloading can be done without describing a hysteresis loop. Unloading and loading, once the limit has been passed is always accompanied by an elastic hysteresis loop.

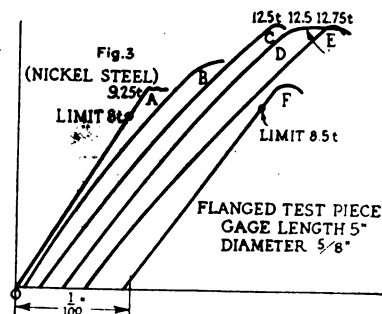
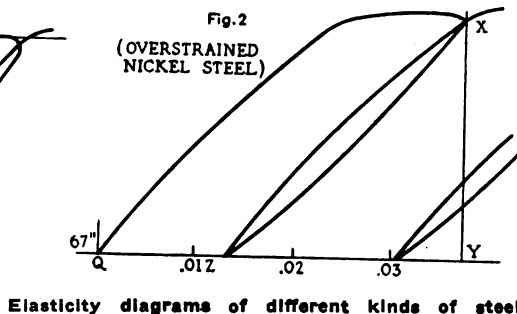
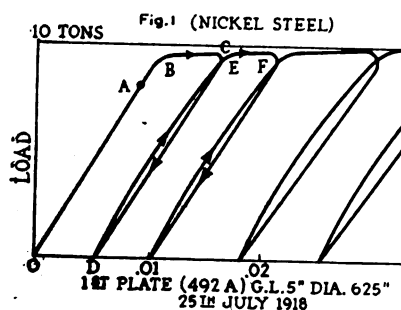
I illustrate this by a few lantern slides of diagrams I have taken from various materials.

Diagrams of this sort provide new data for the engineer from which to estimate the quality of the material. The new data are the area of the loops and the rate of increase of area. I have taken a succession of loops on several materials up to the point of fracture, and find that the area increases at first rapidly in some materials and then tends toward a limiting value. A typical instance of this is shown in Fig. 1, herewith.

Inner structure and elastic limit are mutually dependent. The microphotograph [not reproduced] of the inner structure of a piece of mild steel containing about 0.13 per cent carbon, shows the blocks to be of enormous size. The L. E. diagram corresponding to this shows the low yield-point, and therefore low elastic limit of 9.2 tons per square inch. The material was suitably heat treated to refine the structure, and then the yield point leaped up to 18 tons per square inch.

High elastic limit steel is produced by heat treatment designed to refine the inner structure. The temperatures refining the heat treatment are not obvious of the same for all steels, in fact each steel requires special investi-

\*Condensed from a paper presented to the Institution of Civil Engineers by Prof. William Ernest Dalby.



Elasticity diagrams of different kinds of steel

gation of its thermal properties by means of cooling curves to find the regions of the necessary temperatures.

I should like to refer briefly to one point in conclusion. Proportional elasticity is destroyed by overstrain. A diagram illustrating this condition is reproduced in Fig. 2. The term overstrain means that the material has been loaded to the extent required to pass it into the condition of unproportional elasticity.

The behavior of irons and steels differs after overstrain. It is known that iron and soft steels tend to recover their property of proportional elasticity by mere lapse of time. And the state is reproduced in very short time by moderate heating as, for example, by mere boiling in water. But the hard steels and the alloy steels do not share this property. After overstrain they remain in that state without recovery indefinitely, and recovery can only be brought about by heating to high temperatures.

I cite one example. The material is nickel steel, the curves being shown in Fig. 3 herewith. The elastic line

of a fresh test-piece is shown at A. The piece was stretched 2 per cent and then a diagram taken, line B. The curvature shows a state of unproportional elasticity. Line C was taken after stretching to 6 per cent. Line D is a repetition test after a rest of 24 hours. In another test the lapse of time was one year. But in this example there was no restoration of proportional elasticity. Line E the diagram after boiling the piece in water—no effect. Line F taken after heating the piece to 550 deg. C. in a muffle for an hour. The elasticity recovery is perfect.

These few remarks will, I hope, show that the exact definition of the term "elastic limit," is a matter of some difficulty, because of the current use of the term in several cases. The term limit of proportionality may be used for the exact definition of one point in the load extension diagram, without interfering with the present uses of the term elastic limit. The limit of proportionality of a material is not a fixed point, but varies with heat treatment and vanishes with overstrain.

## European Tire Construction

**M**ICHELIN has just placed on the market a cord tire with steel studded band which appears to be the only one of its kind. During the past two years there has been a remarkable change in European tire construction, practically all makers having taken up the cord type, and as a consequence steel studded treads are used only on a very limited scale. In some quarters it has been claimed that the steel studded tread was destined to total extinction.

Michelin considers that the use of the steel studded tread should be encouraged, and has developed a metal non-skid with the cord construction. The tire is a development of the rubber tread cord tire known as the cablé which was brought out about two years ago. In the new type of tire the aim has been to combine all the advantages of the cord construction with the practically unpuncturable features of the steel studded tread. With a view to increasing the non-puncture qualities of the tire, the steel studs are made much broader and flatter than on old type steel studded tires. With a tire of this type there is a 90 per cent guarantee of the tire being used down to the cords without an accidental puncture by metal or loose stones. This is particularly advantageous on French roads which, while being fast, are often strewn with loose stones capable of going through an all-rubber tread. The cord tire with steel-studded tread sells at a price about 10 per cent higher than that of the same type with rubber tread.

The steel studded tire is excellent as a non-skid under

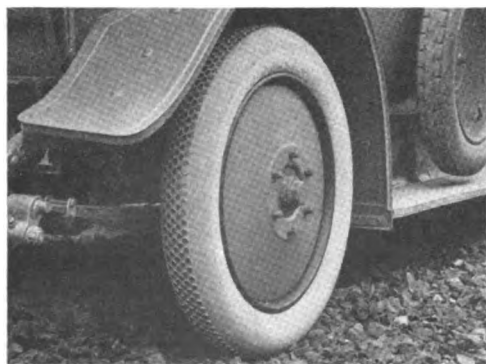
all conditions except dry granite sets, and it is for this reason that in the past the European practice was to use a steel-studded tread staggered on front and rear. Experiments have shown that when cars are fitted with four-wheel brakes there is no skidding on granite sets, and it is therefore possible on such cars to use steel studs on all four wheels, thus getting non-skid qualities under all conditions, together with a big guarantee against accidental puncture and the longer mileage of the cord compared with the fabric type. There are indications that in France at any rate there will be next season a sufficient number of cars with four-wheel brakes to make the use of steel-studded treads all-round quite a common practice.

The Pirelli Company of Milan, Italy, has just brought out a straight-side cord tire for racing purposes and made use of it for the first time on the Ballot cars in the French Grand Prix. No announcement has been made regarding the placing of this tire on the open market.

## An Engineering Employment Service

**T**HE wide and varied field of engineering activity has created the need of a clearing house of engineering services from which engineers of any specific qualifications may be obtained. In recognition of this want, the Federated American Engineering Societies, representing a combined membership of about 50,000, has established at 29 West Thirty-ninth Street, New York, an employment bureau for engineers of every variety of training and experience.

Applicants must be members of one of the Societies and submit a complete educational and professional record which is carefully classified, so that as the special requirements of any position are received, the records of men of suitable qualifications are submitted for consideration. The relatively large number of men with whom the Bureau is in touch, the comprehensive classification of records, and the fact that the services of the Bureau are free to employer and member alike, renders possible the selection of the right man for the services required. Negotiations may be confidential if desired. The Bureau will welcome inquiries from those seeking to build up or expand their engineering organizations.



New Michelin steel-studded cord tire



# Minimizing Waste in the Handling of Lumber

A practical analysis of factors tending to cause deterioration of lumber and loss of time and money in handling, drying and storing this material. Causes of decay and the effects of improper drying, etc., are discussed.

By E. E. Collison\*

**T**HE necessity for cost reduction in all lines of manufacture makes it imperative that waste be eliminated, or at least reduced to a minimum. As wood is a large item in the cost of automobiles, it is well to look more carefully into our equipment for handling and caring for this material. Few manufacturers have really competent men to handle this end of the business.

Probably the greatest loss to the average woodworking manufacturer to-day is in the handling of the wood stock from the time it arrives at the factory until ready to be started through its course to the final finished product. The woodworking shop is often the last to adopt modern machinery and correct machine layout.

The cost of wood has risen until stock which would not have been considered at all a few years ago (such as poplar, gum, jack pine, etc.) is eagerly sought to-day, due to the prohibitive prices of the higher grades of stock and to the fact that the forests of the country are rapidly being depleted. There is good reason to install modern machinery and to make the stock pass through the proper machine at the proper time and in proper sequence. This eliminates the waste of time and labor which was formerly occasioned by moving stock back and forth during the process of manufacture. Instead of the slow processes and crude machines used heretofore, we find high-speed, heavy-duty machines doing the work.

The intention of this article is to show that there is need to concentrate efforts to eliminate waste in the yard and dry kilns.

## Unnecessary Handling of Stock

Stock is frequently handled first from the car to the wagon; second, from wagon to pile; third, from pile to wagon; fourth, from wagon to dry kiln; fifth, from the dry kiln to the dry storage, and sixth, from this storage to the cut-up plant. This procedure is all preparatory to starting the stock through the modern plant. Is it any wonder that the cost of getting the stock ready is high?

It is doubtful whether the cost of these several handlings is greater than the loss due to improper care of the stock for the reason that the ordinary wood man does not understand the substance with which he works. The need to-day is for technically trained men in these positions. We see stock coming from the yard with stains (such as blue sap stain, mildews and other dry rots), and yet, by some it is believed that this sort of thing always has been and always will be; hence, a fixed charge is put against this loss.

Any form of decay is caused from bacterial life or a fungus that thrives under certain conditions, but can be checked to such an extent that it becomes dormant. Bac-

teria increase under certain favorable conditions, such as proper warmth and moisture, hence the fungus is noticed more at one season of the year than at another.

The increase of life of any form of bacteria is effected by the propagation of spores or individual units. The spores are spread from one place to another by some carrying agent such as wind and water. Each spore of a form of bacteria contains all the elements which, when put under proper conditions, carry on the life and spread the fungus.

The spore lodges on a certain board, for instance, and as the three proper conditions, moisture, warmth and a slight amount of aeration, are at hand, life begins. The spores send out tubes or arms which thrive on the wood substances, such as starch, sugars, etc., until the very life is eaten from the wood, and eventually the stock becomes fine dust or powder, held together by a mere shell, with little strength left. As the arms spread out and increase, they at times come to the surface of the board at various places, and at these places spores are again formed, which are transported to adjacent boards, or further away, by the carrying agents. This is especially noticeable in hard and soft maple and elm. The process is similar to that which results from placing a rotten apple in a barrel of good, sound fruit.

It is evident that the fungus or disease is propagated by the spore, and further that, if the spore can be killed off or prevented from spreading, the disease can be controlled. This can be and is being done. The slight expenditure required to stop this form of life will result in big returns.

It is far easier to prevent the growth or life of the fungus than it is to eradicate the spores after they have been formed.

## Proper Yard Storage

If the stock is piled in the yard, the piles should be placed on piers made of a substance that will not itself become infected, such as concrete, stone, or brick. The tops of the piers should be 1½ or 2 ft. above the ground level, to allow ample circulation under the pile, in order to keep the lumber dry. Lumber should be piled on a high, dry spot or on well drained land, so that the ground does not cause the air to become moist or heated.

All infected pieces of lumber should be burned or segregated from the good stock, to prevent spread by contact. All loose chips and boards lying on the ground, or in favorable life conditions for the spore, should be raked up and burned. In other words, the yard should be kept clean.

Some mode of covering should be used—either a good shed or good cover boards, with the pile built on a slant, so that the rain will run off quickly and not drip on stock lower down in the pile. The pile should be built so that the ends of the boards are not exposed to the direct hot rays of the sun which cause a rapid drying of the exposed

\* Works Engineer, General Motors Co., St. Louis.

ends, and result in end checking by the subsequent shrinking of the stock at this point.

In all cases weeds should be cut down and all other conditions which prevent ample circulation under the pile should be corrected. The bottom of the pile should not be allowed to come into contact with the ground.

A good practice, found in many well-kept lumber yards, is to spread from 2 to 6 in. of cinders over the whole space, forming a well drained surface and preventing vegetation from taking hold.

Foundations should be of material other than timber, when possible, and should be durable, strong and solid. The top of each foundation should be level, and from front to rear the top surface of the parallel crossers should be in alignment, so that the lumber to be piled will bear equally upon each one. The foundation piers should be spaced not over 4 ft. apart, except for heavy stock, to prevent sag. The front piers of the foundation should be raised above the second, the second above the third, etc., to allow a slant in the stock of at least 1 or 1½ in. per ft.

Where the boards are of uneven lengths the overlapping ends sag. To avoid this condition, lumber of uniform lengths should be put on one pile, or else the longer lengths on the bottom and the shorter lengths above, to allow a bearing surface for the stickers, with no overlap. Boards in the several layers should be piled with a slight space between them for free air circulation. For the same reason, and also to facilitate fire fighting a space of at least 2 ft. should be allowed between stacks.

Stickers used in spacing the several layers of stock should be uniform in thickness, of course, and of proper thickness so that a standard sticker can be used throughout the yard, thereby eliminating hardships and mistakes on the part of the lumber handlers which would be caused by the use of several different sizes of stickers. They should be ¾ or 1 in. thick and a few inches longer than the width of the pile, preferably 6 ft. long. They should be placed one over the other in the pile, in order that a solid bearing surface is given, to prevent warping.

### Handling Lumber in Bulk

In the more modern yards, all the lumber is piled directly from the cars to the kiln trucks, and, as the whole yard is laid out on rails, whereby a flexible arrangement is secured, the piles on the cars are easily handled in bulk to the yard, back to the kilns, or directly to the kilns, and finally directly to the machines. All these operations are accomplished, not by the old method of piling and repiling each time, but simply by the transferring of the cars; consequently, the lumber is handled but twice: First, when it is piled on to the trucks from the car, and second, from the trucks to the machine on its way to a finished article.

In the larger yards, where thousands of feet are handled daily, power transfer cars are used rather than the ordinary push transfer car. This in itself cuts down the labor cost and increases the ease of handling, as well as shortening the time.

All grading should be done at the place of shipment when possible. This is a big paying factor in large operations, as it eliminates this slow operation at the plant in unloading cars, thereby reducing time and curbing the demurrage costs on freight cars. It also eliminates cull stock from shipment, which allows a greater useful shipping capacity and lowers freight charges.

The dry kilns should be the very best; that is, the selection of drying equipment should not be based upon initial costs, as the operating and time expense on drying will soon eat up the amount saved on the initial expenditure. Equipment that is the most flexible—one that can dry all grades, sizes and thicknesses—rather than one that is limited as to what it can do—should be procured.

The fundamental conditions for drying, requisite heat, proper humidity, and circulation must be obtained.

Any reliable automatic equipment for control of heat or humidity is a big asset to any dry kiln, in that the extra cost will soon be taken up by the improved quality of stock obtained, the decrease in time required for drying, and the avoidance of all worry on the part of the operator. There are many such contrivances on the market to-day, but the majority are too complicated and in many cases are purchased from outside agencies which are not dependable.

Controls should be conveniently located and equipment supplied for making the humidity readings without the operator entering the kilns. There is equipment of this kind to be had that is mounted in the face of the kiln wall. A person who has ever entered a kiln at a temperature of 160 deg. Fahr. will readily appreciate that the operator is not going to make any more humidity tests in the kiln than necessary. You simply pay the bill in unknown losses. Instruments, such as recording thermometers, hygrometers and testing machines, constitute a great asset in the furtherance of proper handling of lumber through the kiln.

### Dry Storage

Wood readily absorbs as well as gives up moisture, depending upon surrounding air conditions. If wood is dried down to 5 per cent moisture content and put into a shed in which the relative humidity of the air is not controlled, it will soon pick up additional moisture, the amount being dependent upon the exact climatic conditions. So much additional moisture may be accumulated in the stock that trouble will occur during the manufacturing process, or later, in the finished article.

A dry storage should be used in connection with the dry kilns, so that any surplus stock, or stock that has been kiln dried, may be held at the proper moisture per cent by controlling the relative humidity of the air in the building or room. Just a few heating coils, and ventilators in the roof of this building, are ample for this control.

The lumber on each car should be tested for moisture content when put into the dry storage, and a notation should be made on both the car record and on a tag that is tacked on the stock. Before the stock is used, another test should be made for moisture content, previous to the stock's being removed from storage. If the moisture content has accidentally risen, it is much easier and quicker to dry this off than it is to cull out many pieces during the process of manufacturing, due to checking and the like.

Body stock that is stored in a shed can be kept at 8 per cent moisture content indefinitely, if the temperature is held at 70 deg. Fahr. and the relative humidity at about 42 per cent.

Low humidities in factory buildings are often lost by the fact that windows and doors are opened, which soon allows the air condition to become the same as that of the outside atmosphere. Then again, humidities in various parts of units of the factory should be about uniform, as it is evident that the differential in humidity to which stock is subjected in passing from one unit of low humidity to another of higher humidity, or vice versa, will cause the stock to work. Inserting pet cocks on the steam heating coils, or putting in steam jets throughout the factory, will give a simple means of raising or lowering humidity.

Keep records of your operations, both for the purpose of bettering these records and for reference on future work. Standardize your operations. Standards are here, as everywhere, fundamental to progress and efficiency. You must have standards for supply and use of time, materials and equipment before you can determine what conditions are best. You must make use of records in order to determine the relative efficiencies of different trial conditions under investigation.

# Grinding in the Automotive Industry

## Part III—Grinding Engine Parts

In this instalment the application of grinding to specific parts of the vehicle is discussed. Tolerances before and after grinding are given together with particulars as to type of machine and grade of wheel.

By P. M. Heldt

**P**ERHAPS the best way of dealing with the application of grinding in the automotive industry is to take up in succession the more important parts of the vehicle in the manufacture of which grinding is used and briefly describe the processes employed.

In the engine there is hardly a part that does not have grinding work done upon it. The most important grinding operation in engine manufacture is the grinding of the cylinder bore. The power and efficiency of the engine depend to a large extent upon the accuracy and smoothness of the bore. The latter must be as nearly as possible a true cylinder; it must be perpendicular to the base and it must be smooth. It is impossible to obtain as smooth and accurate a surface by machining as by grinding. Cast iron is not of absolutely uniform hardness, and whatever hard spots there may be in the cylinder wall will spring away from the boring tool, causing a high spot, especially if the wall is comparatively thin, as it usually is in automobile engines.

The first machine to be used for cylinder grinding so far as recorded was a Brown & Sharpe grinder, but in 1905 the Heald Machine Co. began to specialize in the manufacture of cylinder grinders, and this concern has supplied most of the grinders of this type in service in the automotive industry to-day. It is interesting in this connection to note that the first order for a cylinder grinder was placed with the Heald company by Elwood Haynes, the well known pioneer of the automobile industry. The extent to which grinding is being used to-day for finishing the bores of internal combustion engines may be judged from the statement of one manufacturer of internal grinders that 84 per cent of all makers of passenger cars use engines with ground cylinders, and 91 per cent of all makers of motor trucks. Grinding is also used for refinishing the bores of cylinders after they have become scored or worn out of round.

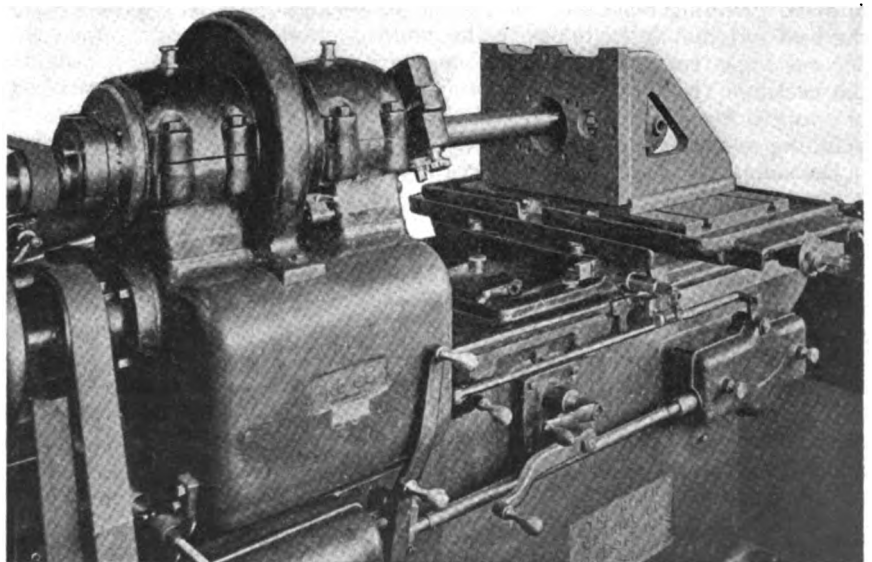
### Cylinder Grinding Data

In one well-known engine plant from 0.008 to 0.012 in. stock is allowed in the cylinders for grinding, and tolerances of plus and minus 0.001 in. are called for on the finished bore. Twelve cylinder blocks having four  $4\frac{1}{2} \times 6$  in. cylinders each are finished per 8-hour day in one of the cylinder grinding machines.

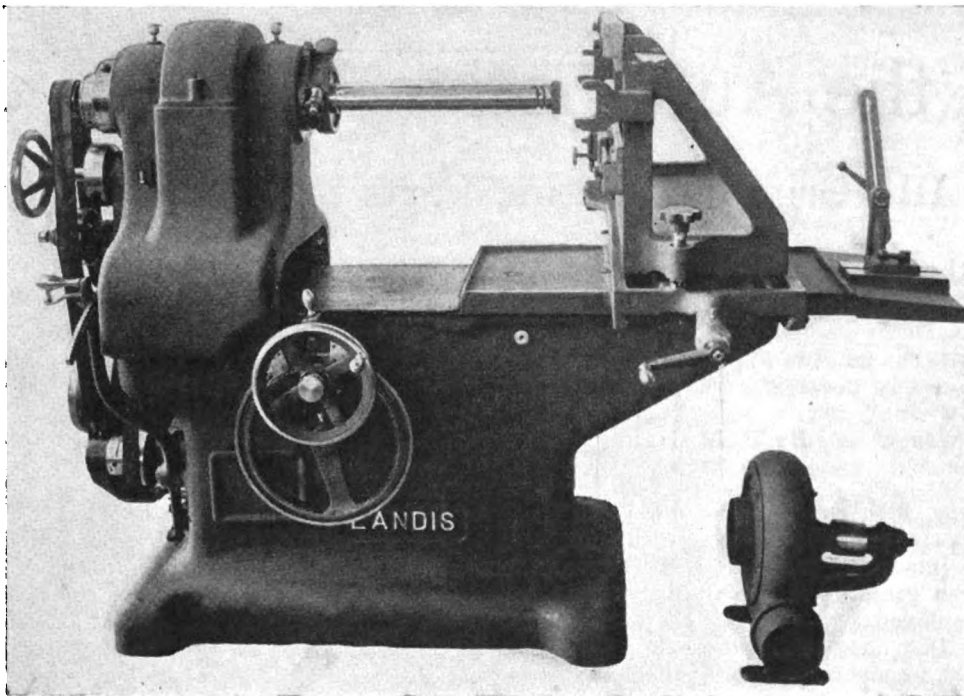
In another plant individually cast cylinders of a large tractor engine are ground. The limits on the turned bore are 6.483

and 6.488 in. and the bore has a length of  $11\frac{13}{16}$  in. In the rough grinding operation 0.017 in. of stock is taken out, that is to say, the bore is enlarged by this amount, while the finish grinding operation enlarges the bore another 0.001 in., making the final limits 6.5025 and 6.5045 in. As in practically all cylinder grinding, silicon carbide wheels are used, of 36 grain and soft grade.

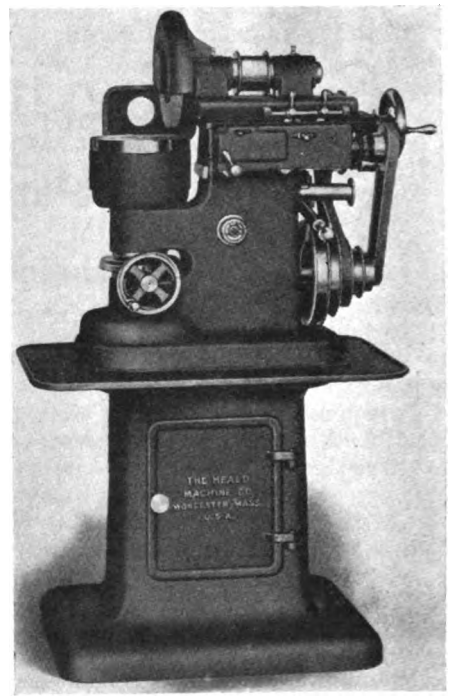
Cylinder grinding is done dry, because water played on the work would form with the metal dust ground off a mud which would choke the wheel. A certain amount of heat is generated in the course of the operation, depending on the hardness of the metal, the hardness of the wheel and the rate at which the work is pushed. To keep the working surfaces at a uniform temperature, cold water is usually run through the jackets of the cylinder block. The dust formed by the grinding operation is carried away dry by means of an exhaust fan. It has been suggested in the past to run hot water through the jacket so as to maintain the cylinder block at substantially working temperature while grinding it, and this plan has been followed to some extent. To-day most manufacturers are using cold water in the jackets, however. The reason is that cylinder bores must be inspected for accuracy after completion, and this inspection usually takes place an hour or more after the grinding operation has been completed, when the block has returned to normal temperature. The cylinders will distort somewhat during the process of cooling, and if they were exactly true after the grinding oper-



Cylinder grinding on a Heald grinder



Landis cylinder grinder



Heald piston ring grinder

ation they are sometimes slightly out after they had cooled, with the result that blocks which were ground with the highest accuracy by this method may be rejected by the inspectors.

#### Grinding Valve Sleeves

Cylinder grinders are also used for grinding the internal surfaces of the valve sleeves of Knight engines. In the case of the Stearns-Knight the sleeves are held in a cylindrical fixture which is cast with a double wall to form a water jacket, and water is circulated through this jacket to keep the sleeve at a uniform temperature. These particular sleeves are finished to an outside diameter of 4.6923 in. and an inside diameter of 4.250 in., and they are 13.125 in. long. The tolerance on the bore is 0.0005 in. and the production is about 50 per 10-hour day.

As an instance of the illogical practices of some firms in the use of grinding equipment, one manufacturer of internal grinding machines relates the following: One of the best automobile factories in the country obtains cylinder castings from two different foundries; unfortunately the castings from the two sources are not kept separate in going through the factory, and therefore every cylinder grinding machine has to handle castings from both sources in the same lot. It so happens that the iron of one foundry is very soft and easy to cut, its scleroscope hardness ranging between 18 and 20, whereas the iron from the other foundry is very hard, showing a scleroscope hardness of 38 to 40, and it is very difficult to find a wheel which will produce a smooth surface on it. Yet these people expect satisfactory work with these very unlike castings on the same grinding machine and with the same wheel. If they would only cast small distinguishing marks on the castings made in the two foundries it would be an easy matter to keep them apart, and by working on one lot on one day and the other on the next they could use a different grade of wheel for each and thus achieve much better results.

#### Characteristics of Cylinder Grinder

Cylinder grinding machines differ materially from plain internal grinders for the reason that most parts that re-

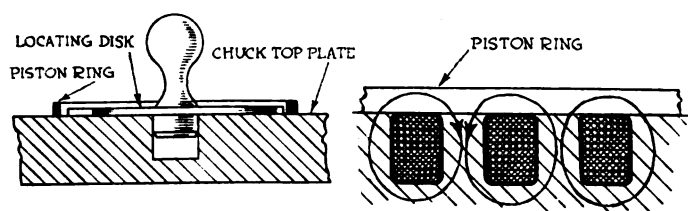
quire internal grinding are of plain cylindrical or other simple shape and can readily be held in a chuck and revolved, so that the axis of the wheel may remain stationary, but a cylinder block is so heavy and of such irregular shape that it cannot well be swung in the machine. The operation therefore called for a machine in which the wheel spindle, in addition to its axial rotation, has an eccentric motion to bring the wheel in contact with the entire circumference of the bore. The cylinder block is bolted and doweled to a fixture secured to the carriage of the grinder and one bore is ground at a time.

#### Piston Ring Grinder

Another special kind of grinder used in the automotive industry is the piston ring grinder, and this was introduced even previous to the cylinder grinder. Piston rings must be accurately finished on both sides and on the circumferences. The latter surface can easily be finished in an ordinary cylindrical grinder after the ring has been clamped on a mandrel. When the rings are turned off in the lathe a rough edge is almost sure to be formed, which prevents a gas-tight joint with the side of the ring groove. Moreover, when cutting off the rings from a pot with multiple tools, the different rings do not come of exactly equal thickness. It appears that all piston rings manufactured to-day are finished to thickness by means of grinding.

A machine for finishing the sides of piston rings by grinding was brought out in 1903 by the Heald Machine Co. A magnetic chuck was used for holding the rings, on a vertical axis, the rings being simply placed on the chuck. The grinding wheel, which was carried in a sliding head moving horizontally, would travel from the outside to the center of the chuck and back again. The same machine could be used for grinding disks, thrust collars and similar parts.

The plan of holding the rings in a magnetic chuck proved entirely practical, ensuring rapid operation and high accuracy. Almost any mechanical way of holding the rings would have caused distortion. It is claimed that rings can be manufactured in quantity in this way with a



Diagrams illustrating principle of magnetic chuck

limit of accuracy of 0.0005 in. as regards the measurements of different rings and in a single ring the tolerance around the circumference is held to 0.00025 in.

Piston ring grinding is a special form of surface grinding. In order to save time the work is not fed in a straight line toward the wheel, but is rotated around its axis. There are two general types of piston ring grinder; in one the grinding wheel grinds with its cylindrical surface and its horizontal spindle is mounted on an automatically reversing wheel slide; in the other the wheel is of the ring type and operates with one of its end faces. According to the diameter of the work, the wheel is set by a lateral movement of the wheel slide.

### Grinding Pistons and Piston Pins

Pistons are ground on their outside surface which bears on the cylinder wall, in order that that surface may be true and smooth. This work is done in cylindrical grinding machines. In one particular plant the pistons, which are 4½ in. in diameter, come to the grinding department rough-turned 0.030 in. oversize and are finished in a single operation with tolerances of plus and minus 0.0005 in. Aluminous wheels of 24 grain and medium grade are used. The output is 300 per eight-hour day. For holding the pistons in the grinder one end is centered, while a cap, placed over the open end, is held in position by a dummy piston pin which passes through the piston bosses and the shank of the cap. In another plant producing a high grade car the pistons have a number of grinding operations performed upon them. In the final cylindrical grinding operation from 0.004 to 0.007 in. is taken off the diameter, the skirt being brought down to a diameter of 3.375 in. with tolerances of plus zero and minus 0.001 in. In this case silicon carbide wheels are used, of 36 grain and soft grade. The time is two minutes per piston.

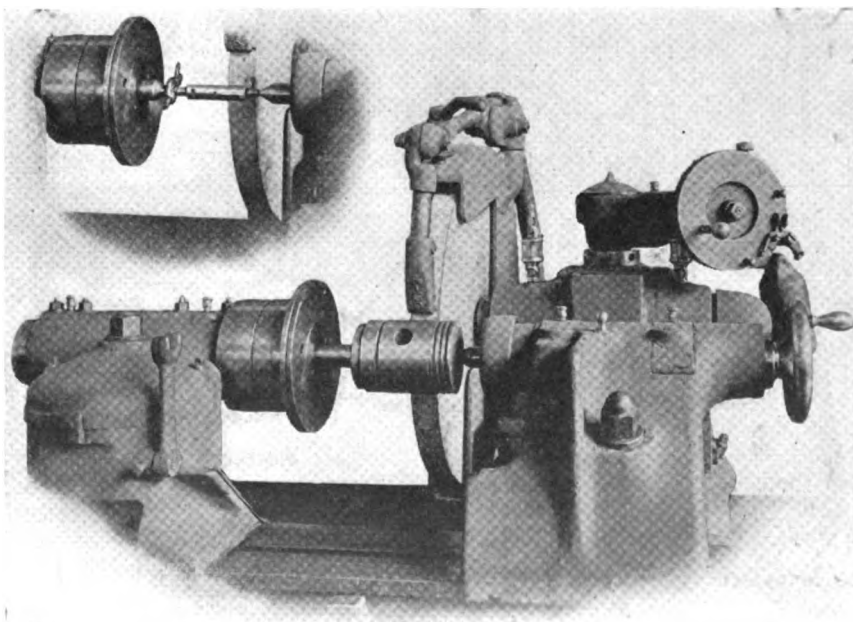
Piston pins are ordinarily of case hardened material and the common method of finishing them is by grinding. They can be ground either on a mandrel between centers or in a wedge type of steady shoe, the first method being preferable as far as results are concerned.

At first sight it might be thought that there would not be much chance for grinding operations on the connecting rods, but such is not the case. Grinding starts with snagging of the rough forgings and ends with the finishing of the outside surface of the piston pin bearing bushings which are of phosphor bronze. The end faces of the two ends of the rod can be faced off to advantage in a face grinding machine with magnetic chuck. A considerable number of rods can be placed in the machine at once and the chuck fed under the ring type of grinding wheel at a speed of about 25 ft. per min. All the advantages of surface grinding with magnetic chuck are here attained, including accuracy and rapid production. The plane surfaces of the joint between the cap and

the rod may also be ground if a high grade product is aimed at, and after the cap has been bolted in place the big end is bored out by means of a special fixture. These operations on the connecting rods are generally performed with vitrified aluminous wheels of 36 to 46 grain and soft grade. Grinding of the piston pin bushing is practiced by the Buda Co. The bushings are first bored, reamed and faced at one end in a screw machine and are then placed on an arbor and put in a grinder in which from ⅛ to 3/16 in. is removed from the diameter, the bushings being finished to tolerances of plus and minus 0.0005 in. Formerly the bushings were first turned in the screw machine to within 0.015 to 0.020 in. of the finished size, but now they are ground to the correct size directly from the rough. The production in the grinder is 600 per eight-hour day and it may be readily imagined that a good deal of work is saved by eliminating the turning operation on outside diameter.

STATE control of gasoline in France came to an end in August when the last of the army reserve stocks of gasoline were sold. From now on the importation of gasoline is free, with the exception that a certain percentage of the fuel imported must be kept in reserve for military use when required. The retail selling price of gasoline has been maintained at an artificial level by the law obliging importers to purchase government stocks of fuel to the extent of 50 per cent of their imports, these stocks being paid for at excessively high prices.

Outside Paris the minimum retail selling price of high-grade gas is now 9 frs. 40 per can of 5 litres, being equivalent, at current exchange, to 56 cents per American gallon. A further reduction is expected before the end of the year, but the determining factors now are exchange rates and freights. The American system of bulk storage and curb side pump distributing stations is making great headway in France, and particularly in the neighborhood of Paris. Dealers who stock gasoline in cans are obliged to cut their profit to almost vanishing point in order to compete with the pumps. The French motoring public appears to appreciate the time saved and the economy gained by use of pump-filling stations compared with the can system.



Grinding cylindrical surface of piston and piston pin (Landis)



# A New Principle Used in Machine for Producing Spur Gears

Multiple cutters are employed to form several teeth simultaneously. Operation is similar to that of a vertical shaper except that the tools are held stationary and the gear blank is reciprocated.

**A** DISTINCT innovation in gear production methods is employed in a newly developed machine for the production of spur gears in quantity. In the usual type of gear planing machine one tooth is cut in the blank at a time, a single cutter being used. This principle is departed from in a new type of gear cutter which has been developed by the Stevenson Gear Co., in which all of the teeth or a simple fraction thereof are cut at the same time. Evidently, if the number of teeth in the gear to be cut is a prime number, the same number of cutters as teeth must be used; if it is an even number, half the number of cutters can be used, and if it is divisible by three, one-third the number of cutters as teeth will do. The essential member of the machine is a special tool head which consists primarily of a series of radially disposed tools spaced about the circumference of the blank to be cut.

This machine operates in the same manner as an ordinary vertical shaper, except that the tools are held stationary and the gear blank is reciprocated past the tools. The mechanism of the machine consists essentially of a ram carrying a blank supporting arbor and the multiple tooled head for operating upon the blank. The frame of the machine is a casting of rectangular box section with a vertical cylindrical portion at one

end. The ram is mounted in the center of the cylindrical part of the frame and the tool head is mounted above the ram at the top of this portion. The crank shaft which drives the ram is journaled near the top of the rectangular section; it is provided with an adjustable crank head at the end next to the ram and is driven through back gears by an electric motor. The arbor which carries the gear blanks is not made solid with the ram but fits in a socket in a spindle which is journaled inside the ram and is free to rotate independently of the reciprocating motion imparted to it by the ram. An intermittent indexing movement is imparted to the spindle after each cutting stroke by an intermittent gear train. The machine is 7 ft. high, weighs 17,000 lbs. and when operating to full capacity is driven by a 100 hp. motor. Its capacity is for gears 12 in. in diameter, 6-in. face and 4 diametral pitch.

The tool head consists essentially of a flat steel disc 3 ft. in diameter, provided with a hole at the center and a number of radial grooves cut in its face in which the tool bits are arranged like the spokes of a wheel about the circumference of the gear. Successive feeding movements are imparted to the tools by an annular sectional cam ring. As the gear blank is reciprocated past the cutting tools, the tools are gradually fed in by successive cuts to the full depth of the tooth. At the completion of each stroke of the ram and before the next cut begins, the gear blank is indexed a space equal to one tooth, thereby presenting a different tool to each tooth from the one which made the previous cut. After the tools have been fed in to full depth, they are held stationary in that position while the cutting process continues until the gear has indexed one complete revolution, thereby giving each tool an opportunity to take one last cut on each tooth. This final complete index insures a uniformity of spacing of the teeth in the gear equal to that of the indexing mechanism. Uniformity of the tooth form is secured even though the tools themselves may be far from uniform for it is at once apparent that if any tool is longer or wider than any other tool, even though it be only a thousandth of an inch, that portion of it which is longer or wider will take one last cut on the corresponding portion of each tooth in the gear, thereby eliminating any variation which may have been caused by previous cuts. It is claimed that by this process of finishing all the teeth of a gear with a single

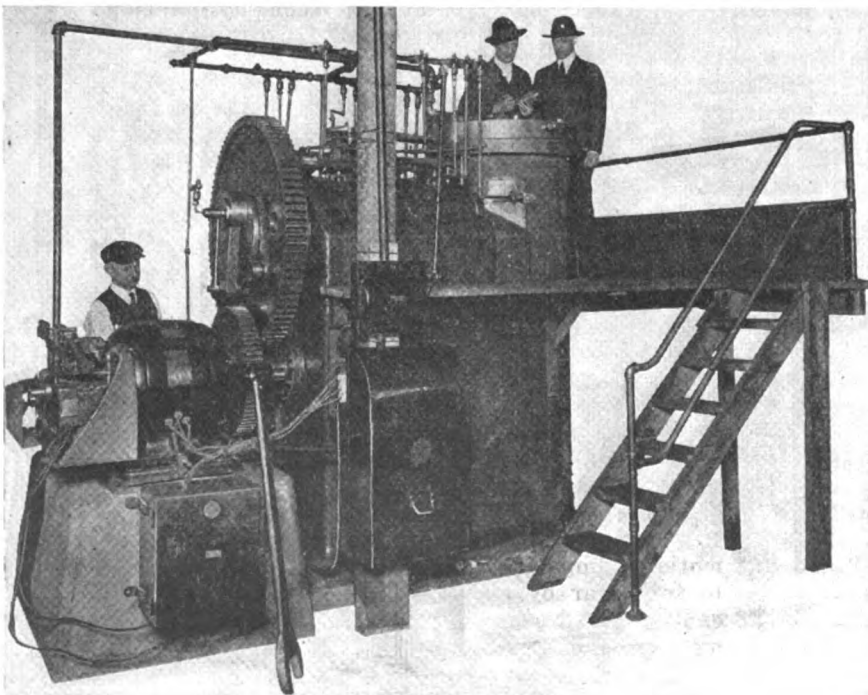


Fig. 1—Stevenson multiple cutter gear shaper

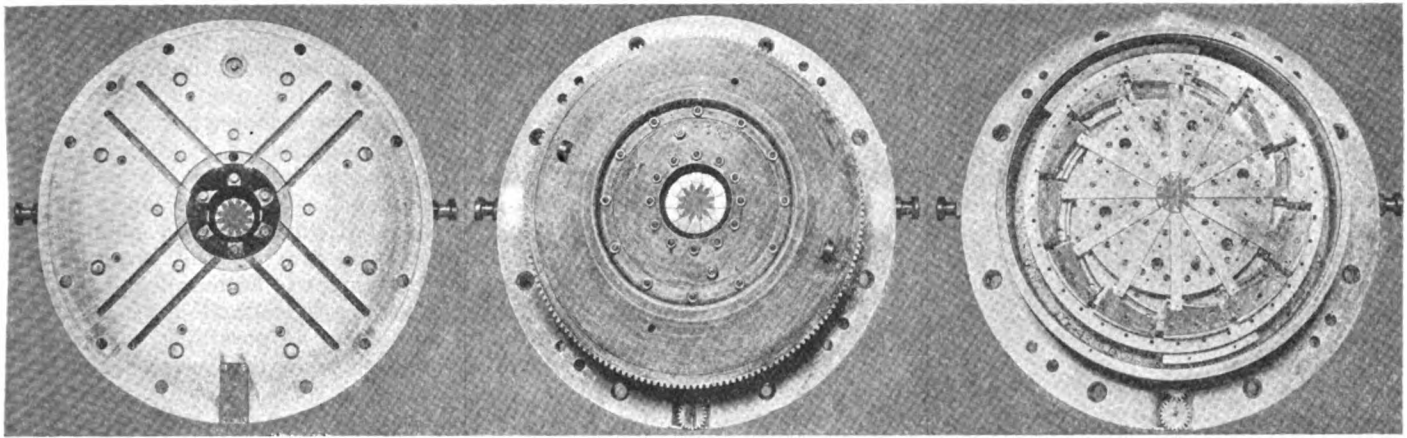


Fig. 2—Tool head for Stevenson gear shaper

Fig. 3—Bottom view of tool head

Fig. 4—Tool head, showing tools and feed cams

finishing tool, this machine attains great accuracy, and the speed is multiplied by the number of tools operating on the gear blank at one time.

Fig. 2 at the top of this page shows a top view of the tool head as it appears when in operation on the machine. Fig. 3 is a bottom view as it appears when taken off of the machine ready for disassembly or adjustment. In Fig. 4, the tool head is partly disassembled to show the principal details of the mechanism. When it is mounted on the machine, as in Fig. 2, the only working parts to be seen are the points of the tool bits surrounding the gear blanks and the small depth adjustment dial seen in the upper part of the illustration. The four pairs of T slots seen in this illustration are for attaching a piloting device which is used on extremely long and slender arbors which may need an outer support. Two tool heads are provided for each machine and while one is in use on the machine, the tools of the other are being sharpened and re-set ready for use after the tools in operation begin to dull. The tool head is held in place by 8 studs and nuts. When it is desired to set up a new job or to sharpen the tools, these nuts are taken off and the head is lifted off the machine and replaced by the other head. This arrangement permits the machine to operate practically continually with little loss of time on account of set-up and sharpening tools. As the tool head is taken off the machine, it is turned bottom side up on trunnions as shown in Fig. 3. The clamp gear and plate are then removed, exposing the tools and feeding mechanism as in Fig. 4.

The tool bits shown in Figs. 4 and 5 are rectangular in section, except the lower side, which is in the form of a "V." The gear tooth profile is formed at the inner end of this tool and is backed off to permit sharpening without changing the form. The outer end of this tool rests against a spiral cam surface and is ground in the form of an exact radius. A small pin near the back end fits in a groove which has an opposing spiral surface and retains the tool in close contact with the other cam surface to insure correct contact, as well as to withdraw the tools to their starting position after the cut is finished.

The individual cam lugs are mounted on a large ring which encircles the tool bits and spacing plate and are held down by T bolts which fit in a circular T slot in the ring. The tool bits are adjusted for depth independently by moving these cam lugs individually along the T slot relative to the cam ring and each other. Simultaneous feeding movements are imparted to the cam ring through the 2 idler gears seen in the lower part of Fig. 4 and are produced by a feed mechanism

which will be explained.

The final depth to which the tools are fed is determined by an adjustable stop which limits the rotary feeding movement of the cam ring. This feed mechanism being spring actuated, the position of the depth controlling stop can be varied within reasonable limits without resetting of the feed mechanism. This is particularly desirable during the operation of the machine in cases where the tool bits may not have been set to exactly the right depth in the beginning or in cases where the keen edge wears off the tools and they begin to cut gears that are uneven or oversize long before they are actually dull. The dial which controls this adjustment is seen in the upper part of Fig. 2 and can be reset quickly when desired.

In order to provide relief for the tools on the back stroke of the ram, a reverse feeding movement is imparted to the cam ring and before the beginning of the cutting stroke; the forward feeding movement of the cam is made great enough to compensate for the slight retraction for relief and also to provide the necessary additional feed for the depth of the next cut.

The large gear and plate shown in Fig. 3 are used to intermittently clamp and release the tool bits during the cutting and feeding operation. The lower central plate is mounted directly above the tool bits and is provided with adjustable set screws and lock nuts above each tool. The outer gear member is free to rotate about the central plate and is provided with screw threads which engage a corresponding threaded portion of the tool head base. A rotary reciprocating motion imparted to this gear by a cam operated segment clamps the tools during the cutting operation and releases them

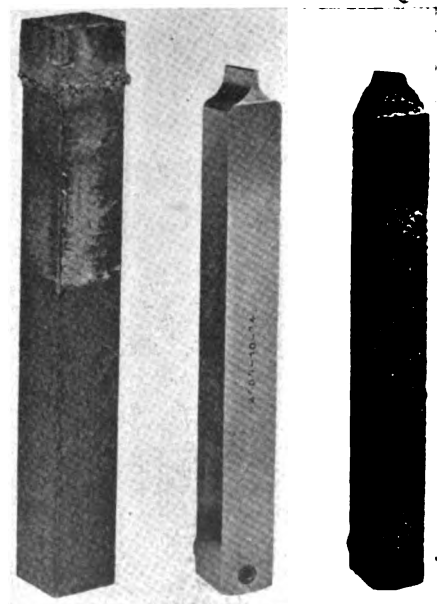


Fig. 5—Tool bits used with Stevenson gear shaper

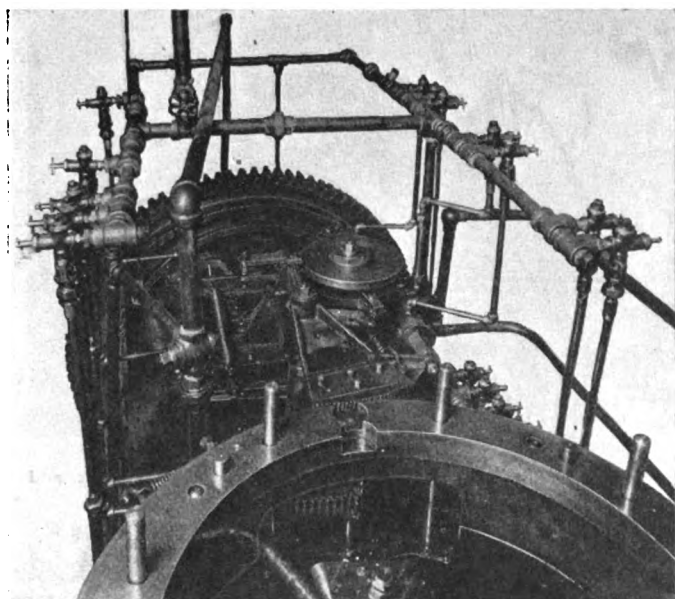


Fig. 6—Feed and clamping mechanism

during their relief and feeding movements. This clamping arrangement by forcing the "V"-shaped seat on the tool bit into a corresponding "V"-shaped seat on the spacing plate in the tool head serves to centralize and accurately locate the cutting point of the tool and in addition to take up clearance and looseness, so as to eliminate vibration and chatter.

The feed and clamping mechanism shown in Fig. 6 comprises the segments and cams for actuating the tool head feed cam and the tool clamping gear. The feed cam segment, which is shown near the center of this illustration, swings about the central stud as a fulcrum and is moved directly by a spiral cam. This cam is rotated intermittently by a ratchet on which it is mounted and can be adjusted to produce various feeding motions. It can be seen from the illustration that this cam has a

long gradual slope for the feeding movement and a sharp descent for quickly returning the tools to their starting position at the completion of the cutting operation. The slight retraction for producing the relief movement is accomplished by mounting the fulcrum stud eccentrically on a shaft, which is given a partial rotation by a face cam on the large driving gear. The tool clamping gear segment seen in the lower part of the illustration is actuated directly by a push rod in contact with another face cam on the large driving gear. The releasing movement is accomplished positively, but the clamping movement is effected by means of a spring, in order to eliminate the possibility of breaking some part if the clamping mechanism were accidentally adjusted too tight.

The indexing mechanism, as shown in Figs. 7 and 8, consists of a split bushing guide, one-half of which is attached to the ram spindle, the other half being attached to a revolving drum on which is mounted a worm gear driven by a worm and an intermittent gear train. The intermittent indexing movement is derived from a Geneva wheel and is transmitted through a set of change gears to the worm and worm wheel. By varying the ratio of the change gears in the train, indexing movements for any desired number of teeth may be obtained. Minute angular adjustments of the spindle position varying by one second of arc, for locating keyways, teeth of cluster gears, etc., are obtained by means of a differential clutch between the worm and worm shaft.

The main crank shaft is connected to the large back gear by a quick return crank of the drag link type, as seen in Fig. 1, which imparts a slow motion to the ram during the cutting stroke and a quickly accelerated motion for the return. The driving motor is mounted on a sliding base and drives through a single set of speed change back gears. The drive for the indexing mechanism is taken direct from these gears. The pump for circulating the cutting oil is driven from a small sprocket on the end of the motor shaft opposite the driving pinion. The motor is controlled by a push button switch, automatic compensation and solenoid electric brake.

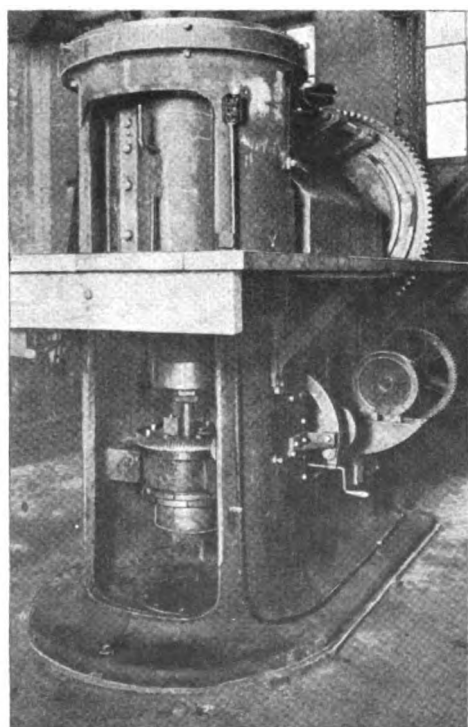


Fig. 7—View showing indexing mechanism

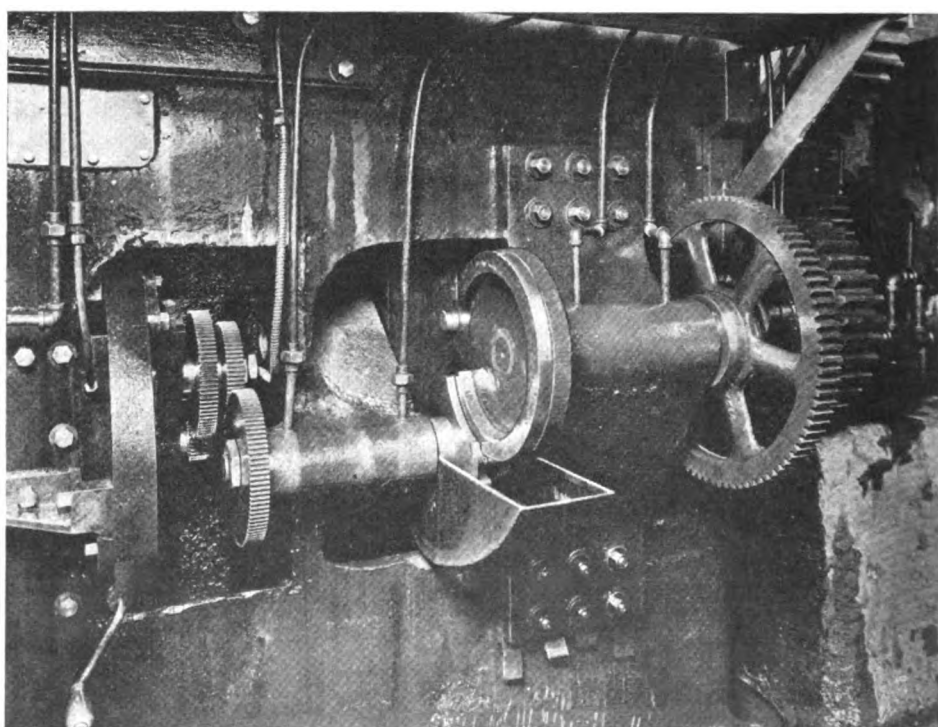


Fig. 8—Another view of indexing mechanism

# Educating the Truck Dealer to Sell Transportation

The dealer must be taught to sell transportation. He must learn how to make a detailed analysis of specific haulage problems; how to determine the truck units best fitted to perform efficiently in each case. Here is how one manufacturer is presenting transportation analysis to his dealers.

By Norman G. Shidle

THE future development of the motor truck industry depends largely upon the recognition by manufacturers of the broader aspects of merchandising problems. The truck is a unit of transportation and must be marketed as such. The truck manufacturer is selling transportation rather than motor vehicles. To properly sell transportation considerable data as regards operating conditions, operating costs, etc., must be developed. Principles underlying proper analysis in any given instance must be determined and tested. The task embodied in developing these features of transportation merchandising has scarcely been begun and the individual effort of all manufacturers will be necessary before sufficient data can be obtained to form the basis of any comprehensive study.

It is possible immediately, however, to discuss the factors entering into the analysis necessary in selling truck transportation equipment to the user. A few firms have recognized the importance of the problem confronting them, have developed certain principles and, in specific instances, have accumulated considerable performance data.

The manufacturer is likely to find that he will have to be the leading spirit in developing this idea of selling transportation, of outlining detailed methods of accomplishing it, and of instructing his dealers both in fundamentals and in details. For this reason the work of the Selden Truck Co. is of special interest at this time. This company has outlined for its dealers the various factors entering into a transportation analysis, has instructed its dealers in the use of the analysis and has shown the relation between the various factors involved. This analysis probably is not the last word on the subject, but it is far in advance of the methods common to truck selling to-day and constitutes an excellent example for study.

There are two main heads in the transportation analysis developed by this company. They are:

1. Basis of analysis; items to be known and considered.
2. Method of procedure.

The first division has to do with determining the conditions under which the truck will have to operate, the material it will haul, etc. The second division relates to the type of truck best adapted to the conditions outlined and the exact cost of operating that truck. The various divisions of the two main heads are worth discussing in detail.

The first division under the first head is the material to be hauled. Concerning this factor it is necessary to know the kind of material and the quantity in which it is to be hauled. It is also necessary to know the methods used in assembling the material for loading. It

often happens that inefficient methods of assembling the material increase trucking costs materially. This concern takes the attitude that the truck salesman should understand every factor affecting trucking cost, whether it relates directly to the running of the truck or not. Thus, if the salesman finds that the assembling of material is not being done in an efficient manner, he is expected to point out to his prospective buyer how those conditions can be improved.

Then road conditions must be studied. These will have a direct affect upon operating costs and consequently must be understood by the salesman before attempting to solve the particular transportation problem.

Next comes the problem of loading conditions. Loading devices may be applicable which would reduce appreciably the loading time and cost. The load must be assembled in the best possible manner taking into account loading and unloading time as well as safety of the load during driving time.

Routing conditions must be analyzed. The number and place of stops, the unloading conditions and the laws restricting unloading conditions all come in for consideration. The distance of the trip to be made constitutes another factor, while garage conditions are also important. The distance of the garage from the starting and stopping point of the regular runs is an important factor in operating costs, while the equipment of the garage will have an effect upon the way in which the truck will be serviced. All of these items, then, are to be known and considered before attempting to tell the man what truck equipment he should buy. Presented in outline form they appear as follows:

1. Items to be known and considered.
  - A. Material to be hauled.
    - a. Kind and quantity.
    - b. Assembly of material.
      1. Plant conditions.
      2. Can they be improved?
  - B. Road conditions.
  - C. Loading conditions.
    - a. Loading devices.
    - b. Load assembly.
      1. Plant arrangements.
      2. Devices for efficiency.
  - D. Routing conditions.
    - a. Routing of stops.
    - b. Unloading conditions.
    - c. Laws restricting unloading.
  - E. Trip distance.
  - F. Garage conditions.
    - a. Distance from loading point.
    - b. Conveniences for working.

This brings the analysis to its second stage, termed in the Selden outline, "Method of procedure." Under this head there are two main factors, namely, operations and



cost. Seven points are to be considered under "operations."

First the salesman—or transportation engineer, as he should be in fact, if not in name—must determine from the facts already considered the proper size of truck and type of body best adapted to economical operation under the given conditions. It will immediately be objected that this is easier said than done in many cases. That is true, but the salesmen of this truck are being materially assisted by a weekly data service which present them with actual figures and experiences of trucks already in use. This service is discussed more fully later in the article.

The next factors are the standing time and the running time. In connection with the former, loading and unloading time must be found, while the type of load and road conditions will be determining factors in the latter case. Then the total time for the various trips must be determined. From this can be computed the number of possible trips during each day. In making this computation delays should always be allowed for and the traffic conditions of the trip may have to be analyzed to determine what that allowance should be. The allowance for delays is analogous to the allowance made in time study work. The scientific analysis determines the theoretical possibilities of perfect performance and then allowance is made in the light of practical difficulties and experience.

The amount of material that can be hauled is determined. This quantity is given in barrels, gallons, pounds, tons, board feet, or in whatever units are common to the industry of the prospective purchaser. This is a point not always recognized by truck salesmen.

The purchaser is interested in how much of the material he deals in can be carried, and he is used to gaging amounts of that material in certain units. To tell a lumber man that the truck will haul six tons a day does not give him any mental picture of what is to be accomplished. The Selden company tells more than one story of sales gained or lost through failure to recognize this comparatively small factor of sales psychology.

Then the actual work done by the truck is determined. This work is usually expressed in unit miles, i.e. that number of units multiplied by the number of miles those units are carried. The actual computation is not made on this theoretical basis, however, since it has been found that practical contingencies render it improper for actual use. The rule used is as follows: "To determine a unit mile when loads are carried one way only multiply total loads carried by one-half the round trip distance. . . . To determine a unit mile when loads are carried both ways multiply total loads carried by actual round trip distance." The latter case, of course, is in accordance with the theoretical rule.

Special care is always taken to explain fully what a unit-mile is, since many purchasers are not familiar with the term and its usage. Often, in fact, it is advisable not to insist too strongly on this terminology where the prospective purchaser is unfamiliar with it. This completes the first section of this second main division. In tabular form its looks like this:

## II. Method of Procedure.

### A. Operations.

1. Determine from previous facts proper size of truck and type of body most economical.
2. Standing time; loading and unloading.
3. Running time; depending upon load and road.
4. Total trip-time.
5. Trips possible each day.
6. Amount of material hauled.
7. Number of unit-miles; work actually done.

After this careful analysis has been accomplished it is possible to figure the probable costs of operation. These must in turn be analyzed and subdivided so that the prospective purchaser may know accurately what to expect in the way of truck transportation costs. The first factor under cost is that of investment. This item includes cost of chassis, body, cab, freight charges, war tax, etc. It will be noted that the truck man has already done a great deal of constructive analysis work for the benefit of the prospective purchaser before the matter of original investment is discussed. This is proper not only from the standpoint of sales psychology, but also from the standpoint of good transportation. The initial investment—or any other costs for that matter—can be properly visualized only in their relation to other factors of transportation.

Next to the original investment come the fixed charges, the charges that must be expected continuously. These charges include interest on the original investment, insurance, garage, taxes and license. They are computed on a per year and per day basis. The transportation engineer in any territory must be thoroughly familiar with the insurance, garage and tax rates in that territory, as well as with the details of all the laws regarding trucks. Liability, fire and theft, collision and property damage insurance are included in the cost analysis, although the items are separated so that the prospective purchaser may eliminate any that he feels are unnecessary in his particular case.

Then there are the variable charges. These are computed on a per mile basis and include fuel, oil, tires, maintenance, depreciation. Here again the data service comes to the aid of the salesman in aiding him to determine accurately the variable charges in a particular case.

Drivers' wages are included as a separate item. Then the total cost of operation is computed and included as the final item under "cost." There are several steps in

Analysis of Selden Truck Operation and Costs	
Owner—Luger Furniture Co. Address—North St. Paul, Minn.	Business—Furniture Manufacturing Truck Capacity—2½ Ton ("A" Model)
Operation Records	
A—Total Period	B—Daily Averages
1. Period covered..... 8 mos.	12. Round Trips.....
2. Days operated..... 75	13. Deliveries—Pickups.....
3. Days out for Repairs.....	14. Quantity—Out.....
4. Total Round Trips.....	15. Quantity—In.....
5. Deliveries—Pickups.....	16. Total Quantity.....
6. Quantity—Out.....	17. Miles Traveled..... 50
7. Quantity—In.....	18. Miles per Round Trip.....
8. Total Quantity.....	19. Quantity per Trip.....
9. Miles Traveled..... 2750	20. Unit Miles.....
10. Gasoline—Gals. used..... 600½	21. Miles per Gal. Gas..... 6.2
11. Cyl. Oil—Pts. used..... 300	22. Miles per Pt. Oil..... 18.75
Cost Records	
C—Investments	D—Variable Charges—Period
23. Chassis Complete..... \$2500.00	40. Fuel at 20 cts. Gal..... \$ 100.15
24. Body..... 153.00	41. Cyl. Oil at 1½ cts. Pt..... 15.00
25. Cab..... 90.00	42. Tires—5,750 Miles..... 215.75
26. Painting..... 40.00	43. Depreciation—5,750 Miles Life..... 106.75
27. Special Equipment.....	44. Depreciation—40—50,000 Miles Life..... 72.00
28.....	45. Maintenance and Repairs (Est.)..... 272.00
29. Total Investment..... 2653.00	46. Total Variable Charges..... \$1147.65
30. The Value—Pneumatics..... 675.00	47. Total Fixed Charges..... 100.00
31. Total less Tires—to be Depreciated..... 2001.50	48. Total Operation Cost..... \$1253.65
E—Fixed Charges—Yearly	F—Daily Costs
32. Interest on Total Inv. @ 6%..... \$ 219.30	49. Cost per Day Operated..... 316.70
33. Taxes and License..... 1.00	50. Cost per Mile Traveled..... .804
34. Insurance..... 90.00	51. Cost per Unit Hauled.....
35. Garage Expenses..... 100.00	52. Cost per Unit—Mile.....
36. Total Per Annum..... \$421.30	53. Repair Cost per Mile—Est..... .02
37. Total per Month..... 35.10	54. Repair Cost per Mile—Actual..... .012
38. Total for Period 8 mos..... 105.30	
Note Carefully	
This 2½ Ton Selden has operated with another Selden to connect two factories which are 28 miles apart. With railroad switches at the doors the factories suffered heavily because of four day trip necessary for shipping. The trucks have reduced this to a 9 hours trip, travelling an average of 50 miles per day at the cost of \$16.70. A remarkable low rate to pay for the services obtained. The total repairs for the 75 days was \$45.00 although an estimate of 2 cents per mile or \$100.00 was set.	



determining this total operation cost. First, the total variable charges are multiplied by the total miles traveled. To this are added the total fixed charges and the total drivers' wages. The result obtained is the total cost per day. From this the total cost per mile and per unit-mile can readily be computed. For greater clearness the various factors under the second division of "Method of procedure" may be tabulated as follows:

**B. Cost.**

- a. Investment.
- b. Fixed charges; per day and per year.
  1. Interest on investment.
  2. Insurance.
  3. Garage.
  4. Taxes and license.
  5. Total per year; per day.
- c. Variable charges; per mile.
  1. Fuel.
  2. Oil.
  3. Tires.
  4. Maintenance.
  5. Depreciation.
  6. Total per mile.
- d. Driver's wages.

In working out these costs, depreciation is figured according to the following rule: "To find depreciation per mile subtract cost of tire from total investment and divide this result by estimated life of truck in miles." Obviously there is room for variation in nearly every factor mentioned throughout the entire analysis. The aim, however, is to render the figures as nearly truthful as possible, for the cause of transportation—in which every truck manufacturer has a vital interest—is greatly injured every time inaccurate figures are given; figures which promise more than subsequent operation proves practically possible.

The advisability of trailers is also a factor to be considered. When they are necessary the type must be determined and 15 to 30 per cent added to operating costs.

Such an analysis as the foregoing, however, provides a sound basis upon which to base an accurate estimate of future performance, and indicates, as well, the factors to be considered in calculating past performances on the basis of actual records. There is great need in the industry for more data concerning truck operating costs under various given conditions. Such data can be compiled only by careful investigation over a long period of time and by many manufacturers. Some such system of transportation analysis, if taken up by a large number of truck manufacturers would accomplish several things, each important to progress:

1. It will build a permanent business for the manufacturer; it will enable him to sell more of his own trucks.
2. It will bring the motor truck more favorable notice as a real economic factor in transportation.
3. It will develop the use of trucks in a sound and economic manner.
4. It will make for the permanent progress of the truck industry as a whole.

The weekly data service used by this company has been mentioned. This service is of interest because of its function in connection with the foregoing transportation analysis and also because of its part in building up data on truck operating costs. Its points of contact with the transportation analysis have already been indicated, but the system itself has not been described.

**Weekly Data Service**

From all parts of the country the Selden company collects information concerning the performance of its trucks in various industries. The company asks men

who have been operating the trucks to write a few brief paragraphs concerning the conditions under which the truck has been performing, the type of loads it has been carrying, the routes it has been making and various other details of its performance.

In addition to this, it procures from the man operating the truck operation and cost records. This analysis sheet has two purposes. First, to provide a suitable form upon which the operation and cost data of Selden trucks can be tabulated as received from owners, presented to prospective purchasers that they might profit by the experience of the owners.

Second, to provide a suitable form upon which to list the various items of operation and expense which would be incurred by the prospective purchaser, if a Selden was put to work.

This material is all practical and accurate information. It should not be confused with the ordinary house organ "performance stories" which are so common. These are detailed studies of trucks being operated in various industries, of trucks performing regular routine hauling jobs.

Each week all dealer salesmen receive one of these data sheets; each week their files of data grow and on the basis of the figures and performances recorded elsewhere they are aided in making new analyses.

This does not mean that the figures of one performance can be used to predict costs in another case. Thorough analysis of each individual case is essential, but the general aid rendered by such a service can be easily understood. A sample of one of the analysis sheets which comprises part of one week's data service is shown in the accompanying cut. The value of data of this kind grows as more of it is accumulated and the value to the industry will grow as more companies begin to gather it.

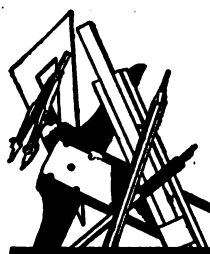
## Number of Automobiles Licensed in Great Britain

**P**ARTICULARS issued by the Ministry of Transport indicate approximately the number of automobiles in use in Great Britain on May 31. The figures given apply to the number of vehicles for which licenses have been taken out and are issued primarily in connection with a return showing the yield of the new motor tax from Jan. 1 until May 31. This tax, which is applied in one form or another to private passenger cars, trucks, motorcycles and hackney carriages (otherwise public passenger vehicles) yielded £8,436,000 (about \$42,000,000). The number of vehicles licensed during the period mentioned as compared with the year ended March 31, 1920, was as follows:

	1921.	1920.
Private Passenger Cars	212,000	185,700
Motorcycles	370,000	278,600
Public Passenger Vehicles	95,300	71,400
Trucks	16,000	No Record
Agricultural Tractors	10,160	No Record

In arriving at the 1921 figures allowance has been made for the fact that in the case of private cars and public passenger vehicles quarterly licenses were taken out in some cases.

As giving some indication of the average horsepower of private passenger cars in use, the average yield of tax per license is of interest, for the tax in this class is at the rate of £1 per horsepower. The average yield per license was £17 6s, which indicates that the average horsepower is 17.3 by the rating adopted, namely .4D<sup>3</sup>N where D equals the diameter of the cylinders in inches and N the number of cylinders.



# The FORUM



## Variations in Tread

Editor, AUTOMOTIVE INDUSTRIES:

Referring to Mr. David Fergusson's letter in the Aug. 4 issue of the AUTOMOTIVE INDUSTRIES, there is little doubt that the 56 in. tread for automobiles was taken from the 56 in. standard wagon tread of the North, and his own statement that for fifteen years he has used this tread seems to establish this, and it is difficult to see how the standard was derived from the railroad tread.

As a matter of fact, the railroad tread was derived from the standard 56 in. carriage tread which was in use many years, both in this country and England, before the railroad was even dreamed of.

The suggestion that the 56 in. tread should be adhered to because trolleys have this tread is also equally bad, for if this tread is adopted and the automobile run on the trolley rails it is absolutely the worst tread that could be adopted, as the tires are apt to get badly worn and cut, as pointed out by Mr. Fergusson, as both wheels tend to run in the groove of the rail instead of on the flat surface. If slightly wider at least one wheel will run on smooth surface.

If any one will take the trouble to measure the width of the trolley rails to the center of the flat surface this will be found to be about 58½ in., and if the automobile was made with this tread both wheels would run on smooth and flat surfaces, except when crossing switches, and the tires would be preserved instead of being worn, and for this reason the writer in 1904 made 58½ in. as his standard tread (long before any automobile standards were adopted), for in those days, before there were any hard roads outside of the cities, running on trolley rails was oftentimes not only desirable but necessary for miles at a time.

The fallacy of a 56 in. standard is shown by Mr. Fergusson's own statement, that so prominent a company so easily departs from it, and if this is to be done it is just as easy to vary half a foot as half an inch.

Neither is it a fact that the dirt and clay roads have distinct ruts (except in the engineer's mind) until they are created or produced by the engineer's creation of a standard tread, as pointed out in my previous letter, and for this reason, if none other, should be abandoned. If it were possible the groove of the trolley rail would be made as large as the deepest rut of a dirt road.

Further, it is not a fact "that on hard roads almost every part of the road is traveled and there is no necessity for varying the tread" and many improved state roads have signs, "Do not travel in the same rut." As previously pointed out, until we had the cement or concrete road we have never been able to make an "improved" road that would not go in ruts where standard treads were used.

The advantage of varying the tread does not apply so much to hard roads as Mr. Fergusson seems to think in his reference to paragraph 21 as it does to soft roads as pointed out in paragraph 22.

Neither was it suggested to make cars (automobiles) 65 in. or 70 in., but from 48 in. to 63 in., as stated in paragraph 20. The wider tracks referred to trucks and

they exist to-day on the 3, 5 and 7 ton trucks and even if they are not 70 in. to the center of the wheel, on solid tires, they are more than this to the outside of the flat portion.

As Mr. Fergusson points out, "Unfortunately many of the latest improved highways are almost too narrow for cars of 56 in. tread," but this doesn't take the 65 in. to 70 in. tread trucks off the road, neither will it keep them out of the garage.

Admittedly the car would be much improved in appearance and have a better balanced appearance by being considerably narrowed in body width and vice versa—so long as the wider exists the same would apply to a wider tread; one is as logical as the other, and perhaps as easy to bring about, and it is up to some automobile maker to have the courage of his convictions and boldly adopt say a 60 in. tread or a 10 in. narrower body.

Either would have the same advantages as regards the problems of body construction, disappearing windows, appearance, riding qualities, mud guards independent of the body, etc.

In regard to external and internal brakes it is, I believe, a fact that not one European car or American truck is fitted with external brakes, and even the Pierce-Arrow trucks, which are of later design than the car, have this distinction. If internal brakes become inoperative from oil this could probably be overcome by an improved method of preventing the oil from escaping from the axle and certainly want of contact of surface is due to bad design. The difference in surface between an external and internal brake applied to the same diameter of drum only 3/16 in. thick is not so much. External brakes drag 75 per cent of the time more or less and, as pointed out, the soft braking material quickly cuts out. W. J. P. MOORE.

## More Accessible Emergency Brakes

Editor, AUTOMOTIVE INDUSTRIES:

I have been reading with much interest the recent discussions on four wheel brakes, as set forth in the Forum, and I should like to add another feature pertaining to braking and brakes. The great majority of car builders seem to be constantly overlooking the emergency brake.

It is almost a physical impossibility for the average driver to reach the emergency brake handle, since it is usually hidden under the dash, when occupied with one foot on the clutch and the other foot on the service brake, looking forward trying to avert an accident. It is in time of danger that such an important thing as an emergency brake should be within easy reach.

Less than half a dozen manufacturers have arrived at any definite improvement over the old style hand brake, which is usually difficult to reach in case of an emergency.

Generally speaking, the service brake bears the brunt of the braking effort applied to the rear wheels, and it is true (as Mr. Moore says) that about 75 per cent of these brakes are either dragging or are loose; what then about the emergency brake?

The active part of the emergency brake now seems to have degenerated into a wheel-lock used to keep the car

from moving while parked on an incline, but most drivers shift into reverse to utilize the braking power or inertia of a dead motor.

I have done some remodeling of brake handles on several makes of cars and I find that by cutting off the shank immediately above the pivot pin hole and welding in enough material to lengthen the handle to any desired height it may then, by bending it to conform to the dash, be placed within easy reach of the driver. The release rod and catch are operated the same as before with an extension welded into the rod. The action of the handle is improved by the additional leverage and so adds both a mental and physical security to the driver. It is surprising to note the psychological effect obtained by this simple remodeling, as shown by count of the number of times this remodeled brake handle is brought into use compared with its more obsolete form. This naturally results in a decrease in the constant wear on the service brake band.

I should like to hear from some of the manufacturers as to why some such changes are not made in the prevailing emergency brake handles; is it the cost of the change or pure negligence and indifference?

R. W. ORRELL.

## Some Features of Body Design

Editor, AUTOMOTIVE INDUSTRIES:

The letter of Mr. W. J. P. Moore in the *Forum* of July 28, mentions the capacity of the rear seat. Speaking from the body builders' point of view, we know that the rear seat cannot be made to accommodate three adults comfortably, with 56-in. tread, but we do know that the public, including the majority of special body buyers, insisted on the maximum seating width at the rear. With the increase in the number of bodies that eliminate the folding seats, the necessity of the additional seat room is greater than ever.

The writer received an inquiry from the Pacific coast last week asking if we could build a coupé body with room for three on a straight seat across. Think of what that means. The driver sitting back of the wheel occupies one-half the body width and by some magical means, the body builder is expected to arrange for seating two persons comfortably on the remaining half of the body.

Mr. Moore mentions 20 in. as the space for each person, but 17 in. is the maximum allowed by body builders, and public conveyances sometimes allow only 16 in. The maximum width on an open body rear seat is 51 in., and as the shoulders of those seated at the sides can extend beyond this, a fairly comfortable seat for three can be arranged. On a closed body the maximum seat width is 48 in. To seat three, a pillow may be used in the center that will put the shoulders of the middle passenger forward of those at the sides. This will be a very acceptable seating arrangement for most people.

The stock body furnished by the car manufacturer may at times be carried over to suit material on hand and manufacturing conditions, but as a rule manufacturers, except those who build the very cheap car, change the body models each season to incorporate the needs that their experience with the trade during the preceding year has taught them. The writers' experience as stated above, is that even the special-order bodies must seat three at the rear.

In paragraph 11 Mr. Moore suggests that all seats except the driver's seat be made movable and capable of being adjusted to suit different occupants. This has been tried in various ways and one manufacturer featured such an arrangement at the New York show a few years ago. The majority of car users do not take kindly

to anything that is adjustable. They don't want to even fold down the touring body top. All folding-top body designs except the cabriolet have been eliminated, and the cabriolet is used in limited numbers. Removable sides can be used to convert the California top into a closed body, but this design, which has excellent and substantial features, has not taken hold to the extent that was anticipated, due simply to the inherent dislike of the public to be troubled with mechanical devices that mean work, at a time when they look forward to doing nothing but drive or ride in the car. They will change a tire because there is no other way out, but the writer's experience has proven it better to leave all convertible and mechanically operated arrangements out of the body that you can possibly do without.

In paragraphs 12 and 13 Mr. Moore speaks of the seats and trimming. The idea of air cushions being a substitute for those now used may have commercial advantages. The increased tendency to roll would prevent the use of a single air bag, but the possibility of air cushions would be feasible if the cost can be made low enough.

As to paragraphs 15 and 16 the writer agrees with Mr. Moore that some plan of mounting the body and carrying it suspended, so that the distortions of the frame are not communicated to the body as shocks would be an advantage. The writer outlined a suggestion on this line in the June 16th issue of the AUTOMOTIVE INDUSTRIES. The advantage of some form of construction there outlined would be to eliminate the squeaks of the body and frame contact and permit the body to ride more evenly and without distortion from the frame.

GEORGE J. MERCER.

## Engine Cooling

Editor, AUTOMOTIVE INDUSTRIES:

Mr. Ludlow Clayden's remarks on "Improved Engine Cooling" in the July 28 issue are of interest. I am in the main in agreement with his comments in the engineering number regarding the relative positions of air and water cooling.

To state, however, that the present position of the air-cooled engine is analagous to that of the two-cycle engine is a deal more amusing than accurate. The success of the Franklin car I think demonstrates that air-cooling is by no means as undeveloped as suggested.

Mr. Clayden apparently entirely ignores the progress that has taken place in Europe with the large air-cooled aircraft engine cylinder, although it is admitted that the reports seem exaggerated to those who have not witnessed the results. However, it is but a matter of a short time before it will be demonstrated with cylinders of domestic origin that such reports are not flights of fancy and that claims to equality of brake mean effective pressure and of exhaust valve reliability, with the best water-cooled engines have some foundation in fact.

Mr. Clayden rightly says that the air-cooled engine is not waiting for any great invention to aid in its development. Its development in Europe has been the result of common sense and extensive careful research, the cylinders having been to all practical purposes designed on the test engine.

The lessons learned from the high-efficiency water-cooled engine are in the main applicable to the air-cooled engine if due allowance be made for the variation in the specific heat of the cooling medium.

S. D. HERON.

**B**OTH the Dutch and the Belgian governments publish at intervals lists of articles which may not be imported into the respective countries. The latest lists do not include any products of the automotive industry.

# An English View of American Industrial Relationships

Two keen British observers visited America recently, and, after returning to England, made some interesting comments regarding American industry. A few comments by Mr. Tipper serve as a background for their remarks. The labor problem is prominently discussed.

By Harry Tipper

**I**T is interesting at all times to see ourselves as we appear to other people, and particularly when the conclusions of the visitors are complimentary to us. Mr. E. J. P. Benn and Mr. F. Elliott recently reported to the Industrial League and Council of Great Britain their impressions of the United States, particularly in regard to the industrial development, after a visit to this country.

Their impressions were recorded in the *Daily Telegraph*, and there are many suggestions in the statements they made.

Viewed in this way, it is obvious that the conditions in the United States are so much better than conditions in the most stable European countries, that the troublesome difficulties are really very small in comparison.

Some comment should be made upon the statement as to the differences in the attitude of labor in this country and in Great Britain.

The long history of union development, the homogeneous character of the people, and their tendency to remain in one place have accentuated the political tendencies toward socialism by the very increase of uniformity in the course of these developments.

We are fortunate in this country to have a different standpoint, but the development of trade union, uniformity of pay, and uniformity of operation lead inevitably toward uniformity of production pace in the last analysis.

The great difference in the ownership of houses by the workers in the two countries is perhaps the most important difference in influence. The vast majority of workers in Great Britain do not own their houses and the possibility of ownership is hampered by the old land laws which still exist. The workers, therefore, have no stake in the stability of the country. The ownership of real estate demands a stability and safety not otherwise visible in their necessity to the worker.

Where rent is paid weekly, and all the items are weekly, and there is no visible connection between the worker and the community, there is less hesitation about employing experimental ideas and there is a more general tendency to radical movements.

Mr. Benn and Mr. Elliott are able men, close and keen observers, and the following comments on our industrial conditions are repeated here as worthy of attention:

Mr. E. J. P. Benn said he was in America five weeks—just long enough to appreciate that fifty years would be insufficient to grasp all that America had to teach one.

But upon one point he could be definite without any qualification; the need for the closest understanding between the English-speaking peoples as

the means of saving the world for civilization was recognized by the Americans with a depth of conviction which rivalled, if it did not excel, our own.

He confessed that he had returned a more confirmed individualist than when he set out. Could they imagine a land of 110,000,000 civilized persons without a political labor party; a land in which the workers, who had never heard the words "ca' canny," regarded restriction of output as a mythical madness? The policy which was known here as "9d. for 4d." was there expressed as "nothing for nothing." The differences between ourselves and our American friends in these industrial questions were so fundamental that little use could come from the discussion of matters of detail.

That veteran leader of American labor, Mr. Sam Gompers, claimed that so far from being fifty years behind England in matters of labor organization, America was 100 years ahead. He claimed that to estimate the success of a labor movement one must not judge by the violence of its political programme; a more effective test was to go to the homes of the people. Mr. Gompers pointed with pride to the 6,000,000 working-class homes which were either completely or partially owned by their workmen occupants; to the 12,000,000 automobiles among 110,000,000 people; and to the 15,000,000 owners of shares or other forms of property which existed in that wonderful country.

America, like the rest of the world, was having her revolution, but there it was taking the form of a transference of large blocks of industrial capital into the hands of the workers in industry. The most striking example was the Ford Works, where the workmen owned no less than \$6,600,000 worth of the company's stock. The force of this movement was further shown by the fact that savings banks at street corners were more numerous in America than public houses at street corners here. Mr. Gompers claimed that he was leading the only constructive labor movement in the world.

The whole force of public opinion in America, said Mr. Benn, was directed to teaching its people how to push, while here it seemed to be concerned to teach its people how to lean.

Having expressed the view that the vast accumulation of wealth in the U. S. A. would not flow to Europe as it should do until Americans regarded Europe as a safe place for the investment of money, he said that an American Senator told him that America looked with some apprehension on the light-hearted way in which we appeared to be conducting great and novel economic experiments, particularly in the matter of legislative enactments. This

Senator gave the following list of British inconsistencies:

- (1) Our demand for German indemnities and our refusal to take German goods;
- (2) Our need for industrial activity and our taxation, which, to an American, spelt nothing but industrial murder;
- (3) Our depleted wealth and our bragging of a higher standard of living;
- (4) Our centuries of economic experience, and our flippant economic legislation, which appeared to be enacted and repealed with equal regularity and levity;
- (5) Our surrender to lassitude, the natural result of the war, and our self-infliction of doles and dope which must inevitably accentuate the trouble.

In Chicago, proceeded Mr. Benn, he heard a speaker tell a brotherhood meeting of 2500 men that "no power in Heaven or in hell can prevent America from assuming the leadership of mankind." "I am here to say that is true," said Mr. Benn, "if we are going on in the way we have followed during the past couple of years. But if we can succeed in taking advantage of the one thing we have which America has not—the one thing which has given us the trade unions and other blessings; if we take advantage of our genius for organization and turn it to constructive instead of destructive purposes, then America can do all the leading of mankind she likes; she will have to come here to learn how to do it."

American wages were roughly two and a half times those earned in this country, but it was erroneous to suppose that American labor costs were dear. American labor, as a cost factor in production, was among the cheapest in the world. He watched a man earning 7s. 6d. per hour tending three machines, which in this country would each have required a minder and a laborer to care for.

If it were true that we had to face the consequences of cheap German labor we had also to face the good, healthy, straightforward competition of efficient, hard-working, economic American labor.

The theory that America was the land of the "Almighty Dollar" was true, but all depended upon what one meant by the dollar. The impression of Americans as a grasping, materialistic crowd of moneymakers was altogether beside the mark. We understood neither America nor the dollar. While we groveled in the depths of sophistry, getting more and more miserable as we failed to find the philosopher's stone in the shape of some mystic new system, the streets of America were thronged with happy, optimistic people who talked a great deal about dollars but more about service. Most mysterious of all, one found the two words used in association.

The American, being a sound economist, recognized that the proper measure of service was not that put upon it by the man who rendered it, but the measure calculated by the one who received it. The only measure which the receiver of service could use was the dollar, which explained America's attachment to it.

The underlying inspiration, the thing which gave the cheery life which characterized that wonderful people, was not the dollar, but service. The Declaration of Independence gave to the American citizen the right to life, liberty, and the pursuit of happiness; he found happiness, satisfaction, self-respect, and independence in doing good and useful work; in rendering service.

Mr. F. Elliott, who also replied, said the deepest impression that he formed of America was that it was a nation of capitalists. The country's wealth was rapidly passing from the hands of the big people into the hands of the many, and that transference

was being welcomed by the big leaders of industry, who saw in it a bulwark for civic stability and industrial stability.

When referring to the packing houses in Chicago, he said that Swifts had 40,000 shareholders, which included 14,000 employees. The shareholding averaged thirty-seven shares per individual, and it would require 900 shareholders to pool 51 per cent of stock and exercise control. In some firms bonds were purchased on the instalment plan, a system that would be good in this country.

The standard of living and dress was higher among the workers in America. In Detroit there was one motor-car to ten inhabitants. Here it was one to ninety-five inhabitants. Few signs of poverty were to be seen. Prohibition seemed to have been a good thing; it was certainly better to have the savings bank at the corner of the street instead of the public-house. He did not know whether it was due to prohibition, but America seemed to have passed through her industrial crisis with comparatively little trouble in the way of resentment, or poverty, or strikes. They had accepted wage "cuts" in a philosophical fashion. While he was there the steel-workers' wages were cut by 20 per cent. They studied and understood economics in America.

Rather than see the works of the American Manganese Company—which supported thousands of people—closed, the workpeople and directors met, and there was a voluntary offer to accept a cut of 40 per cent in wages. The directors agreed to that, and in return they agreed to reduce the rents of the houses in which the workers lived by 40 per cent.

Then the shopkeepers agreed to reduce the prices of necessities, a most practical effort at co-operation in bringing down prices. They had no old age pensions and unemployment schemes. The Secretary of State for Labor told him and his colleague that they thought the people of England were being pauperized by their methods of social reform.

The American worker said, "Give me the highest possible wages, and in return I will give you the highest possible output and look after my own old age pension."

The American was no more enamored of the bureaucrat than we were in England. He had a slogan, which Mr. Hoover invented, "Less Government in business and more business in Government."

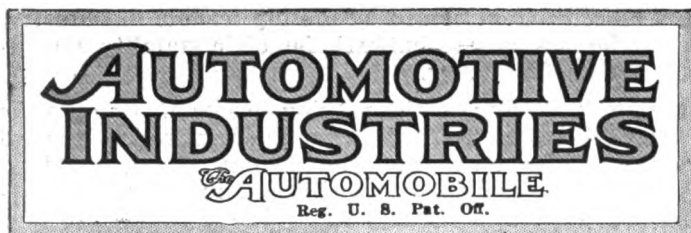
ENGLISH aircraft papers report that owing to the steadily increasing use of the air mails the German postal authorities have found it necessary to establish a main aerial post office in the Konigstrasse, Berlin, in order to be able to properly handle the mass of aerial mail which leaves Berlin daily in connection with the regular air services.

The German Government now grants a subsidy of ten marks per kilometer to exclusively German companies for flights less than 250 kilometers and eleven marks per kilometer for flights exceeding 250 kilometers.

The official stipulations, however, require each subsidized company to declare its daily services in advance and to undertake the carrying of mails and passengers. Connections at specially indicated railway stations in order to link up with the railway expresses are also insisted upon, and every effort has to be made to link up with the international air services flying through Germany and making use of German aerodromes.

In regard to the occupied zone, motor bicycles carry the mails and passengers from the nearest points at which German aircraft are permitted to land by the Inter-Allied Air Commission.





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## Truck Overloads Prohibited

THE tendency of users to overload trucks has been one difficulty met in truck merchandising. Truck transportation units often have failed to perform effectively in a given case because of continual overloading. Such failures, although not justly attributable to the truck manufacturer, have reacted against him because the user failed to understand the real cause of the poor truck performance.

Certain provisions of the Connecticut motor vehicle law are interesting in this regard. A complete file is being made in Connecticut of every commercial motor vehicle, its model number, type and carrying capacity. Motor vehicles are taxed according to total piston displacement and according to carrying capacity. To carry out this provision, Section 32 of the law prohibits the operation of an overloaded motor vehicle. A commercial motor vehicle, therefore, cannot be operated in Connecticut beyond the carrying capacity or rating of the manufacturer.

If such a vehicle is found on the road overloaded, the operator is arrested and prosecuted under this sec-

tion of the law. The state officials do not allow a two-ton motor truck to be rated as a three-ton truck simply because of the addition of a few spring leaves. To facilitate the operation of law, Section 42 requires that the maximum capacity, light weight and maximum speed in miles per hour be painted on the side of each truck.

This is one case, at least, where the state law would appear to operate to the advantage of the truck manufacturer in compelling the sensible loading and use of a truck of a given capacity.

## Variation of Power with Compression Ratio

THAT the mean effective pressure and the maximum output of an engine increase with the volumetric compression ratio used is well known, and in practically all engines the compression ratio is made as high as the character of the fuel to be used and the conditions of operation in the service for which the engine is intended permit. There is a theoretical formula for the variation of the mean effective pressure with the compression ratio, namely,

$$\text{m.e.p.} \left( \frac{1}{r} \right) y - 1$$

in which  $r$  is the compression ratio and  $y$  the ratio of specific heats, which latter for air has the value 1.41.

There is comparatively little experimental data available to substantiate this formula, because it is seldom that two engines are built exactly alike except for the compression ratio. It would be absolutely futile to try to substantiate or refute it by means of data from engines varying also in other respects, as the mean effective pressure is influenced by many other factors. Some years ago, however, the Benz company of Germany made tests on an aircraft engine with successively increased compression ratio, starting with a ratio of 5 and ending with 5.8, and the results obtained in these tests afford a means of checking the formula. In order to prevent preignition and knocking at such high compression as that corresponding to the ratio 5.8, benzol was used as fuel. The tests were even extended to cover the case of a compression ratio of 6, but it was then found impossible to prevent preignition, and the power fell off for all speeds.

For an increase in compression ratio from 5 to 5.8 the above formula indicates an increase in mean effective pressure of 6.3 per cent. In reality the increase was 16 per cent at 1600 r.p.m., 14.5 per cent at 1500 r.p.m., 12.5 per cent at 1400 r.p.m. and 10.9 per cent at 1300 r.p.m. That the increase should be greater than the theoretical is easily explained, because theory takes account only of the increase in pressure or directly due to the higher compression and neglects the gain due to the reduced cooling area. It is also clearly shown that the gain in power due to the increase in compression ratio is greatest at the higher speeds. For all speeds, however, the peak of the m.e.p. curve seems to lie very close to a compression ratio of 5.8 (for this particular case). The rate of

increase in m.e.p. with increase in compression ratio increases at first, then decreases and for a compression ratio of 5.8 becomes zero, while beyond this point the m.e.p. decreases. For gasoline the optimum compression would, of course, be lower. But the conclusion seems justified that for each design of engine operating on a particular fuel there is a compression ratio which gives the highest m.e.p. at all speeds, and that for lesser compression ratios the m.e.p. and the power output drop more rapidly than the theoretical formula would indicate.

## A Fool's Paradise

**F**EW men are better informed regarding the automotive fuel situation than H. Foster Bain, Director of the Bureau of Mines. In complimenting us for articles on the fuel situation which recently appeared in these columns, Mr. Bain says:

"I agree with you that it is not desirable to emphasize the impending scarcity to a point where people get nervous. We will find some way to supply what it is necessary to have when the time comes. It is well, though, that the industry should appreciate the difficulties that will have to be faced and not rest in a belief that the future will be as easy as the past."

Is the industry going to heed the advice of those who have made a thorough study of the fuel situation and take steps to economize in the use of remaining petroleum resources by building apparatus better suited for their efficient utilization, or will it prefer to live in a fool's paradise until the pinch comes and business suffers correspondingly?

Some far-sighted companies are looking ahead and planning their research work accordingly. Others continue to turn out apparatus, which is not only wasteful of fuel but gives trouble because no serious attempt is made even to vaporize present-day fuel, which is temporarily better than it was a year ago and far more volatile than it will be in the not distant future. This seems incredible if they realize that there is such a thing as a fuel problem.

## Shows and Congresses

**A** METHOD which is being successfully used in France for stimulating interest in new industrial developments might be profitably adopted in this country. Over there industrial shows are combined with so-called "congresses" at which are presented papers on the technical and economic problems to which the new development has given rise. Two such international congresses were held in Paris during the early years of the automobile industry, and no doubt helped materially in securing for France that pre-eminent position in the manufacture of automobiles which she enjoyed for a long time. Such international congresses are particularly opportune in the early stages of an industry when the movement in any particular country is not sufficiently advanced to be self-sufficient and when the people engaged in it are still eagerly looking across national boundaries for ideas and suggestions. But the plan can also be carried out on a national basis, as was shown on the

occasion of the Columbus tractor show last winter. At the meetings in Columbus it was quite obvious that the persons attending the conferences were very eager to learn, and had it not been for the poor acoustics of the hall in which the meetings were held the attendance would have been very good.

The average show visitor of the "ultimate consumer" type has only a very limited knowledge of the principles underlying the construction and operation of the apparatus shown, and while there is much information freely dispensed at the stands, it is not always of the character most desired by the visitor and, moreover, it is biased.

The French plan of international industrial congresses is, of course, materially different from the American plan of free lectures at industrial shows. The "congress" is partly independent of the show and its expenses are defrayed from dues paid by the members. Each member has the right to present to the Congress a communication on any of the topics covered by the program of the affair, and each receives in due course a copy of the printed "transactions." The aeronautical industry has reached the state where an international congress would meet with considerable support, and it is not surprising to learn that a congress will be held in Paris in October.

## Market Research Methods

**T**HERE are a number of very real dangers to be avoided in carrying out a program of merchandising research. Considerable emphasis is being laid upon such efforts in all parts of the industry and constructive progress is being made, but one point must be constantly born in mind. The object of merchandising research is to discover as accurately as possible the market for a given make of car or product and the best methods of selling that market. This object must not be confused with the mere obtaining of a formula or an answer that sounds plausible but does not bear close examination.

Final conclusions must not be based on insufficient evidence. Merchandising data are almost entirely lacking in the automotive industry at present, so that it will be necessary for some time to make temporary plans and adopt temporary policies on the basis of inconclusive data, as additional information is obtained. There is an immediate and practical value to be obtained from each bit of new marketing data that is gathered and compiled, but it will be necessary for a long while yet to carefully interpret the data so obtained in the light of the many variables and unknowns which still enter into the calculations.

Certain engineering and production problems have been puzzling engineers for years. Experiments and investigations are still going on in regard to these problems. Real merchandising research is comparatively a new development in the automotive field. Involving, as it does, the complex problems of human psychology along with other intangible and variable factors, final results cannot be expected in a brief time. Definite value can be derived from each step of progress when results are carefully interpreted and the relative value of the various factors understood.

## Firestone Reaches Peak of 1920 Output

Average Production Over 28,500  
Tires Daily With 50%  
Less Workers

AKRON, Aug. 22.—That which it has been freely predicted would never happen—namely, any of the major tire building companies of America returning to their 1920 records of peak production this year, has been accomplished by the Firestone Tire & Rubber Co. of Akron.

While other major companies in Akron are laying off men and curtailing tire production, Firestone has been adding men and steadily increasing production and this week had climbed back to an average production of over 28,500 tires daily which compares with the company's 1920 peak established a year ago last April, of 28,800 tires a day. The present Firestone record is 28,500 casings and 30,000 tubes daily.

### Others Laying Off

In the face of the Firestone report of steadily increasing orders, both from dealers and manufacturers, Akron's other two leading tire companies are reducing production. Goodyear in the past three days has laid off 900 men and curtailed production commensurately and Goodrich has dropped from 16,000 tires daily to 13,000.

The significance of the Firestone status is the fact that Firestone has wrested the tire production leadership from Goodyear and Goodrich, although in the past it has ranked third in the line of major rubber companies, and has now assumed the world leadership in respect to gross production of automobile and motor truck tires.

### Only 50 Per Cent of Workers

Another significant point is the fact that Firestone has returned to its peak production with slightly more than 50 per cent of its peak number of employees, and despite the fact that its factories are now operating on a basis of fewer hours of factory work a week. When Firestone reached the mark of 28,800 tires in April, 1920, it was running every department 24 hours a day and six days a week.

To-day Firestone is making the same production with a little more than half as many employees, and is running most of its departments only 18 hours a day on a six-day weekly basis. Most departments are operating two nine-hour shifts, and only a few are running three eight-hour shifts daily.

Goodyear up until the layoff of 900 men was turning out 25,000 tires a day. Steadily increasing individual factory efficiency, officials state, will mean only a slight modification of production, despite the heavy layoff of men.

The Miller Rubber Co. is operating on a basis of 4000 tires daily, as compared with a peak of 5200. The General Tire

& Rubber Co. of Akron is operating up to capacity and almost to peak production, making 1500 tires daily. Other smaller concerns are faring better than the larger tire building companies and are operating on a higher percentage of peak than Goodyear and Goodrich. The Goodyear peak was 31,181 tires and the Goodrich peak slightly exceeded 28,000 tires daily.

While other companies anticipate a slowing up of tire orders from now until next January, Firestone officials say they expect the present rate of business to continue, and are contemplating no production curtailment for several weeks at least.

## Illinois Sales Will Exceed 1920 Totals

BLOOMINGTON, ILL., Aug. 22.—Central Illinois automobile dealers report the volume of business this summer well ahead of the same period a year ago. Industries which were suspended last summer and fall are reopened in most instances and, while many are working with a reduced force as compared to the war period, there is a gradual increase in forces which is reducing the number of men out of employment and increasing the money in circulation.

With bumper crops farmers are becoming more cheerful. Wheat has been up to expectations and the major portion has been converted into cash. The money in most instances has been utilized in paying old obligations and in buying machinery and other necessities deferred from a year ago. The oats returns have been disappointing.

The corn crop promises to be the best in years. With the harvesting of the latter cereal the farmers will again be in a position to spend money and the men who handle tractors are preparing to interest them in a machine. Tractor demonstrations are being arranged in many sections in Illinois, which is a healthy indication of a revival in power farming business.

## Chicago Rural Sales on the Upward Trend

CHICAGO, Aug. 19.—Sales for August in Chicago and controlled territory are not as brisk as they were through July. There has been a decided falling off both in actual sales and inquiries. July business was unusually good, so that with the noticeable drop in sales business may still be said to be satisfactory. August this year compares favorably with the same month of last year.

The one bright spot as pointed out by Chicago distributors is the strong upward trend of rural business. Country dealers are finding more business than for many months, and the prospects are for fall business that will be very satisfactory.

Trucks are not moving, excepting for a light turnover of light machines. Tires are keeping up an active market and accessories are speeding up.

## Manufacturers Say Business Is Better

Indianapolis Reports Reductions  
Have Had Good Effect on  
Sales Everywhere

INDIANAPOLIS, IND., Aug. 20.—Reports from the various automobile manufacturers here show that business in the cars made in Indianapolis remains about the same throughout the country. It is significant to note that the reports show no particular territory far behind, with the exception of some sections of the south. Reports of sales made by dealers show that the eastern business is picking up slightly and the Pacific Coast sales appear to be a little stronger. No change has been noted in production schedules at the different plants. The H. C. S. Motor Car Co. now is working under its schedule of five cars a day. While some of the manufacturers here reduced prices with "mental reservations" it having been their private opinion at the time reductions were made that the result would be only a temporary increase in sales, they now have had time to see the result and they do not hesitate to say that the general reduction has stimulated business.

The sales forces here have been extremely active during the past week in an effort to cause August sales to equal the July sales. Present indications tend to point to an equal month with last month. The higher priced cars have had a good demand during the past week, which has heartened up the dealers considerably. Dealers in the Dodge, Chevrolet and Ford are confident there will be no slump during the month. This is considered remarkable in view of the fact that this is the big vacation month and hundreds of persons are out of the city. Accessory dealers also are having a good business, but it is not thought that this branch of the trade will equal the sales made in July. Tire dealers report a good business for August, but the volume will likely not be so large as in July, due to the cooler weather, they say, which has reduced tire wear.

### PLAN TOLL HIGHWAY

CHICAGO, Aug. 24.—Alfred E. Case, head of the brokerage firm of Case, Boyd & Co. of this city, is having plans drawn for a private toll highway between Chicago and Milwaukee, the road to be 200 feet wide and to be laid in six one-way traffic sections. The base of the roadway is to be of concrete with asphalt surface, if built as planned. Branch roads leading to the lake regions of Wisconsin are to be part of the system. Two of the six sections planned are to be for motor bus express; two to be operated as toll lines for private passenger cars and two as freight roads. A \$5,000,000 company has been organized with an authorized bond issue of \$10,000,000.

## Cleveland Demand Far Above Average

**Retail Dealers Believe August  
Business Will Surpass  
Same Period 1920**

CLEVELAND, Aug. 22—Statements of retail automobile dealers here that after harvest sales this year are exceeding those of a year ago for the month of August is borne out by conditions in industries that sell to the automobile trade.

August according to local leading retailers is running far better than August, 1920. Now that the harvest is about ended the farmers are commencing to receive money for their crops; sales of automobiles are increasing in the rural sections around Cleveland. The demand in this city is far above the average for August in the past.

### Steel Buying Better

Buying in the steel trade in the Cleveland district is better during August than it has been for many months. A large part of the buying is being done by manufacturers of automobiles, and this is taken as evidence that production will increase greatly in the fall. The buying movement in the steel industry reflects the low ebb that manufacturers have let supplies reach and also that it is generally understood that prices have reached rock bottom. Some of the newcomers into the automobile sheet field have made concessions of several dollars a ton to get trial orders.

The Wills Sainte Claire agency here, a newcomer to automobile row, reports that August business is running close to July figures, and that was a banner month. Floormen state that persons visiting the salesroom daily run from 60 to 100. There is a healthy interest in this car and the management reports that sales exceed expectations.

The cut in the price of the Hudson has greatly stimulated sales at the Stuyvesant agency—distributors of the Hudson and Essex. The price cut from present indications will send the record for August way above the average for the month and also will enable the company to do some nice business September, October and November.

### Dodge Going Good

The Dodge car is still selling at the same clip that made July this year one of the largest months in the history of the local agency, which is now the Barnes Motor Co. This firm will sell around 250 cars in this city during August from present indication.

The Chevrolet agency, which started a whirlwind business with the last cut in prices, has not experienced a let down in August. Other agencies also report a healthy demand.

Additional evidence that business is healthy in this city came when directors of the White Co. declared the regularly

quarterly dividend of \$1 a share payable Sept. 30, to stock of record of Sept. 15. Sales of trucks, especially in July, have been of a satisfactory nature and because of the generally improved conditions, the directors felt justified in declaring the regular dividend. It became known here that the White Co. had reduced bank loans \$2,500,000 since March 31.

The Ohio Committee on Public Utility Information reports that a survey of power users discloses a good increase recently in production. Electric power consumption in Cleveland the last week in July was 14.1 per cent higher than during the first week of the same month, the totals being 8,773,926 kilowatt hours the first week and 10,013,931 for the last. Gains also were reported for Akron, Lorain, Warren, Dayton, Columbus and Cincinnati. Automobile plants are among large users of electricity.

## Plants in Milwaukee Maintain Production

MILWAUKEE, WIS., Aug. 22—From the manufacturers' standpoint the automotive industries in the first half of August maintained, generally speaking, the production rate reached at the close of July. A few manufacturers of parts and equipment were successful in placing business on the books sufficient to warrant increase in working forces, but others made no headway or were obliged to make small cuts owing to extension of old orders due to somewhat lesser output by passenger car builders.

The situation is considered satisfactory, in view of the slight slackening of activity in some other centers. Locally there is no expectation of increased activity until the State fair season in the Middle West is in full swing and distributors and dealers begin to book new business on dealer contracts for 1921-1922 or retail orders. Farm demand, at present very slack, is counted upon to produce a revival as the harvest season comes to a close and stimulus is lent by agricultural expositions, State and county.

### DURANT BUILDS SALESROOM

DETROIT, Aug. 22—Ground has been broken at Lansing for the Durant Motor Co.'s garage, office and salesroom for the display of the new Durant car. The cost will approximate \$30,000 and the building will be the property of the Durant Motor Sales Co., a corporation distinct from the manufacturing organization.

### BRIGGS OUTPUT BRISK

DETROIT, Aug. 23—Business at the Briggs Mfg. Co., manufacturer of enclosed bodies, is running fully up to the height of business a year ago and practically at capacity. The office force at the factory has been doubled and almost as many men are at work in the factory as there were in 1920.

## Good Crops Swell Southwest Sales

**Many Dealers Report Business  
Back to Normal—Trucks  
Doing Better**

DALLAS, TEX., Aug. 22—The automotive business in North Texas, Oklahoma, parts of Louisiana, New Mexico and Arizona, supplied by Dallas dealers and jobbers continued to show some improvement during the first half of August. Many of the retailers in Dallas and other parts of the trade territory reported their business back to normal.

The selling of cars has been augmented by the presence of some \$100,000,000 from the grain and fruit crops. This money is now in general circulation and the buying has been rather brisk. Retailers have noticed also that buyers are paying cash, or considerably more cash for cars than they have been for many months.

Accessory men from all sections of the territory report brisk business and tire dealers claim their business was never better. One thing making the accessory and tire business so much better than it has been for months is the thousands of cars from other states which are now touring Texas.

Trailer and truck dealers have also found business increased and prospects generally brighter, especially in the grain and cattle belts.

The gathering and marketing of the cotton crop will begin before the first of September. For months the automotive business has been dull in the cotton belts of Texas because the farmers were without money. Retailers, accessory and tire men are ready to invade these cotton belts as soon as the crop begins to move.

## South American Trade, Better, Say Ford Agents

NEW YORK, Aug. 22—Distinct improvement in trade in some sections of South America is reported by Charles T. Lathers and George R. Brubaker, representatives of the Ford Motor Car Co., who have returned to this country on the Munson liner *Aeolus* from Buenos Aires after a study of business conditions. Their main purpose in making the trip was to effect changes in the management of the Buenos Aires branch of the company.

The Ford policy of cash against documents is working out very favorably, Lathers and Brubaker report. The branch has no bad debts, although there are about 300 machines in Pernambuco which have not been accepted.

Brazil is developing its highway systems, and the extension of improved roads is expected to have a substantial influence on the possibilities for American cars in that republic. Licenses, however, are too expensive.

## Automotive Bureau Planned for Mexico

### Expect Stabilization to Follow Move of American Commerce Chamber

MEXICO CITY, Aug. 10 (Special correspondence)—The American Chamber of Commerce has undertaken the organization of an automotive division and it is expected that the division will take up important work in an energetic effort to stabilize the business situation and to promote still further the demand for automobiles and automotive equipment in Mexico.

Improvement of existing roads, and the construction of new roads are going on rapidly. It is certain that the present activity toward good roads will result in continued efforts of the National Government, together with various State Governments, to improve materially the roads throughout the country.

Ford has opened a number of new agencies throughout this country. The third Ford agency in Mexico City has, in fact, just been given to A. F. Robertson, former manager of the Mayfield Auto Co. here. The new company is named the Robertson Motor Co. A. J. Sewall, a former Ford dealer under the Dallas, Tex., branch, has taken over the dealership at Guadalajara. The Dodson Manufacturing Co. is the new dealer at Torreon and Suess y Garcia Narro has opened a Ford agency at Zacatecas.

Effective Aug. 1, duty was placed on vehicles amounting to 75c. per kilo up to 250 kilos in weight, 60c. for the next 500 kilos and 50c. per kilo for weight in excess of 750 kilos. This does not apply to automobiles but it is rumored that the automobile industry may be affected by reinstatement of the old tariff on motor cars and it is possible that this may be put into effect as the present government needs additional revenue.

## Gilland Lock Builds Factory in Michigan

DETROIT, Aug. 23—Gilland Auto Lock Co. is building a factory at Fenton, Mich., which is expected soon to be in production of a patented lock for automobiles which operates by a system of buttons attached to the dash. The buttons provide for hundreds of combinations. The ignition system is automatically cut off when the engine stops and can be started only on pressure of the buttons forming the combination. Pressure of the wrong buttons sounds an alarm either by horn or gong.

### BOLLSTROM HAS RECEIVER

DETROIT, Aug. 22—S. O. Burgdorf has been appointed permanent receiver of Bollstrom Motors, Inc., St. Louis, Mich. The company's affairs will now be closed up.

### 5800 BUICK CARS SHIPPED DURING FIRST HALF OF AUGUST

DETROIT, Aug. 22—Shipments of Buick cars for the first half of August reached 5800, or approximately one-half of the 11,750 production schedule set for the month. With the fulfilling of this schedule the company will come within 250 cars of the biggest month it ever enjoyed. Present indications are that production will exceed this figure and probably set a new record. The shipments include all models, a large part being the new four-cylinder car.

## Malleable Iron to Open Plant in Indianapolis

INDIANAPOLIS, Aug. 23—The Malleable Iron Co., a new organization in a new plant in Kokomo, opens next week to supply the Haynes Automobile Co. and the Service Motor Co. of Wabash. The opening of this plant provides employment for 500 men. The Haynes company will average full normal production this month, although at times it has exceeded normal production. The Kokomo Rubber Works has been busy and other automotive plants in northern Indiana are getting back to nearly capacity operations.

In the southern part of the State motor car and motor vehicle body manufacturers report very satisfactory increases in business.

The Lafayette Motor Co. is making five cars a day. Stutz has resumed on a small scale and the Nordyke & Marmion Co. is operating to near capacity.

General conditions in the State have become encouraging, the building trades showing much activity. Crops have been fairly good but nothing unusual.

## Raleigh to Produce New Passenger Car

NEW YORK, Aug. 22—A new passenger car to be known as the Raleigh Standardized Six, which has been undergoing development for over two years, is shortly to be produced by the Raleigh Motors Corp. in Buffalo, N. Y.

The car is an assembled product using a six-cylinder 3¼ x 5 in. Herschell-Spillman engine, Borg & Beck clutch, Grant-Lees transmission with Kellogg tire pump, Merchant & Evans universals, Columbia axles, Sharon frame, Gemmer steering gear and American Body Co. aluminum body. Westinghouse starting and lighting equipment and Bosch magneto ignition are employed. Fuel is fed to the Stromberg LB-2 carbureter by Stewart vacuum system of the 2 qt. "industrial" type system from 17 gal. tank at rear of frame. The wheelbase is 122 in. Hotchkiss drive through 54½ x 2¼ in. semi-elliptic underslung springs is employed. Wheels are Harvey disk type.

## Export Situation Improved in July

### Figures Undoubtedly Increasing —Decline Shown Comparing With Same Period 1920

WASHINGTON, Aug. 22—A bright spot appeared in the automotive export situation during July. There has been a slight increase in the volume of passenger cars and motorcycles exported to this country. These figures are undoubtedly increasing at this time despite the fact that there has been marked declines in foreign sales of other automotive products. The records of the Bureau of Foreign and Domestic Commerce, for July, show that 2224 passenger cars were exported, representing an increase of 260 over the previous month. Shipments of motorcycles amounted to 441, or 103 more than in June. In every other item the decreases during the month were noticeable. The value of automotive parts, not including engines and tires, fell off \$259,003 since June, while shipments of trucks were 109 less than the previous month, and the total number of engines declined by 845, as compared with June.

Compared with July, 1920, the figures for the same month of this year show a tremendous decline in the volume of automotive exports, for instance, during July of 1920, 2042 trucks, valued at \$3,434,070 were exported, as against 399 commercial cars with a value of \$314,237, for the corresponding month of this year.

Passenger car exports for June, 1920, amounted to 13,320, valued at \$16,220,965, and for the same period this year, 2224 cars valued at \$1,873,368, or a decline of approximately \$14,500,000.

There is a slump amounting to \$75,816,548 in the total value of passenger car exports for the seven months ending July, as compared with last year. The decline in the volume of engine exports was very marked. These figures indicate that the foreign trade department of the Government and the industry have a difficult problem on their hands to develop foreign markets.

## Goodyear Officials on Inspection Tour

AKRON, Aug. 22—Officials of the Goodyear Tire & Rubber Co. have started on a month's inspection tour of the company's subsidiary corporations. In the party are E. G. Wilmer, successor to F. A. Seiberling as president of Goodyear; Vice-President and Factory Manager Paul Litchfield and General Sales Manager L. C. Rockhill.

The three have gone first to the Goodyear plants at Bowmanville and Toronto in Canada. From there they will proceed to California to inspect the Los Angeles tire plant and will then visit the Goodyear 56,000-acre cotton plantation near Phoenix, Ariz.



## Registrations for Bay State Increase

**Figures for Three Months Exceed  
1920 Period by Over 5000—  
Trucks Gaining**

BOSTON, Aug. 22—An analysis of the registration figures by the motor vehicle department for the year up to Aug. 1 shows a tendency toward buying for the last three months.

For May, June and July there were registered 55,081 cars. For the same period last year there were 50,842 registrations. And last year was regarded as an exceptional year until the slump came along in the fall.

For the entire period up to Aug. 1 there were registered a total of 266,342 cars while for the same period a year ago there were 220,799 giving an increase this year of 45,543. Of course a large number of these 1921 registrations were used cars.

### Figures for Months

In 1920 there were 33,417 registrations in April. May they dropped to 21,771. June they figured 15,128 and July 13,943. This year there were 37,447 in April. The drop in May was to 20,687, or 6760 against the last year drop of 11,646, a balance of 4886 in favor of 1921.

June of last year showed a decrease from May of 6643. In 1921 for the same months the decrease was but 1857, or another balance for this year, this time of nearly the same as the preceding month, or 4786. This July showed a larger falling off than a year ago, for the decrease in 1920 was 1185 while for 1921 it was 3266.

What is happening, apparently, is that buying is going along like a series of waves, up and down. About every dealer has a number of very live prospects, some with cars, others figuring on buying. These people are trying to solve the fall business, and while they hope it will pick up they are not certain therefore they intend to continue along until they see how things are going to shape up.

### Trucks Show Gain

This is reflected, too, in the registration of trucks. While the total for the year is larger by 5063 than a year ago, the monthly registration figures show that for the past four months the totals are smaller than for the same ones in 1920. But the declines average pretty nearly the same as for the last four months of 1920.

The fees show a large increase, however, and the State is \$773,827 richer this year than for the same seven months of 1920. This year the fees have climbed to \$4,115,688.50. With this average for a comparison when the fines are computed later Massachusetts will get from the motorists this year about \$5,000,000.

## ORIGINAL VANNIMAN ENGINE RESTS AT BOTTOM OF LAKE HURON

AKRON, Aug. 21—The original Vanniman engine, used to propel the huge Vanniman dirigible, the first large dirigible to be built in America, and which crashed near Atlantic City nine years ago, killing its pilot and crew, now rests somewhere on the bottom of Lake Huron.

The Vanniman airship was built by Goodyear. After the disaster at Atlantic City the huge engine was dug from the sands where it imbedded itself in its fall from the skies and was shipped to the Les Cheneaux Islands in Lake Huron, to the summer home of F. A. Seiberling, founder and former president of Goodyear. A high-powered motor boat was constructed for Penfield Seiberling, aged 22, son of F. A. Seiberling, the Vanniman engine being installed in it.

A few days ago, while speeding near the Les Cheneaux Islands, young Seiberling's boat struck a rock. Due to the heavy weight of the engine, the craft sank in less than a minute. Young Seiberling, after swimming around for nearly half an hour, was rescued by Stewart Rodgers of Cleveland.

## Pierce-Arrow to Have New Enclosed Models

BUFFALO, N. Y., Aug. 22—The Pierce-Arrow Motor Car Co. has introduced four new enclosed drive bodies for the Standard Pierce-Arrow Dual Valve Chassis. These are in addition to the standard open and closed types of cars already listed. The new ones include a coupé; four-passenger, four-door sedan; seven-passenger sedan, and a seven-passenger vestibule sedan.

Several new constructional features are used in these models, among which are a new form of roof construction which does not differ any in appearance from the previous roof construction, but eliminates drumming. The roof, instead of being a sound board to intensify noises, deadens all sounds. Special attention has been given to ventilation and the duplex windows in the rear quarters lower close to the sill, the door windows open fully, and the windshield is adjustable. A cowl ventilator forces air along the floor boards, while a new roof ventilator, cleverly concealed by the dome light, draws air from the interior.

### PASS AUSTRALIAN TARIFF

LONDON, Aug. 16 (By Mail)—The revised Australian tariff has been passed in the face of strong opposition by the agricultural interests and the rest of the Empire against a reduction from 12 per cent to 5 per cent in the preferential rate accorded British goods.

## Cleveland Tractor Puts Out New Model

**Lightweight Cletrac Is Radically  
Different—Will Sell for \$845  
Complete**

CLEVELAND, Aug. 20—A new, lightweight Cletrac has been added to the line of the Cleveland Tractor Co. The new tractor, which is known as model F, is also a tank type, but of radically different construction throughout as compared with the larger Cletrac.

Weighing but 1820 lb., and with an overall width of but 32 in., this new tractor lends itself readily to such work as corn cultivation, being able to operate between corn rows without difficulty. In order to facilitate this function, a cultivator which is particularly adapted to the machine has also been brought out by the Cleveland Tractor Co. The new tractor sells for \$845 complete f.o.b. Cleveland, and the cultivator \$135. This is a two-row cultivator and with the new lightweight tractor puts in the hands of the dealer a complete unit which is priced at less than \$1,000 f.o.b. the factory.

The new tractor is constructed of chrome steel wherever severe stresses are encountered. It is noteworthy for the exceptionally ingenious use that is made of pressed steel in its construction. The track chain operates upon a floating roller chain in place of wheels and differs in this respect materially from the other Cletracs. The makers claim a plowing rate of 6 to 8 acres a day using two 12-in. plows. It is stated to develop 16 hp. at the belt and 9 hp. at the drawbar. The overall dimensions are 80 in. in length, 50 in. in height and 32 in. in width. The four-cylinder engine has a bore of 3¼ in. and a stroke of 4½ in. It is rated at 16 hp. with kerosene at the normal speed of 1330 r.p.m. There is one speed forward and one reverse. A feature of the design is that the entire tractor is self lubricating from the supply of oil in the motor and gearcase unit, which is all contained in one housing. The tracks are designed to run without lubrication so that a minimum amount of upkeep attention is required.

### BELGIAN TRADE GOOD

LONDON, Aug. 12—(By Mail)—The automotive industry in Belgium has had a rapid recovery. The possibilities of export trade have been taken up seriously and have led to the design of light but strong cars of from 12 to 14 horsepower for export. The centers of business are Liège and Brussels. Belgian roads are notoriously bad and for this reason the cars designed for export are equally well adapted for use at home.

Other Belgian exports which are increasing in volume are one- and two-ton trucks and motorcycles. An especially good market for motorcycles is found in the Balkans and Greece, the Belgian Congo and in Brazil.

## Townsend Highway Bill Passes Senate

### Measure Providing \$75,000,000 Goes Over With Commission Proviso Eliminated

WASHINGTON, Aug. 23—Eliminating the provision calling for the establishment of a Federal Highway Commission, the Senate to-day passed the Townsend highway bill appropriating \$75,000,000 for the construction and maintenance of roads, one-third of which will be available immediately and the balance to be distributed within six months. It was for the recognition of this highway commission plan that the automotive industry conducted a strong legislative campaign. The defeat was brought about by an unexpected eleventh-hour change of front on the part of Senate leaders. It is believed that the opposition developed not because of the industry's advocacy of it, but owing to the growing evidence of a reaction against bureaucracy or investment of power in new commissions.

#### Fight for Economies

Senators from the eastern states, where the highway system is fairly well developed, were quick to oppose the appropriation of \$100,000,000, as proposed by the Senate Committee on Post Office and Post Roads. Senator Lodge of Massachusetts, Republican leader in the Senate, insisted that it was only fair to the taxpayers of the country that economies should be made in road expenditures as well as in other forms of governmental enterprise. He declared that it would be at variance with the administration's program of economy if such large appropriations were sanctioned. An effort was made to cut the appropriation in half, but subsequently it was agreed to appropriate \$75,000,000.

The movement to abolish the highway commission, as proposed in the Townsend bill, was a distinct surprise to Senator Townsend and southern Senators who had heretofore opposed any change in the distribution of Federal funds, but later agreed to a compromise bill. Representative leaders declared that their action was based upon the fact that a report will be received shortly from the reorganization committee now planning the redistribution and reorganization of Government departments. It is believed that the control of highways, which is now vested in the Bureau of Public Roads, Department of Agriculture, will be transferred to a separate highway bureau in the proposed department of public roads, or to the Department of Commerce, because of the gradual recognition of the fact that highway transport and transportation affects business more than agricultural interests. For a time it appeared that the so-called agricultural "bloc" in the Senate had taken control of the highway bill, but developments showed that it was the drive of

### NORTHWESTERN BANK SEES BEGINNING OF END IN DEPRESSION

MINNEAPOLIS, Aug. 23—Economists have agreed that inasmuch as the Northwest was the first section of the country to begin liquidation, its recovery will mean the beginning of the end of depression in the United States. Conditions in this section undoubtedly are improving. In this connection the Northwestern National Bank, the largest in the Northwest, says in its monthly review of conditions:

"There has been a large carry over of obligations, and many of our trade difficulties caused by uneven readjustment processes have not been overcome; but in spite of disadvantages to surmount, the Northwest is definitely on the way to a recovery of its deferred prosperity. Bankers comment quite generally that the turn in affairs has come, although it will be far from a stampede toward affluence. Most of them believe that the present prices of grain and live stock, coupled with high freight costs, will make impossible a rapid or complete liquidation this season. Freight rates are the main factor out of the general alignment, to judge from the general comment."

the administrative leaders for economic limitation of commissions that changed the committee's bill.

The bill as reported from the committee would probably have passed with the commission plan intact if a delay had not been occasioned by the inquiry of Senator Pomerene as to the terms of the measure and his objection to a vote until delays could be given him. The Senate leader decided to rule adversely on the commission plan during the interim.

As a result of the debate on Tuesday it was decided that 60 per cent of all Federal funds should be expended on three-sevenths of the total mileage of any State and the remaining 40 per cent to be expended on the next 4 per cent of State roads, thus assuring interstate roads. This agreement is regarded as a forward step by the industry agents. The bill, when passed by the Senate, will go to conference, but will not become a law for several weeks as a result of the congressional recess.

#### OHIO LENS MAKERS BUSY

COLUMBUS, OHIO, Aug. 23—Lens manufacturers and agents are rushed to death in Ohio supplying the demand for anti-glare lenses. The State law defining the lenses to be used became effective Aug. 15 and the lens people have been reaping a harvest. The Ohio Highway Department has approved about three score of different lenses.

The rush of business is expected to last for a week at least.

## Packard Plans Big Advertising Drive

### \$200,000 Publicity Campaign Begun in Newspapers for Fall Business

DETROIT, Aug. 22—Packard Motor Car Co. has launched a \$200,000 advertising drive for fall business through the medium of local newspapers in all sections of the country. The drive will continue for five weeks and will be staged throughout in close co-operation with the distributor organization in each territory.

The potential fall market for cars is so large, officials said, that the company feels fully warranted in investing \$200,000 in developing it. There is no question, officials said, but that sales of cars from Sept. 1 can be brought up to a high level by a well-planned and well-executed campaign.

The introduction of the single-six line has brought a great increase in the number of Packard dealers, and this number is being constantly augmented. Cities and towns which formerly were too small for twin-six representation have now regular Packard dealers who are turning in steady streams of new business.

Orders at the factory are showing gains. On Aug. 19 production on twin-sixes was one month behind orders. Truck sales in the first ten days of August ran 59 per cent ahead of orders for the same period in July. The increase in twin-six business for August over July was considered remarkable at the factory in view of the heavy price reduction made in July.

Reports from territorial distributors show good business. Twin-six sales in Chicago for July equalled previous three months' business. Detroit retail sales in July ran in excess of \$250,000. Reports from New York and Philadelphia showed dealers sold out of touring cars and waiting deliveries. Single-six sales at the factory in July equalled the two previous months.

#### COLT WILL FILED

PROVIDENCE, R. I., Aug. 20—Under the will of Colonel Samuel P. Colt, which has been filed for probate here, \$410,000 was left in public bequests. Other specific bequests to individuals aggregated \$1,069,000, not including \$1,000 left to each employee of the Industrial Trust Co. Senator L. B. D. Colt, the Colonel's brother, and Russell G. Colt and Roswell E. Colt, his two sons, get \$100,000 each.

#### A. E. A. SEEKS SLOGAN

CHICAGO, Aug. 19—The Automotive Equipment Association, through its new merchandising director, Ray A. Sherman, has made an appeal to the industry for a slogan fitting the greater sales campaign now being waged by the association. All ideas for such a sales phrase are to be sent directly to Sherman, City Hall Square Building, Chicago.

## Gas Quality Rises as Prices Come Down

Survey Shows 25% Cut Was Accompanied by Increased Volatility

WASHINGTON, Aug. 22—Fears of automobile users that cheap gasoline would mean inferior grades have proven unfounded, as the fourth semi-annual motor gasoline survey conducted during July by the Bureau of Mines shows that a price cut of about 25 per cent was accompanied by an increased rather than lessened volatility of the product. The studies conducted in the larger cities of the country at all seasons indicated that the volatility of the gasoline was improved in the winter months, thus assuring better performance with the motor, especially at starting.

The bureau is convinced that the quality of gasoline to-day is much better than it was last summer, despite the price reduction. It is interesting to note that the average reduction in gasoline prices has been seven cents per gallon at tank wagon quotations.

At the end of May, 1921, there was over 800,000,000 gallons of gasoline in storage at the refineries, a figure never before reached in the history of the industry.

The increases noted in production and in stocks are sufficient to explain the drop in price and the improvement in volatility. It is interesting to note, however, that there is no uniformity in the relation throughout the country. Some cities show improvement in quality and little change in price, while in others the gasoline is similar to that sold a year ago, but the price has dropped markedly.

Exports of gasoline for the first five months of 1921 are larger than for the same period of 1920. For this period, shipments to our insular possessions and domestic consumption are also larger than they were a year ago, so the total outgo of gasoline for the first five months of 1921 is almost 200,000,000 gallons greater than it was for the corresponding period in 1920.

It is only in a study of production figures that the explanation is found. Production of gasoline for the first five months of 1921 was almost 400,000,000 gallons greater than for the same period in 1920. Imports were less, but the increase in the total income of gasoline is much greater than the increase in total outgo.

### NEW LEACH-BILTWELL "SIX"

LOS ANGELES, CAL., Aug. 23—The Leach-Biltwell Motor Car Co. has just brought out a new model of the Power-Plus Six, the first cars being displayed at the First Industrial Trade Exposition. While some of the mechanical details remain as before, the engine is entirely new, being made in the company's own plant. It has overhead valves and is said to develop over 100 hp. on the brake.

The cylinder dimensions are 3 3/4 x 5 1/4 in. The wheelbase has been lengthened to 134 in. Prices on all models have been set at \$6,500. Standard units include Delco ignition, Timken axles, Disteel wheels and Prest-O-Lite battery. The gearset is made by the company.

## New Orleans Ruling Would Affect Trucks

NEW ORLEANS, LA., Aug. 22—All motor vehicles with a combined weight of truck and load of more than two tons and all horse-drawn vehicles weighing, with load, more than 2300 pounds would be barred from certain residential streets of the city of New Orleans under the terms of a municipal ordinance just introduced in the city council by Commissioner of Public Safety Ray.

The ordinance also fixes size limits of motor trucks, specifying that no truck shall exceed 30 feet in length and, with trailer, two being allowed, shall not exceed 70 feet in length. Exceptions in the ordinance grant the barred vehicles the privilege of making immediate delivery within the limits specified or of taking on loads therein.

According to weight and tires the speed limit of motor trucks is fixed at from 15 to 20 miles per hour in the daytime and not more than ten miles per hour after nightfall. The ordinance also designates certain paved streets as heavy traffic avenues through which the vehicles forbidden to the residential section would be expected to pass.

## Canada Shows Gains in Exports to Australia

OTTAWA, ONT., Aug. 22—The increase in Canada's trade with Australia for rubber tires, tubes and solid tires during 1919-20 over the 1918-19 figures was quite remarkable, the increase being \$122,845, the total business for the 1919-20 period being \$304,430.

American imports fell off from \$434,626 to \$431,262, a slight loss of \$3,364.

Total importations from all sources in 1918-19 were valued at \$811,034 and for the next year \$884,590, an increase of \$73,556.

### NEW CAMERON TRACTORS

NEW YORK, Aug. 23—The Cameron Motors Corp., which recently took over the plant of the Dauch Mfg. Co. at Sandusky, Ohio, announces that it will bring out a new small, general purpose tractor under the trade name of Sandusky Model A. It will be equipped with a four-cylinder Cameron air-cooled motor and will be simple both in construction and design. The price will be \$425. The company asserts that its fuel consumption will be comparatively small. The Dauch Mfg. Co. has 300 dealers and Cameron Motors proposes to increase this organization by the addition of 700 more workers within the next week or so and as business necessitates.

## Sherman Gives Out A. E. A. Selling Plan

Chicago Manufacturers Ready to Support Idea—Vigorous Campaign to Start

CHICAGO, Aug. 20—Details of the merchandising plan of the Automotive Equipment Association, which was authorized at the Mackinac Island convention, were made public for the first time last evening at a meeting of the Association of Automotive Equipment Manufacturers by Ray W. Sherman, who recently left the Class Journal Co. to become the merchandising director of the A. E. A. The organization which heard the story last evening is made up of equipment manufacturers in the Chicago district, most of whom belong to the A. E. A. The manufacturers expressed their approval of the plan and gave assurances of their support for the work.

As a first step in the plan the association plans to enlist the assistance of the jobbing salesmen, many of whom have already won the approval of dealers by efforts to show how business profits may be increased without much increase in operating cost by installing automotive equipment departments. That the merchandising plan may be presented to the largest number of dealers in the shortest time a book on the subject is being prepared and will be ready for distribution this fall. The entire industry will lend its assistance to the distribution. Briefly described, the book will tell how to add to business profits by equipment sales and will tell how to sell.

Many meetings of jobbing organizations and also of dealers are planned.

The automotive equipment week, Aug. 6-13, proved successful and other national campaigns for the furtherance of business are planned.

## Limousine Top Making Practical Sedan Body

KALAMAZOO, MICH., Aug. 22—A practical type of sedan body for use in the equipment of the higher grade of automobiles has been worked out and designed by the engineering department of the Limousine Top Co. It will soon be regular production at this plant.

These bodies are built of leather inside and out, the body material corresponding exactly with the material used for seats and cushions, that is, in color effect. The side sections are set in heavy metal frames, bound in leather and are of the best grade of heavy French plate glass. They are easily adjustable and can be removed or put in place at will. When not in use these glazed leather side sections are carried in a well appointed case that folds under the front seat, thus being entirely out of the way.

The first body shown here was finished in a rich maroon leather, with maroon Spanish leather seats.

## Akron Production Waste \$20,000,000

Survey Shows Vast Losses in Rubber for 1919 and 1920—  
Could Save 15%

AKRON, Aug. 23—Millions of dollars are lost every year in the rubber industry in Akron through production waste, according to the statements of salvage experts, who estimate that the total production waste in 1919 and 1920 in Akron's rubber and tire factories amounted to nearly \$20,000,000.

Practically all tire companies here are training men scientifically to aid in salvaging waste materials, and also are conducting educational campaigns among factory operatives and tire builders, in an effort to increase efficiency and to eliminate avoidable production wastage. Salvage experts claim fully 15 per cent of the total waste in Akron's rubber plants each year can be eliminated as a result of such educational work, through the proper training of salvage men and through proper waste utilization.

The Goodyear Tire & Rubber Co. alone estimates that its production waste in 1919 and 1920 was \$6,880,878 as compared to a total production cost of \$156,023,307. This means a wastage percentage of production cost of 4.409 per cent.

### Can Save 15 Per Cent

At least 15 per cent of this can be saved if workmen, inspectors and foremen are alert, painstaking in their work and efficient, according to C. E. Falor, Goodyear salvage expert and manager of the company's by-products department which handles all matters pertaining to production wastage.

Much of the waste is salvaged, some of the salvaged material being re-absorbed in various departments and the remainder being sold. The sale of salvaged material by Goodyear last year amounted to \$1,181,954, while it is estimated that \$3,770,279 worth of salvaged wastage was absorbed in the manufacture of by-products. Friction wastage alone in 1919 and 1920, according to Falor, amounted to \$3,630,461. In addition to heavy rubber and fabric salvage, the company last year salvaged 5100 tons of scrap iron. By use of a large magnet for loading the scrap iron, a saving of over \$2,000 over the cost of man power for loading accrued, Falor states.

### Scrap Great Crop

"Next to wheat, scrap is one of America's greatest crops, and it takes men with scientific training to harvest it," states Falor. "We are using in our salvage work only men who have passed the foresight and mental alertness tests. Many of them are college graduates. There is a fast future for proper salvage work. It is a science in itself.

"The salvage department of any big corporation must be a service department, intended to assist rather than en-

force, and to help rather than to criticize in the work of reducing production wastage and increasing wastage salvage," states Falor. "It must back up its records with accurate statistics brought down to each individual if possible, to show each man's efficiency and to determine the extent of individual production wastage."

## New York Studebaker Predicts "Best Month"

NEW YORK, Aug. 22—The New York branch of the Studebaker Corp. reports that this month probably will be the best August in its history, although comparison with previous months indicates that the company is feeling some of the effects of seasonal let-up in automobile buying.

The best month the New York branch ever enjoyed was last June, when 451 vehicles were sold. July deliveries were 328 cars and indications are that August sales will run about 90 per cent of July, or something like 300 machines.

There is an unusually heavy demand for Studebaker closed cars in the Metropolitan district and some business is being lost every day because of inability to make immediate deliveries. The factory is expected to increase the proportion of closed cars to open models turned out from now on, and while sales of the latter may show some further falling off this fall and winter, sales of coupés, sedans and limousines are expected to be heavy.

## Ford Dealers in Mexico Agree Future Is Bright

HOUSTON, TEXAS, Aug. 22—More than 100 Ford dealers and agents in Old Mexico have been in Houston this week to discuss the situation in the southern republic with the officials of the branch Ford house here. From the reports gathered from these agents, the greater part of whom are Mexicans, the prospects for the automobile business in the Land of the Montezumas are exceedingly bright. They declared things are rapidly getting back to normal in Mexico and that since revolts and banditry have stopped and the people are following the peaceful pursuits of agriculture and stockraising, money is more plentiful and hence more cars are being bought.

The Mexican dealers declare what is greatly needed in Mexico now in addition to regular automobile houses is some big accessory house and that until such house is established at some central point the Mexican dealers will be compelled to be satisfied with meager supplies on hand and depend upon the Texas dealers for the main business.

The Mexican agents were greatly interested in tractors and trailers and were placing orders for what they could carry. They declared the Mexican ranchers and plantation owners are waking up to the value of these things and are in the market for them. They agreed conditions are brighter.

## Former Revere Head Seized on Charges

Stockholder Files Grand Larceny  
Complaint Against Newton  
Van Zandt

INDIANAPOLIS, IND., Aug. 20—A charge of grand larceny has been filed in city court at Logansport, Ind., against Newton Van Zandt, formerly president of the Revere Motor Car Corp. of Logansport.

The action was taken by John B. Porter of Buffalo, N. Y., a stockholder in the company. Porter also filed civil suit in the Cass circuit court against Van Zandt and the Revere Motor Corp. and its receiver, the Citizen's Loan & Trust Co. asking \$10,000 judgment. It is alleged in the complaint that the plaintiff, who is president of Blackburn, Inc., Buffalo, N. Y., bought \$4,050 of stock of the Revere Motor Corp., the purchase price being made through Van Zandt, president of the company at that time.

The complaint asserts that Van Zandt represented to the plaintiff that the Revere Motor Corp. had its output contracted for five years in advance, at a profit of \$500 a car, the contract being with a New York firm. The plaintiff asserts that he later learned there was no such contract. Word received here this morning is to the effect that Van Zandt has been arrested in Philadelphia, but dispatches did not say whether he would fight extradition to Indiana.

## Acceptance of Ford's Nitrate Offer Urged

WASHINGTON, Aug. 22—Approval of Henry Ford's offer for the purchase of the Muscle Shoals, Ala., nitrate plant and lease of the dams is urged by James E. Smith of St. Louis, vice-president of the Mississippi Valley Waterway Association, and other officers of that organization. They say that if the plants were completed and their operation assured, more than 150 miles of land rich in iron, coal and other valuable deposits would be open to development along the upper Tennessee River.

### WHEEL PLANTS BUSY

DETROIT, Aug. 22—Prudden Auto Wheel, Gier Pressed Steel and Motor Wheel plants of the Motor Wheel Corp. are now operating on a full six day week. Motor Wheel plant has increased the number of men on its payrolls from 600 to 1075; Prudden is now employing 750, and Gier, from almost complete suspension 60 days ago, is now employing 175. Die and toolmaking divisions at the Gier plant have been working overtime preparing to go into production on new contracts signed during the dull season. The general atmosphere around the plant indicates brisk business. Every day finds a greater volume gotten out at the three plants.

## Texas Relieved as Truck Bill Passes

### Objectionable Features Are Eliminated from Measure Regulating Commercial Vehicles

AUSTIN, TEXAS, Aug. 23—Motor truck dealers and operators of these vehicles are much relieved by the passage of a bill by the Legislature repealing the more objectionable features of the "motor truck law" which was enacted at the last regular session of the law-making body. As the measure finally passed both branches it increases the annual license fee on commercial motor vehicles according to net carrying capacity and tire equipment, but the mileage tax imposed by the regular session of this Legislature is eliminated. Trucks and tractors used exclusively for agricultural purposes are exempted from the special license fees stipulated in the bill, but it is provided that license fees shall be paid on agricultural trucks according to horse power just as now paid by automobiles. Fees for tractors not used for agricultural purposes are based on weight.

Under an amendment adopted by the conference committee a license shall not be issued to any truck of more than four tons carrying capacity, except on written application to the Highway Commission showing that roads would not be injured by such trucks. The bill provides, however, that no license shall be issued to trucks of more than 5-ton carrying capacity.

#### Some of the Rules

Another section of the bill provides that county road superintendents or supervisors may during wet weather prohibit the use of any highway to loads of such weight as would damage the roads.

Speed limits are fixed according to gross weight of vehicle and load and according to tire equipment. Pneumatic tire equipment is favored in this as well as in the case of license fees, higher speed limits being allowed vehicles equipped with pneumatic tires as lower license fees have been provided for such vehicles.

All trucks must be equipped with rear-view mirrors and no truck shall operate with solid tires less than 1 inch in thickness at any point or with pneumatic tires where one of such tires is missing. Drivers operating cars in this condition are subject to penalty of not more than \$200 as are also those drivers who operate vehicles of more than 4-ton carrying capacity without special permit.

Following is the scale of license fees provided for commercial motor vehicles, which are defined as any motor vehicles designed for the transportation of property:

Carrying capacity—1 to 2000 lbs., pneumatic tires, \$15; solid tires, \$18; 2001 to 3000 lbs., pneumatic tires, \$30; solid tires, \$36; 3001 to 4000 lbs., pneumatic tires, \$40; solid tires, \$48; 4001 to 5000 lbs., pneumatic tires, \$50; solid tires, \$60; 5001 to 6000 lbs., pneumatic tires, \$65; solid tires, \$78; 6001 to 7000 lbs., pneumatic tires, \$80; solid tires, \$96; 7001 to 8000

lbs., pneumatic tires, \$100; solid tires, \$120; 8001 to 9000 lbs., pneumatic tires, \$120; solid tires, \$144; 9001 to 10,000 lbs., pneumatic tires, \$150; solid tires, \$180.

For each trailer or semi-trailer drawn by a commercial vehicle or tractor, per 100 lbs. gross weight of vehicle and capacity load equipped with pneumatic tires, 15 cents; solid rubber tires, 25 cents; iron, steel or other hard tires, 35 cents.

Provided that semi-trailers equipped with iron, steel or other hard tires shall pay at the rate of \$1 per 100 lbs. of gross weight as specified under this section.

For tractors, the annual license fee shall be based upon the weight of the tractors as follows: 1 to 2000 lbs., \$5; 2000 to 4000 lbs., \$10; 4000 to 6000 lbs., \$15; 6000 to 8000 lbs., \$20; 8000 to 10,000 lbs., \$25.

Following is the speed limit scale. Commercial motor vehicles equipped with pneumatic tires, maximum weight in pounds, including gross weight of vehicle and load:

2001 to 4000, 22 m.p.h.; 4001 to 6000, 18 m.p.h.; 6001 to 8000, 15 m.p.h.; 8001 to 10,000, 12 m.p.h.; 10,000 to 12,000, 10 m.p.h.

Commercial motor vehicles equipped with solid rubber tires, maximum weights in pounds, including gross weight of vehicle and load:

1500 to 2000, 20 m.p.h.; 2001 to 6000, 15 m.p.h.; 6001 to 8000, 12 m.p.h.; 8001 to 10,000, 10 m.p.h.

## Civilian Air Board Bill Is Introduced

WASHINGTON, Aug. 25—Senator Wadsworth of New York to-day introduced a bill in the Senate providing for establishment of commission of civilian aeronautics. The bill is said to represent plans of permanent aviation engineers and aircraft manufacturers, many of whom are identified with the automotive industry. The bill, which has been referred to the Senate Committee on Commerce, provides for a commissioner at a salary of \$7,500 and assistant commissioner at \$5,000 with a necessary clerical force. The bill as drafted would give the commission authority to investigate and design the construction of all aircraft and if approved to license all civil aircraft, to regulate navigation and operation of civil aircraft with established rules and regulations, to foster aeronautics by designating, mapping and approving of layout air course and to control all civil aeronautics.

## ZR-2 Is Destroyed; Loss of Life Heavy

NEW YORK, Aug. 25—The dirigible ZR-2 which was built in England for the American Navy was completely destroyed in an accident during a trial trip near Hull, England, yesterday, and 43 of the 48 occupants perished, including 16 out of 17 Americans on board. The ZR-2 was the largest dirigible ever built, being 695 ft. long, 84 ft. 4 in. in diameter and having a gas capacity of 2,700,000 cu. ft. From the reports of eye witnesses and survivors of the disaster it appears that some of the girder work of the hull near the middle of its length gave way and the gigantic structure practically broke in two in the middle. This was followed by a number of terrific explosions, the last one occurring as part of the hull came down on the Humber River. The ZR-2 had been in the air a total of 35 hours up to the time the accident occurred, but it appears that this was the first time she was going under full power.

## Detroit Sees First Trackless Trolley

### Packard Demonstrates Working Model—Five Other Bids Received by Mayor

DETROIT, Aug. 23—Packard Motor Car Co. demonstrated here to-day its first trackless trolley bus, the vehicle being built in conjunction with Westinghouse Electric & Mfg. Co., as a working model for operation on the new municipally owned trolley lines in this city.

The bus was built to meet specifications designed by city officials, and if present plans are carried out 50 will be ordered for immediate operation in city streets. President Alvan Macauley of Packard said the company could deliver this number in six weeks if the order is given. The estimated cost is \$8,065 each.

Other bids were received, but Packard was the only company to furnish a working model. Other bidders were: J. G. Brill Co., Philadelphia, \$8,744; Standard Motor Co., Detroit, \$8,950; National Safety Car & Equipment Co., St. Louis, \$7,325; St. Louis Car Co., \$7,800; International Motor Truck Corp., Detroit, \$9,988.

#### Mayor Is Impressed

Mayor Couzens, much impressed with the possibilities of the vehicle for public transportation, said:

"I do not wish to appear definitely committed to this type of car, but from what I have seen I believe it can be used very successfully in conjunction with our municipal lines and, with time, developed to give adequate service in the downtown district."

The street railway commission of the city was represented by Commissioners William B. Mayo and G. O. Ellis, the former, chief engineer of the Ford Motor Co. Though each considered the bus practical for suburban districts, they said it would have to be considerably developed to meet requirements of transit on busy streets. Further action will be taken at a meeting this week.

The vehicle used to-day followed the usual bus outlines except for the double trolley pole on the roof. It was 24 ft. long, 8 ft. wide and weighed 11,500 lb. The model used to-day seats 29 persons, but the design which the Packard company plans will seat about 40.

Through the special trolley arrangement the bus was enabled to range from one curb-line to the opposite one. Its turning area was small, considering its size.

Control of the bus, both power and brakes, is worked by the feet of the operator. There is also an emergency hand-brake. Power is thrown on and off by a treadle. There are two speeds, 15 and 25 miles an hour, all regulated by foot pressure. Both hands of the operator are free to steer and to handle fares and the single door.



## Graham Reimports Measure Is Held Up

### 90% Duty Feature Meets with the Objections of Senator Pomerene

WASHINGTON, Aug. 23—Objection of Senator Pomerene, Democrat, of Ohio, to the consideration of the joint resolution imposing a duty of 90 per cent on all reimported army supplies, including automobiles and trucks, temporarily delayed the passage of this measure in the Senate this week. It is believed, however, that it will pass after the Congressional recess.

#### Contained Amendment

The Graham resolution as reported by Senator Watson, of Indiana, from the Senate Committee on Finance, contained an amendment drafted by the committee. The amendment provided that the provisions of the resolution should not apply to "any goods, wares, merchandise or military or naval supplies purchased prior to Aug. 15, 1921, by any citizen of the United States, or by any partnership, corporation, or association created or organized in the United States, and exported to the United States prior to Nov. 1, 1921, if (1) such purchases are certified to by the United States consul, and (2) such citizen, partnership, corporation, or association files within 45 days after the approval of this resolution with the Secretary of the Treasury and the United States consul a certified copy of the instrument of purchase of such goods, wares, merchandise, or military or naval supplies. The term 'United States consul' means the United States consul in the country from which such goods, wares, merchandise, or military or naval supplies are exported to the United States who certified to the consular invoices."

#### Senator Watson Speaks

Senator Watson stated that the amendment was drafted by the committee in response to the plea of American second-hand goods dealers and certain groups of bankers who have financed them. He further stated that these citizens had purchased in the aggregate about \$6,000,000 worth of goods, some of it on the high seas in transit to this country; some at the ports awaiting shipment, and some on cars waiting to be transported to ports for shipment. The Committee on Finance believes, inasmuch as these goods were purchased by American citizens in good faith; inasmuch as banks had loaned them money with which to make the purchase, and inasmuch as credit has been established in France on the borrowings thus made, it would be unfair to exclude these goods from coming into the United States. Hence, they drew up an amendment allowing them to enter until Nov. 1.

American truck manufacturers and dealers were largely responsible for this

resolution because they suffered keenly from the effects of unfair competition. The fact that the Senate Finance Committee consented to delay the imposition of the duty was not at all to their liking, because they believed that legitimate business enterprise should have protection rather than organized speculators in war supplies. It is claimed that speculators are free from many of the burdensome taxes imposed on legitimate dealers and manufacturers. There is a possibility that the Senate may strike out the committee amendment and pass the Graham resolution in its original form in order to prevent delay in the enactment of this important legislation.

## Post-Whitney Plans Fall Tractor Sale

CLEVELAND, Aug. 19—The Post-Whitney Co., a consolidation of the Post Tractor Co. of Cleveland, the Whitney Tractor Co. of Upper Sandusky and the Chief Motor Co. of Port Huron, has made plans for the sale and distribution of a large number of tractors in the next 16 months.

## S.A.E. to Have Winter Meeting Jan. 10 to 13

### Many Subjects to Be Discussed at Annual Conference of Engineers

NEW YORK, Aug. 23—The Meetings Committee of the Society of Automotive Engineers has announced that the Annual Meeting of the Society will be held at the United Engineering Societies Building, New York, Jan. 10 to 13, inclusive, Tuesday, Wednesday, Thursday and Friday, of New York Automobile Show Week.

The meeting will open as usual with a session of the Standards Committee, the only event scheduled for Tuesday. Business and professional sessions will be held on Wednesday, probably morning and afternoon. The annual carnival is planned for a late hour Wednesday evening. Professional sessions will be held on Thursday and probably on Friday. The annual dinner is scheduled for Thursday evening, as usual.

## Statement Showing General Motors Sales for Passenger Cars, Trucks and Tractors

NEW YORK, Aug. 25—Passenger and commercial car sales by Divisions of General Motors Corporation, as reported to the National Automobile Chamber of Commerce, follow:

1921	First Quarter	Second Quarter	Six Months
<b>Passenger Cars:</b>			
Buick .....	9,945	19,020	28,965
Cadillac .....	1,394	3,484	4,878
Chevrolet .....	5,007	20,153	25,160
Oakland .....	2,775	3,598	6,373
Oldsmobile .....	4,976	6,385	11,361
Scripps-Booth .....	532	929	1,461
<b>Commercial Cars:</b>			
Chevrolet trucks.....	466	863	1,329
GMC trucks.....	491	801	1,292
Oldsmobile trucks.....	15	...	15
<b>Totals:</b>			
Passenger cars.....	24,629	53,569	78,198
Commercial cars.....	972	1,664	2,636
Miscellaneous* .....	3,660	7,359	11,049
Grand total.....	29,261	62,622	91,883

Sales for the past four calendar years follow:

Years Ended Dec. 31	1920	1919	1918	1917
<b>Passenger Cars:</b>				
Buick .....	111,215	115,405	74,856	117,300
Cadillac .....	19,826	19,801	12,279	19,692
Chevrolet .....	126,397	127,362	81,435	109,111
Oakland .....	36,155	51,901	24,110	33,951
Oldsmobile .....	25,713	33,345	18,822	22,045
Scripps-Booth .....	8,779	8,128	4,098	2,545
<b>Commercial Cars:</b>				
Chevrolet trucks.....	13,651	6,098	384	2,604
GMC trucks.....	5,137	7,729	8,997	5,861
Oldsmobile trucks.....	8,239	7,782	30	15
<b>Totals:</b>				
Passenger cars.....	328,085	355,942	215,510	304,644
Commercial cars.....	27,027	21,609	9,411	8,540
Miscellaneous* .....	36,421	28,607	21,913	11,319
Grand total.....	391,533	406,158	246,834	324,503

\*Consists of tractors; McLaughlin, Chevrolet and Olds cars produced and sold in Canada, and therefore not included in reports to National Automobile Chamber of Commerce; and also Buick and Cadillac commercial cars.

## Manufacture Fast Becoming Fine Art

### Some Detroit Plants Sacrificing Schedules to Keep Product at High Standards

DETROIT, Aug. 23—Automobile manufacturing to-day is nearer the fine art period than at any time in its history. With the rush for production steadied down to a regular demand, the factories are concentrating on turning out the very best product possible at the price.

In some factories such extreme care is being exercised that it often happens daily production schedules are sacrificed to keep the product up to high standard. This is in spite of the fact that daily production is based on sales, and failure to meet schedules means falling behind.

Building for the future is the watchword of the industry to-day. Every bit of material and work is carefully inspected, and parts or assembly work which fail to come up to requirements are turned back for rebuilding. Nothing is being passed about which there is any doubt, and every automobile turned out represents a 100 per cent perfect job.

In this fine building period the industry is benefited greatly by the high class of workmen now available. The type of man found in the automobile factories to-day is probably the most expert mechanical type in the country. The industry has had the pick of many industries owing to the general depression and it has made the best of it.

The indifferent worker who found place during the exigencies of the post-war rush is gone. In his place is the highest type workman the industry has known. The honor system is largely prevalent, each man being relied upon to see that his end of the work matches up with general excellence of the completed job.

There is no such thing to-day as labor turnover in the sense that applied during the rush period. Men are not leaving their jobs to-day voluntarily. Jobs are at a premium, and as a result the factories are getting better co-operation than they have in years, and all of this is reflected in the finished car.

### Delay Building Truck Plant for Harvester

FORT WAYNE, IND., Aug. 20—Construction work on the motor truck plant of the International Harvester Co. in this city will not be started until next spring. An extension of eight months has been granted by the Greater Fort Wayne Development Corp. which has a contract for the building.

That the plant will be developed according to the original plans is indicated in the following letter from the Harvester company:

"In requesting this further extension we desire to assure the Development company and all concerned that our com-

pany has never entertained for a moment any doubt of ultimate execution of the contract referred to or of the carrying out of its plans for the development of a Fort Wayne plant as heretofore declared to you. With us the question is solely one of time. Our reason for asking this further extension is to be found as before in the present and prospective conditions of our business, of finance and of building costs."

### No Angus Sanderson Cash to Creditors

LONDON, Aug. 12 (*By Mail*)—Creditors and shareholders of the Angus Sanderson Co. were told this week the sad story of the failure of an enterprise which began as a well-paying, high-class body building business and agency for high-grade cars, but which joined later with associated interests to produce the Angus Sanderson car.

The car production business began with the purchase of the Birtley projectile factory with 51 acres of land in 1919 for \$1,125,000 (normal exchange), payable part in cash and the remainder in 10 yearly installments. In April, 1920, a loss of \$946,590 had been incurred and on Dec. 20 of that year there was a further loss of \$817,715.

The accounts filed in the proceedings disclosed total liabilities of \$4,442,465. The total deficiency in regard to stockholders is \$1,513,325. Representatives of the debenture holders stated at the meeting it was doubtful whether there would be anything for the creditors, as the assets probably would lack \$400,000 of being sufficient to pay even the debenture holders.

No statement was made as to the cause of the failure, but the creditors expressed the view that it was due entirely to mismanagement.

The business will be liquidated by the official receiver, but the manufacture of Angus Sanderson cars is being continued with new financial aid in the works of the Tylor Co. in North London, and the output is declared to be increasing.

### Plan Distribution of Hayes Wheel Products

DETROIT, Aug. 22—National distribution of Hayes Wheel Co. products was discussed at a meeting of executives and distributors held at the Jackson factory, this month. In connection with the meeting an exhibit of wheels and component parts was shown, the new demountable at rim wheel being featured. The company plans to build its business in the United States and abroad around this type of wheel.

Addresses by dealers and officials showed complete confidence in the future of the automobile business in general and the wheel part of it in particular. Among those who spoke were W. D. Blood, head of W. D. Blood Co., New York, export agents for Hayes products; President C. B. Hayes, G. S. Porter, Sargent Ziegenbien, C. F. Field and Brundage.

## \$70,537,620 Assets for Maxwell Motor

### First Financial Statement Issued by New Organization—Presi- dent Wilson Talks

DETROIT, Aug. 22—The first financial statement issued by the new organization of the Maxwell Motor Corp. shows total assets of \$70,537,620.28, as of June 1. Cash in bank and receivable from the reorganization committee totals, with certificates of deposit, \$7,931,361.34. Inventory stands at \$16,166,867.05. Current assets are shown as \$28,615,098.87, as against current liabilities of \$1,855,179.98.

Commenting on the statement, President W. R. Wilson said:

"Assets in plants and equipment have been conservatively valued and adequate depreciation maintained, and the value of inventories has also received depreciation consistent with the fall of market prices, with substantial allowance for any further loss from this or other causes.

"Inventories of the corporation are only a little more than 60 per cent of those of the old company a year ago, and sales have been affected to such an extent that the number of cars and trucks in inventory is only slightly in excess of daily production, and the number of cars in the hands of distributors and dealers throughout the country is less than normal.

"Your corporation embarks upon its undertaking with bright prospects. During the immediate future and pending the return of better business efforts will be concentrated upon further improvement of the company's product, reduction of cost, conservation of cash, welfare of its distributors and dealers, and consolidation of its position. In other words, efforts of general preparedness for the increased volume of business which it is believed will be available in the industry within the next twelve months period."

### Dutch East Indies Now Fertile Motor Car Field

SEATTLE, Aug. 22—Information received here from Batavia, Java, shows that the Dutch East Indies present one of the most fertile fields in the Pacific Ocean trade mart for American motor vehicles. The total number of automobiles in use in the Dutch East Indies is now estimated at 15,500. Since 1915 nearly all of the cars imported have been of American manufacture.

One of the features of the automotive trade in Java, the chief island of the group, is the development of motor truck transportation. Between Sorabaya, one of the leading ports, and Tandjung Perak two hundred motor trucks are now required to take care of the daily freight traffic. The trucks are of 1½ to 2 tons capacity.

The market in the Dutch East Indies for tires is also very good under normal conditions. Imports of tires last year numbered more than 200,000, as compared with 94,508 during 1918.

## Bay State in Throes of a Headlight Law

### Lens Makers Working Night and Day But Cannot Supply Demand

BOSTON, Aug. 23—Massachusetts is now in the throes of a headlight law with a scarcity of lenses to meet it, and thousands of motorists are going about frantically trying to get what they want in the way of new lights. Many of them waited until the last minute, as they do in registering. And the makers of lenses have been working night and day to get goods here, but not enough were available. One lens man stated that if he had 10 carloads in Boston, dealers from all over the State and from some of the other States would be racing in to get their share, fighting with the Boston dealers anxious to take the whole shipment.

#### Time for Hustling

It is a time of hustle and make money for the accessory people, and some of the car dealers have taken a hand in adding a little money to their finances by selling bulbs and lenses, also doing a focus business. All over the State men are opening up focussing stations and charging from 50c. up to take care of motorists' wants. General focussing costs an average of about \$1. Then there is the profit on the sale of 21 candlepower bulbs, and lenses. Also there is shop work when brackets are to be bent down. As one accessory man remarked to-day, discussing the sales: "God and the highway commission were good to us just when we needed help."

A lot of the motorists are trying to do their own focussing and the placing of the lenses. The State Motor Vehicle Department has had printed some cards giving directions for doing this work. But some of them are not having much satisfaction as they have bought the wrong size lens, or do not know how to put them in properly, with the result that it is not unusual to find on main traveled roads broken lenses every few hundred yards, or meet with cars whose lights are out of focus.

#### Warning Tags for Cars

It is doubtful if the law will be of much use for several weeks. Meanwhile the police chiefs of Massachusetts have all received letters with a lot of warning tags to place on cars not properly fitted with lenses when they see them parked by day. These warning tags will tell the owner he cannot operate his car at night until it meets the law's requirements, and the number is sent to the Motor Vehicle Registrar's office where it will be checked up. A second report of not being equipped will cause suspension of the license to drive, and perhaps the registration of the car. The owner, too, will be in jeopardy if he has an accident, for not being lawfully equipped and the burden of blame would be on him.

### Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for July and Six Previous Months

	Month of July				7 Months Ending July			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes .....	12	\$55,110	...	...	41	\$381,204	30	\$193,775
Airplane parts .....	...	34,174	...	\$2,444	...	505,238	...	113,573
Commercial cars .....	2,042	3,434,070	399	314,237	18,333	28,582,566	5,092	7,798,907
Motorcycles .....	2,299	608,030	441	124,523	23,373	6,308,949	8,398	2,800,160
Passenger cars .....	13,320	16,220,965	2,224	1,873,368	88,640	98,059,062	19,466	22,242,514
Parts, not including engines and tires .....	...	5,394,350	...	1,952,525	...	48,998,975	...	26,768,707
<b>ENGINES</b>								
	Month of July				7 Months Ending July			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas .....	3,181	\$594,809	415	\$108,472	24,986	\$4,051,310	5,812	\$1,195,920
Marine, gas .....	917	316,261	265	85,545	6,466	2,043,696	3,222	1,166,716
Stationary, gas .....	2,466	460,866	433	123,350	17,546	3,041,152	7,094	1,721,952
Tractor, gas .....	2,145	1,911,903	16	29,082	13,834	13,573,810	2,624	3,262,254
<b>Total .....</b>	<b>8,709</b>	<b>\$3,283,839</b>	<b>1,129</b>	<b>\$346,449</b>	<b>62,832</b>	<b>\$22,709,968</b>	<b>18,752</b>	<b>\$7,366,842</b>

### Seizure of "Hooch" Cars Worries Southern Dealers

BIRMINGHAM, ALA., Aug. 20—Action on the part of county and federal authorities of condemning automobiles seized for carrying alcoholic liquors in violation of the prohibition laws is giving dealers in this district no small amount of trouble.

The latest instance is a car sold by the Pryor Motor Co. on which there was a balance of \$1,250. This car was not in possession of the buyer when seized for alleged transportation of whiskey. It was taken by deputy sheriffs and was being turned over to federal authorities for condemnation and sale at auction when the Pryor company got an injunction to prevent this action.

When cars are thus turned over to federal authorities without the lien held by the company selling it being filed in court, the company has no claim on it. It was for this purpose the injunction was secured.

If motor companies file their liens in time there is a chance of recovering their cars, but many times they are ignorant of the seizures and cannot do so.

While most of the cars used for the purpose of illicit liquor traffic are second-hand ones, a number of dealers have lost high priced cars through seizure. They were, of course, unaware that their cars were being used for such purposes.

#### HENDEE FILES PROTEST

SPRINGFIELD, MASS., Aug. 20—The Hendee Mfg. Co. of this city, motorcycle manufacturer, it is announced, has filed a protest with the Senate Finance Committee at Washington, protesting against the proposed duty on bicycles, motorcycles and parts, as contained in the Fordney bill, saying that in common with other manufacturers the company believes the provision would harm the industry. The company states that foreign competition is not feared and, furthermore, would stimulate the industry.

### Scandinavian Trade Looks Better for 1922

STOCKHOLM, Aug. 5—(By Mail)—While the 1921 automobile season has been the worst on record in Scandinavia, indications are that with the improvement in general conditions the market will be much stronger next February and March. The public has awakened to the fact that American cars are best suited for use in Norway and Sweden, as the motor car driver in these countries needs power more than anything else.

There is no market in prospect for trucks of any size above 2½-ton capacity. Buyers now all specify pneumatic tire equipment. Electric lighting is asked for, but not electric starters in all cases. Buyers favor low frame height to facilitate loading and discharging. American manufacturers should consider the double pneumatic tire and rear equipment similar to that of the Fiat and should not let tire sizes exceed 33 x 4½.

The conditions generally are brighter than they have been in the country in some time past.

#### REDUCE VICTOR TRUCK CLAIM

DETROIT, Aug. 22—The claim of Alfred F. Rick of Baroda against the Victor Truck Co., St. Joseph, Mich., has been reduced by the referee in bankruptcy from \$40,160 to \$8,946. Rick was treasurer of the company. A claim for stock which the company was said to have given gratis was disallowed on the ground that no corporation could give stock to officers or directors without adequate consideration.

#### ASK CLAIRMONT RECEIVER

INDIANAPOLIS, IND., Aug. 22—Judge Solon J. Carter of Superior Court, this city, has been asked to appoint a receiver for the Clairmont Reynolds Body Co. The petition for a receiver was asked by Alva C. Robbins.

## Flying Exhibition to Be Held in Paris

### French Airplane Manufacturers Expect to Cover All Phases of Industry

PARIS, Aug. 12 (*By Mail*)—French airplane and kindred manufacturers will hold an aviation exhibition in the Grand Palais, Paris, from Nov. 12 to 27. This event will unite all types of flying machines and will cover every phase of aerial navigation.

The first international aerial navigation congress in Europe is announced during the period of the Paris aviation show, from Nov. 15 to 26.

The congress is divided into two sections, dealing respectively with the techniques of flying and aerial navigation. Eight main subjects are provided for in the discussions, as follows: (1) Application on full size machines of results obtained on small models in the aerodynamic wind tunnel. (2) Commercial airplanes and flying boats; thick and thin wings; all-metal construction. (3) Big capacity airships. (4) Airplane engines for commercial services. (5) Instruments for plotting an aerial route and determining position. (6) The formation of aerial highways; the installation of airdromes and their operation. (7) Commercial aerial navigation; organization and operation of aerial transport lines; aerial mail. (8) Aerial traffic regulations; examination of pilots; safety; insurance.

### Jersey City Will Have Motor Show This Year

JERSEY CITY, Aug. 20—Jersey City will have another automobile show this year, its second, the success of the initial one held last fall being so great it incited the members of the Hudson County Automobile Trade Association, who sponsored the event, to even greater efforts than they made last year. As in 1920, the display will be held in the Fourth Regiment Armory, and the demand for space greatly exceeds that of the first exhibition. At least 25 makes of passenger cars will be on view, every one of them representative products of the leading American manufacturers. There will also be a display of accessories worthy of inspection, while special days will include many features, the programs of which will be announced later.

Elmer E. Hallinger is president of the Hudson County Automobile Trade Association this year and he will be ably assisted by his fellow officers in carrying out the organization's plans. These include A. R. Southworth, vice-president; H. V. Lehman, treasurer; A. W. Elder, secretary, and Duncan Stuart, recording secretary. F. W. Payne, who was manager of the show last year, has again been retained in the same capacity.

## Complete Program of State Fairs Scheduled Throughout United States During 1921-1922

Alabama—State Fair, Birmingham, Oct. 3-8.  
Arizona—State Fair, Phoenix.

California—State Fair, Sacramento, Sept. 3-11.

Canada—Calgary Industrial Exhibition, Calgary, June 30-July 8; Canada's Great Eastern Exhibit, Sherbrooke, Que., Aug. 27-Sept. 3; Canadian National Exhibition, Toronto, Ont., Aug. 27-Sept. 10; Central Canada Exhibition Association, Ottawa, Ont., Sept. 9-19; Edmonton Exposition, Edmonton, Alberta, July 8-16; Quebec Provincial Exposition, Quebec-Next Westminster, B. C., Sept. 12-17; Vancouver Exposition, Vancouver, B. C., Aug. 13-20; Western Fair, London, Sept. 10-17.

Colorado—State Fair, Pueblo, Sept. 26-30; National Western Stock Show, Denver, Jan. 14-21, 1922.

Connecticut—Connecticut Fair Association, Hartford, Sept. 5-10.

Florida—State Fair, Jacksonville.

Georgia—State Fair, Macon, Oct. 27-Nov. 5; Southeastern Fair Association, Atlanta, Oct. 15-25.

Idaho—State Fair, Boise, Sept. 26-Oct. 1.

Illinois—Illinois and Indiana Fair Association, Danville, Aug. 27-Sept. 3; State Fair, Springfield, Aug. 19-27; International Live Stock Association, Chicago, Nov. 26-Dec. 3; Kankakee Inter-State Fair, Kankakee, Aug. 15-19.

Indiana—State Fair, Indianapolis, Sept. 5-10; Inter-State Fair Association, South Bend, Sept. 12-17.

Iowa—Inter-State Fair, Sioux City, Sept. 18-24; Iowa State Fair and Exposition, Des Moines, Aug. 24-Sept. 2; National Swine Show and Exposition, Des Moines.

Kansas—State Fair, Hutchinson, Sept. 17-23; Free Fair, Topeka, Sept. 12-17.

Kentucky—State Fair, Louisville, Sept. 11-17.  
Louisiana—State Fair, Shreveport, Oct. 27-Nov. 6.

Maryland—Hagerstown Interstate Fair, Hagerstown.

Massachusetts—Eastern States Exposition, Springfield, Sept. 13-24.

Michigan—State Fair, Detroit, Sept. 2-11.

Minnesota—State Fair, Hamline, Sept. 3-10; South St. Paul Stock and Feeder Show, South St. Paul.

Missouri—American Royal Live Stock Show, Kansas City, Nov. 12-19.

Mississippi—State Fair, Jackson, Oct. 17-22; Mississippi-Alabama Fair, Meridian, Oct. 10-15.

Montana—Midland Empire Fair, Billings, Sept. 19-23; State Fair, Helena, Sept. 12-17.  
Nebraska—Ak-sar-ben, Omaha, Sept. 13-24; State Fair, Lincoln, Sept. 4-9.

New Jersey—Trenton Interstate Fair of New Jersey, Trenton, Sept. 26-30.

New York—State Fair, Syracuse, Sept. 12-17; Rochester Exposition, Rochester, Sept. 5-10.

North Carolina—State Fair, Raleigh, Oct. 17-22.

North Dakota—State Fair, Grand Forks, July 18-23; State Fair, Fargo, July 11-16.

Ohio—State Fair, Columbus, Aug. 29-Sept. 3.  
Oklahoma—Free State Fair, Muskogee, Oct. 3-8; State Fair and Exposition, Oklahoma City, Sept. 24-Oct. 1.

Oregon—State Fair, Salem, Sept. 26-Oct. 1; Pacific International Live Stock Exposition, Portland, Nov. 5-12.

Pennsylvania—Erie Exposition, Erie, Aug. 22-27.

South Carolina—State Fair, Columbia, Oct. 24-28.

South Dakota—State Fair, Huron, Sept. 12-17.

Tennessee—Chattanooga Interstate Fair, Chattanooga, Oct. 1-8; East Tennessee Division Fair, Knoxville, Sept. 26-Oct. 1; Memphis Tri-State Fair, Memphis, Sept. 24-Oct. 1; State Fair, Nashville, Sept. 17-24; West Tennessee District Fair, Jackson, Sept. 12-17.

Texas—South Texas State Fair, Beaumont, Nov. 10-19; Southwestern Exposition and Fat Stock Show, Fort Worth, March 5-12, 1922; State Fair, Dallas, Oct. 8-23; Texas Cotton Palace Association, Waco.

Utah—State Fair, Salt Lake City, Oct. 3-8.

Vermont—State Fair, White River Junction, Oct. 3-6.

Virginia—Staunton, Virginia, Fair, Staunton, Sept. 5-10; State Fair, Richmond, Sept. 1-8.

Washington—Spokane Interstate Fair and Live Stock Show, Spokane, Sept. 5-10; State Fair, Yakima.

West Virginia—State Fair, Wheeling, Sept. 5-10.

Wisconsin—Northern Wisconsin State Fair, Chippewa Falls, Sept. 12-16; State Fair, Milwaukee, Aug. 29-Sept. 3.

Wyoming—State Fair, Douglas, Sept. 13-16.

#### ADDITIONAL FAIRS

Blue Grass Fair Association, Lexington, Ky., Sept. 5-10.

International Wheat Shows, Fair and Exposition, Wichita, Kan., Sept. 26-Oct. 3.

Inter-State Fair, La Crosse, Wis., Sept. 2-23.

Ozark Stock Show, Springfield, Mo., Oct. 3-8.

Dairy Cattle Congress and International Belgian Horse, Waterloo, Iowa, Sept. 26-Oct. 2.

National Dairy Show, St. Paul, Minn., Oct. 8-15.

National Implement and Vehicle Show and Peoria District Fair, Peoria, Ill., Sept. 30-Oct. 8.

National Swine Show, Peoria, Ill., Oct. 3-8.

West Michigan State Fair, Grand Rapids, Mich., Sept. 17-22.

### Buenos Aires Seeking License Plate Samples

WASHINGTON, Aug. 24—The municipality of the city of Buenos Aires, Argentina, desires samples or models of luminous number plates for automobiles for use in that city. The text of the invitation is available to manufacturers and others interested from the Bureau of Foreign and Domestic Commerce. It is stated a business of considerable volume should be afforded for the successful contestant.

### Survey Shows Need for Canadian Lines Abroad

OTTAWA, ONT., Aug. 20—Acting on instructions from the Trade and Commerce Department, L. E. Wolgess, Canadian Government Trade Commissioner, has visited Roumania, Hungary, Czechoslovakia, Austria, Turkey and Jugoslavia and the trade report has now been issued in book form under the title of "Trade of the New Countries of South-east Europe." A list of possible openings for Canadian goods is supplied.

## METAL MARKETS

**A** HIGHLY interesting period in the shaping of the steel market is imminent. While August statistics of production and unfilled tonnages are not likely to disclose startling gains, they will undoubtedly reflect the turn for the better that has come over the market, and it remains to be seen how the minds of the rank and file of producers will react to this changed order of things, following the dreary months through which the industry has passed. While the large interests, far from building castles in the air, recognize only too well that the demand is still a plant of very tender growth, calling for the most careful nursing, one encounters here and there smaller producers whose psychological make-up is such as to preclude interpretation of even slightly increased production, and orders in any other light than as a forerunner of a rising market or justification for such advances. There are those whose minds lean in this direction and who even now point to the pig iron market as an example that rising values beget of themselves more active demand. They make much of the fact that at \$18 pig iron went begging, whereas now that the market has recovered to approximately \$20, there is a relatively active demand in evidence. They overlook, however, that, although it is difficult to dissociate steel from its chief raw material, the pig iron and steel markets have very little in common as to marketing conditions. The former, even in normal times, is more or less susceptible to semi-speculative influences, whereas the latter is amid ordinary conditions a manufacturing affair in which regularity of outlet is of far more importance than ephemeral gains. That the representative elements in the steel industry are not permitting their judgment to be warped by the slightly better appearance of things, may be seen from the intensive competition that is in evidence for orders of attractive tonnage, specifications and delivery conditions. Concessions, it is true, have narrowed down perceptibly for the simple reason that in the case of many mills selling prices represent levels very close to production costs; but, if any buyer were to utilize the last few days of September in an effort to ascertain what he might be able to obtain sizable tonnages of steel at, say for October shipment, he would undoubtedly be able to shade conventional quotations by \$3 a ton and upwards.

**Pig Iron.**—The market's advancing tendency is gaining momentum. The misfortunes that befell the pig iron market when it crossed the \$40 level are still fresh in the trade's mind and should act as a brake on too ambitious and premature efforts to enhance values unduly.

**Steel.**—Again the United States Steel Corp. ratified by official announcement made late on Wednesday its policy of meeting all price cuts by independents, revising its "official" sheet prices downward for that purpose. Producers of cold-rolled strip steel are energetically competing with one another for what orders emanate from the automotive industries. Four cent, base Pittsburgh, appears, however, to be the lowest quotation extant, although mills are apt to do a lot of figuring before they would turn down an order for, say 300 tons, at an even lower bid price.

**Aluminum.**—Although the automotive industries are reported to be working up more metal and sheets, fresh demand has not broadened, most consumers still having considerable stocks and material due on old contracts. A London report says that Ger-

man aluminum production is now at the rate of 15,000 tons a year, compared with 800 tons before the war. The leading Norwegian producer has appointed a selling agent in the United States.

**Copper.**—A slight improvement is noted in the number of domestic buyers, but the aggregate tonnages going into this channel are still negligible.

**Lead.**—The market presents a routine appearance.

**Zinc.**—Dulness persists and the market continues feeble.

## INDUSTRIAL NOTES

**Federal Automotive Sales Co.** has been incorporated to become distributor of Penberthy products in Ohio, Michigan, Illinois and Indiana. Headquarters of the sales company will be in Detroit with other offices in Cleveland and Chicago. Officers are E. H. Janes, president; R. P. Flower, vice president, both formerly with Interstate Foundry Co., and Walter C. Voss, secretary-treasurer, formerly with Standard parts.

**Peninsular Tire & Rubber Co.,** Tampa, Fla., has announced that the company will shortly begin the construction here of a new \$200,000 plant. The building will be two stories, 100 x 300, and in addition a small office building and a storage building are also to be constructed. The initial capacity of the plant will be about 300 tires daily. The company was recently incorporated at Tampa with \$1,000,000 capital.

**Mason Tire & Rubber Co.,** of Kent, O., will purchase in the near future the cotton mills of the Quitman Mfg. Co., at Quitman, Ga., to be operated as a unit of the tire plant for the manufacture of the various fabrics made from cotton that are used in the making of tires. The Ohio company has been investigating a number of southern cotton mills recently with a view to purchasing a plant.

**Viking Motors Corp.,** Detroit, has been organized with a capital stock of \$100,000 to make airplanes and airplane engines and establish transportation routes. Officers are R. L. Bailey acting president; Fred H. Aldrich, secretary, and R. L. Bailey, treasurer. D. E. Briggs is to be general manager and E. B. Carns, aeronautical engineer.

**Columbia Body Corp.,** Detroit, has acquired the American Chemical Co.'s plant and is moving. The company has been given permission to sell \$200,000 in stock.

**International Harvester Co.** of Canada, Ltd., Chatham, Ont., is equipping its wagon and sleigh plant to manufacture International motor trucks.

## PORTAGE TO GET FIRM BACK

**PORTAGE, WIS., July 20**—The Six Wheel Truck Co., Fox Lake, Wis., which has been manufacturing a new type of truck with dual sets of rear wheels for some time on a limited scale, has accepted the offer of business men of Portage, Wis., to relocate in that city. Portage capital is taking a large financial interest and will provide quarters for a machine shop and assembling floor. Portage is a leading railroad center in the interior of Wisconsin. The Six Wheel truck was designed by F. N. Pettegrew of Fox Lake, who will be vice-president and general manager of the concern in its new location. The truck is designed especially for heavy duty hauling.

Stevens-Duryea Cuts  
Prices of 4 ModelsFive Hundred Men Put to Work  
in Plant at Springfield, Mass.

## —Other Price Cuts

**SPRINGFIELD, MASS., Aug. 22**—Stevens-Duryea has cut the price of its seven passenger touring car to \$6,800; its vestibule limousine to \$8,600; four passenger touring to \$6,900 and chassis to \$5,600, effective Sept. 1. Five hundred men are at work at the plant.

## CUT HARVEY TRUCKS

**HARVEY, ILL., Aug. 19**—Harvey Motor Truck Co. has cut the prices on its 3½-ton truck to \$3,950 and its 5-ton truck to \$4,500.

## PIEDMONT CUTS TRUCKS

**LYNCHBURG, W. VA., Aug. 23**—The Piedmont Motor Car Co. has decided to reduce the price of its 4-30 model from \$1,270 to \$970 and of its 6-40 model from \$1,495 to \$1,285.

Lehigh Rubber Opens  
Manufacture of Tires

**NEW CASTLE, PA., Aug. 22**—The Lehigh Rubber Co., backed by Frank Seiberling, former Goodyear head, has now begun the manufacture of tires. H. W. Smith, the general manager, says 100 men are already employed and that the company intends building up production to 1000 tubes and 500 casings daily.

The capacity of the plant, with full force, is 2000 casings and 3000 tubes.

## LATEST MODELS AT FAIR

**PITMAN, N. J., Aug. 22**—Although the twenty-eighth annual fair and picnic of Gloucester County granges opened in the rain, the attendance was good, and "machinery row" was thronged with a rain-coated delegation. Latest models in several makes of farm tractors, motor trucks and automobiles were the center of attraction.

Automotive men present were optimistic as to outlook for future business and were pleased with the interest taken in the exhibits of the tractors, motor trucks and passenger cars.

## W. U. TAKES INSURANCE

**CHICAGO, Aug. 22**—Effective Sept. 1, the Western Union will assume full jurisdiction over automobile insurance in its territory. This action was taken as a result of the special meeting of the union Dec. 9, 1920. Jurisdiction will be assumed over rules, commissions and regulations connected with the business. The Western merit schedules will be mandatory upon automobile business after Sept. 1.



## MEN OF THE INDUSTRY

**Wainwright Engineering Corp.**, Connerville, Ind., has announced more changes. Walter Duda, formerly sales manager of the Faeth Co., Kansas City, Mo., has been made sales manager; Joseph F. O'Brien, formerly with the Gibson Co., Indianapolis, is now chief of the order department; John D. Carmody has been made district manager of the Pacific Coast territory, with headquarters in San Francisco. For eight years he was district manager for the Champion Spark Plug Co.

**Frank Johnson**, a member of the engineering staff of Cadillac Motor Car Co. from 1901 to 1917, has rejoined his former company, after having served as chief engineer of Lincoln Motor Co. from 1917 to 1920. From 1901 to 1906 Johnson was chief draftsman and designer for Cadillac, and from 1906 to 1917 was designer on all chassis and engine parts. He designed every engine used by Cadillac to the introduction of the eight, and was a part designer of that.

**Klaxon Co.** of Newark, N. J., has placed C. E. Vaughn, assistant sales manager, in charge of the middle and northwestern territories. Vaughn goes into this new field with a thorough knowledge of Klaxon methods gained both on the road and in the office of the plant. He will open offices in Chicago.

**Charles M. Steele**, formerly of the Carl M. Greene Advertising Agency of Detroit, will be the new advertising manager of the Studebaker Corp., with headquarters in South Bend. He was at one time advertising manager of the Saxon Motor Co.

**L. F. Kedzie**, purchasing manager of the Mercer Motors Co., Trenton, N. J., has resigned, due to a reorganization of the Mercer company. Kedzie was formerly assistant purchasing manager of the Packard Motor Car Co. of Detroit.

**Clarence T. Warner**, general manager of the Michigan State Investment Co., Benton Harbor, has resigned to become president of the Warner Auto Equipment Co., which will manufacture a shock absorber with factories in Benton Harbor.

**Roy Hood** has resigned as purchasing agent for Everitt Bros. to become director of purchases for Rickenbacker Motor Car Co., Detroit, of which he will also be a director.

**Victor Bresler** of Detroit has been selected by Lexington Motor Co. to study business conditions and the export market for cars in India, Egypt, South Sea Islands, China and Europe.

**Howard A. Coffin**, formerly secretary of the Detroit Pressed Steel Co. and manager of the Disteel Wheel Division, will become the vice-president of the White Star Refining Co. Sept. 1.

**Glenn B. Hiller**, general sales manager of the American Motor Truck Co., Newark, Ohio, has resigned to take effect Sept. 1. Mr. Hiller has not announced his future plans.

**W. W. Helte**, Detroit branch manager of International Motor Truck Corp., has been transferred to the New York office.

**Harland M. Wirth** has resigned as director of purchases of the Kelsey Wheel Co., Detroit.

## FINANCIAL NOTES

**Wood Rubber Co.** has declared regular quarterly dividend of 1½ per cent on pre-

ferred stock, payable Sept. 1 to stock of record Aug. 2.

**White Motor Co.**, Cleveland, has declared the regular quarterly dividend of \$1, payable Sept. 30 to stock of record Sept. 15.

Find Industrial Field  
Tractors' Best Market

**ATLANTA, GA., Aug. 20**—While a few tractors are being sold for agricultural use in the Southeast this summer, managers for the manufacturers in this district, most of whom have their southern branches in Atlanta, agree that the primary market for the past few months has been in the industrial field, principally for use in factory yards and in road construction.

The lumber industry, ordinarily an excellent market for tractor sales in this section, has experienced such a long period of depression that but few sales are being made to this industry or have been made for some months. A large number of the mills in the Southeast have remained closed for a long time, and, while lumber conditions are gradually improving, there is little chance of this market assuming proportions to make sales effort worth while before the latter part of the year and possibly not before next year.

The revival of activity among the industrial plants of the section is having a favorable effect on tractor sales, and many plants are purchasing them for use in the yards and about the factories. A considerable amount of road construction is going on in the Southeast, and tractor sales in this field have been very good for several months.

The consensus of opinion among the local branch managers is that there will be little demand in agricultural lines until cotton reaches a much higher figure than the present market offers, which will probably be toward the latter part of the year.

Motor Excise Taxes  
Fall Off \$23,377,031

**WASHINGTON, Aug. 24**—Excise taxes assessed on automobiles for the fiscal year of 1921 fell off by \$23,377,031.63, according to preliminary statistics issued by the Treasury Department. The total yield for the past fiscal year of excise taxes on automotive equipment amounted to \$115,545,760.38. The effect of excise taxes in general was illustrated in the fact that the yield declined approximately \$36,000,000 since 1920.

Noma Motor Reduces  
Prices of All Models

**NEW YORK, Aug. 25**—Noma Motor Corp. announces price cuts as follows:

	Old Price	New Price
2 passenger .....	\$3,000	\$2,800
4 passenger .....	3,200	2,850
6 passenger .....	3,500	3,200
Sedan .....	4,350	3,700

No changes have been made in specifications.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

**NEW YORK, Aug. 24**—The publication of the latest index numbers of prices indicates that some degree of price stabilization has been reached. According to Bradstreet's index, wholesale prices rose 3.07 per cent during July, as compared with a rise of 1.05 per cent during June. The rise in June was the first since May, 1920, and the continuation during July strengthens the belief that there is a tendency toward stabilization. This is borne out by Dun's index number, which rose 2.41 per cent during July, the first increase made since May of last year. The Bureau of Labor's index number showed no change. The advance for the month was caused in the main by higher prices for foodstuffs and, to a less degree, by higher prices for textiles. Metals show a distinct decline. What price changes have occurred have been of a character to level out the unevenness of prices and indicate a drift toward stabilization.

The figures presented by Secretary Davis to the Senate regarding the state of unemployment in the country indicate that workers are not yet, as a whole, returning to the factories and mills. His figures, which are merely estimates, show that there are 5,735,000 persons without work in the United States, of which a great majority are employees in the manufacturing and mechanical industries. These latter, including the building trades, have, according to Secretary Davis, 3,900,000 employees now out of work, while the number of transportation workers similarly unemployed amounts to 800,000; trade and clerical workers, 450,000; miners, 250,000, and domestic and personal service employees, 335,000. The greater number of unemployed includes women, girls and boys, who since March of last year, when we were at the peak of industrial activity, have returned to non-profitable employment at home or to school.

Due largely to the continued accession of gold, the Federal Reserve system shows further improvement. The ratio of total reserves to deposit and Federal Reserve note liabilities, combined, of the whole system increased last week from 65 per cent to 65.8 per cent, the highest in more than three years. Gold reserves increased \$24,394,000, while total bills on hand declined \$17,610,000, largely due to fewer discounted commercial bills, and total earning assets decreased \$32,073,000. Federal Reserve notes in circulation declined \$17,142,000. The improvement in the position of the New York Federal Reserve bank was even more marked, the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, was at 108.7 per cent, the highest in the history of the bank.

While seasonable demands for crop-moving funds have been increasing recently, there was last week an easier tone in the money market.

## Calendar

## SHOWS

- Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.
- Sept. 28-Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.
- Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.
- Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.
- January—Chicago, Automobile Salon, Hotel Drake.
- Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.
- Jan. 28-Feb. 2—Chicago, National Automobile Show.

- Coliseum, Auspices of N.A.C.C.
- Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.
- Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.
- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

- September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.
- September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm, Lighting Plants and Power Farming Machinery, Palermo Park; Sociedad Rural Argentina.
- September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

- Sept. 5, 1921—Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.
- Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.
- Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.
- Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.
- November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.
- March, 1922—Santiago, Chili, Annual Automobile Show.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

- Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

- Sept. 14-15-16—Detroit, Credit Convention Motor and Accessory Manufacturers Association.
- Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.
- Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## RACES

- Labor Day—Uniontown, Pa., Autumn Classic.

Bosch Magneto to Go  
into Lighting Field

SPRINGFIELD, MASS., Aug. 24—Reports for some time current that the American Bosch Magneto Co. of this city has closed a deal for production of automobile lighting and starting systems that will make this corporation the largest manufacturers of these lines in the world has been confirmed by President Arthur T. Murray at his office here. However, he said that he is unprepared to give out details.

In reply to a question as to whether the contract will mean a longer working schedule at the local plant, he replied that he does not believe that it will. He explained that, according to present outlook, the larger part of the contract will be handled at the corporation's Cambridge, Mass., plant. An unconfirmed report from Boston is to the effect that the contract in question involves about \$3,500,000 and is from the manufacturers of the Hudson and Essex automobiles.

Bus Companies of Ohio  
Take New Law as Joke

TOLEDO, Aug. 20—The Graham law in Ohio which has put the motor buses operating in inter-city business under the Public Utilities Commission seems to be treated as a joke by many of the operators.

On the day which it became effective—last Monday—only six of approximately 500 buses had filed tariffs and of these only two were correctly drawn.

None of the northwestern Ohio bus lines have filed the required data with the commission.

The commission has drafted rules which require the bus lines to post schedules, rates of fare, maintain equipment, keep adequate supplies, travel fixed routes, maintain certain safety speeds at dangerous points, and pick up all passengers to certain limits who offer to ride except those "drunken or diseased."

Whenever a fare change is contemplated 30 days' notice must be given the commission. Trailers are only permitted upon the special authority of the commission.

The penalty which the commission will seek soon to impose upon delinquents amounts to \$1,000 a day for negligence in filing any required data.

Annual reports of operations and revenues must be made and special reports on accidents and interruptions to service.

Financial Statements  
Show British Losses

LONDON, Aug. 5 (By Mail)—It has been the fashion since the war for British automobile, as well as other industrial companies, to hold back their reports and to issue them for periods of eleven and up to eighteen months. The fault or cause is mostly due to circumstances beyond the companies' control, mostly due to delay in getting accounts passed by Government for excess profits tax, and in some cases it is because of delay in getting accounts through for work on Government account.

Thus the new Wolseley Motors trading report is only down to Sept. 30 last. The trading profit was £44,951 (nominally \$224,755) in comparison with £224,620 (nominally \$1,123,100) for 1918-1919, but by reason of increased first charges on first mortgage debentures issued in 1919, the profit is converted into a net loss of £83,581 (nominally \$417,905).

This bad result reflects and, indeed, is directly accounted by the ill effect of the moulders' fifteen weeks' strike, and its loss value to the company in turnover is estimated to be \$5,000,000. The balance sheet shows a bank overdraft of £315,961 (nominally \$1,579,805), while cash at bankers and in hand amounts to £6,701 (nominally \$33,505).

This report also is pessimistic as to the future of British trade abroad.

The G. W. K. Co., makers of a light friction disc drive car, report a loss of £197,497 (nominally \$987,485) on a 16 months' report up to Dec. 31 last.

Stockholders Ready  
to Back Texas Motor

DALLAS, TEX., Aug. 24—The outstanding obligations of the Texas Motor Car Association, organized for the purpose of manufacturing cars, with headquarters at Fort Worth, will be paid by an assessment of 25 per cent on stockholders, it is announced. The assessment will bring in approximately \$600,000. The outstanding obligations of the company total \$500,000, the receivers stated. The assessment will leave the receivers with \$100,000 to operate with.

The assessment committee is composed of stockholders from many of the larger cities of four States and its personnel and scope of work have the approval of the court. The receivers declared the assessment of 25 per cent will give the 17,000 stockholders in Texas, Oklahoma, Louisiana, Arkansas and New Mexico a chance to get their money back.

It is hoped to have the plant of the company in operation soon. It is believed with the outstanding obligations out of the way and a small amount of capital to work on the business of the company will soon be in operation.

## EUGOL IN CHICAGO

CHICAGO, Aug. 22—The Eugol Motor Truck Co., formed by Eugene Goldman, formerly connected with Master Trucks, Inc., has established offices in this city and has a factory in Kenosha, Wis., for the manufacture of a speed truck which will be assembled largely of standard units. Production is already under way and the factory is being enlarged for body storage and painting.

## BRAZIL CONDITIONS POOR

WASHINGTON, Aug. 20—According to reports from Sao Paulo, Brazil, conditions in the automobile market of that city are even worse than in Rio de Janeiro. Large consignments of cars are held by the banks by reason of the refusal of the consignees to meet the drafts covering their shipments.



SEP 6 1921

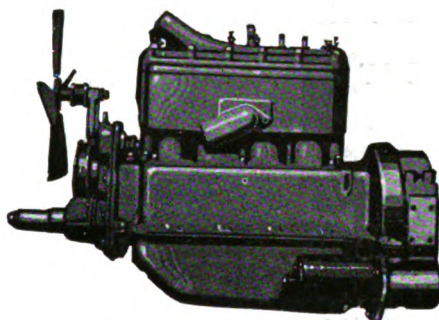
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### Twelve of the Twenty-two Manufacturers of "Fours" Who Do Not Make Their Own Motors Use the LYCOMING Model "K" Motor

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These are undoubtedly some of the reasons that so large a proportion of car manufacturers in this field are using Lycoming Motors.

But, in addition, the Lycoming Motor, with a dozen years of development, fits into the present market as if it had been especially designed for it.

Write for specifications and other information about the Lycoming Motors.

**LYCOMING MOTORS CORPORATION**  
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# FEDERAL BEARINGS

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**BABBITT-LINED BRONZE-BACK BEARINGS - BRONZE BUSHINGS - BRONZE CASTINGS**  
**DETROIT - MICHIGAN**

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

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No. 9

## Public Desires as Related to Design

Last week we discussed the merchandising value of the recent N.A.C.C. attempt to learn what the public wants in an automobile. Here is an engineer's estimate of the survey from the standpoint of design.

By P. M. Heldt

**T**HE relation of the sales manager to the public is definite and obvious. The interest of the engineer in the desires and current opinions of the public, however, is somewhat less direct. In the long run, however, the car which he designs must give satisfaction to the public, so that he can well afford to examine carefully the results of a survey intended to find out what the public wants in an automobile.

The engineer, naturally, approaches the recent N. A. C. C. survey from a different angle than does the sales manager. His reactions to the compiled results are different and the results bear a special significance to the design phases of automotive manufacture. Certain interesting thoughts stand out, however, when the survey is viewed from this angle.

In the first place, it would seem that the questions—which were evidently drawn up with a view to furnishing a guide for advertising managers—were capable of misinterpretation. Take, for instance, the matter of price. Last year nearly one-half of all purchasers bought the cheapest car on the market, which would seem to warrant the conclusion that price is a preponderant consideration in the selection of a car. In fact, it will hardly be disputed that the first

thing almost any prospective purchaser decides upon is the approximate price level at which he wants to buy. This price level may be determined by his financial limitations, and in the case of purchasers of low-priced cars it usually is. Even in the opposite sense price is quite an important item. You will find very few millionaires riding around in \$1,000 cars; these cars simply don't correspond to their station in life, and so they won't consider them, though in talking about the matter they might not express it in exactly that way. Therefore, when the automobile owners in their replies state that price was given fourth or seventh consideration, they probably mean slight differences in price.

What lingers in the average purchaser's mind as the thing that influenced him most is undoubtedly the thing that finally decided him to prefer the car he actually bought, over one or two others very similar to it in other important respects. That is, most of the variables had already been eliminated when the final choice was made.

From all indications buyers attach the most importance to endurance—by which is probably meant durability. But how can the purchaser judge durability? How could even an expert judge durability? True



it does not require a high degree of intelligence to predict that almost any car in the \$3,000 class will last longer than a car in the \$500 class, but this problem does not arise, for, as stated in the foregoing, the purchaser first of all determines the approximate price level at which he wants to purchase, and any comparisons on features other than price would be limited to cars within a comparatively narrow price range.

Durability depends upon a large number of factors, and there is no definite limit to the life of a car. As the car advances in age the expense for repairs and replacement of parts constantly increases, and eventually it becomes excessive, at which time the car should logically be retired. On the other hand, the annual depreciation can be reduced by keeping the car in service for a longer period. The most logical time for retiring the car would seem to be when the repair and replacement expense begins to increase faster than the depreciation expense would be decreased if the car were continued in service longer. This would be true if the service of a car were equally valuable at all periods of its life.

Anybody derives much more satisfaction, however, from a ride in a car that has been out of the dealer's store room for a week than from a ride in one that is going to be scrapped soon.

Nor is the difference wholly of a psychological nature. During the last year of a car's life it has to undergo repairs or has to be tinkered with much more frequently, and therefore is available for service a smaller proportion of the time. Further, the car is no longer as reliable as in its younger years, and the owner can no longer start on a trip with the same assurance of reaching his destination and getting back without trouble as he could when the car was newer. It is for these reasons that cars are usually retired long before the repair and replacement costs have become excessive.

Generally speaking, the things which make for durability in automobile construction, such as liberal bearing surfaces, hardened and ground parts, high grade materials and close tolerances, occasion a good deal of expense to the manufacturer, and it is well understood that they can be expected in a full measure only in the more expensive cars.

The principles of construction employed in any narrow price class are usually so much alike and the durability of the car as a whole depends upon so many separate features that it would be entirely impossible to tell which of two nearly equally priced cars on the salesroom floor would last the longest. Freedom from trouble and satisfactory service, which are generally associated with long life, are brought out in the hands of users, however, and a car that thus shows up well will in the course of time establish a reputation for itself that will be a great help toward future sales.

Engineers should be and actually are constantly on the lookout for any changes in design which would add to the durability of the car without adding materially to the cost. If cost was no object it would be an easy matter to improve any cars of the lower priced class, but, as pointed out at the beginning, price is nearly always an important factor.

In fact, most of the engineering developments of the

future in connection with passenger-car design will be with economic ends in view. While we have no doubt that salesmen and publicity writers will continue to tell of the wonderful advances in beauty of lines, in riding comfort and in luxuriousness of appointment—all of which are more or less intangible things—it seems to the writer that the present day high grade car leaves little to be desired from the standpoints of appearance, speed, acceleration, quietness, comfort, durability and dependability. Unfortunately, this type of car is within reach of only a narrow class of purchasers.

Any changes in design which can be made to reduce either the cost of construction or of maintenance will widen the market for the car. An increased market is in itself a great advantage, for it permits of increased scale of production and consequent lower manufacturing costs.

By economy in the questionnaire is undoubtedly meant low running cost (fuel and tires). About the only way the purchaser can form an estimate of these factors is on the basis of the weight of the car. There will, of course, be differences in this respect even between cars of about the same weight and within the same price class, but these are generally so small that there is no means of determining them with any degree

of accuracy, and, moreover, such slight differences would have little weight with the purchaser. Fuel consumption and tire consumption are almost entirely independent of the quality construction of the car, except in so far as this affects the weight of the machine. Therefore, to aim at economy in running cost is to aim at light weight, and this is what most designers have been doing persistently in recent years.

The results achieved in this direction have been somewhat obscured by the demand for additional equipment.

Appearance probably has more to do with the sale of cars than is generally believed to be the case. It is not meant to convey the idea that the thing which influences the purchaser above all others is appearance, but that, having narrowed the choice down to two or three makes which are satisfactory from the viewpoints of price, size or weight, seating capacity, etc., the final selection among these several cars is made on the basis of their appeal to the purchaser's aesthetic sense. Therefore, the car with an attractive body design has a distinct advantage over competitors. This is fully realized by manufacturers. In fact, appearance is bound to become a constantly stronger factor in determining car sales, as mechanical features are becoming more and more standardized and the service value in competing makes is becoming more equalized.

Service—by which is meant the facilities of the maker to provide repair parts and make repairs promptly—undoubtedly has a considerable influence on resales, while the engineer has nothing directly to do with the establishment of service stations nor with the organization of their personnel and the selection of their equipment, he has an interest in service. The ease with which a car can be serviced depends upon the design, and the engineer is to an extent responsible for the maintenance cost. For instance, if a certain part is very hard to get at and this part happens to be short-lived, it may cost a great deal for labor for replacing it when worn out, and if a car possesses a number of such

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**“MOST** of the engineering developments of the future,” Mr. Heldt says, “in connection with passenger car design will be with economic ends in view. Any changes in design which can be made to reduce either the cost of construction or maintenance will widen the market for the car.”

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features this may prove a great obstacle to resales. The factors affecting cost of servicing a car are so involved, however, that it is practically impossible to judge this item merely from an inspection on the salesroom floor. Evidently what most of the car owners had in mind in answering this question was a convenient, well equipped and well run service station.

It is noteworthy that hill climbing and speed are both classed very low; that is, there is only a small percentage of buyers who make these factors the leading consideration in choosing a car. Almost any car of standard make now satisfies the average purchaser in these respects. Appointments count comparatively low in the scale of factors determining sales and not much attention is paid to specifications.

If any useful conclusion can be drawn from the results of the questionnaire it undoubtedly is that the great majority of purchasers today are serious-minded and are looking for real service from their cars. Above all they want their cars to last. They want them to be fairly economical to operate and they want them to be comfortable and moderate in price. Less emphasis is laid on flexibility, hill climbing ability and speed, a large percentage of all buyers evidently considering the average modern car equal to all reasonable requirements in these respects. From the importance attached to endurance, which figures first in every sectional average and also in two price class averages, it would seem that a great many purchasers believe that the endurance of cars in general is not what it should be.

## Results of Argentine Tractor Trials.

THE table published herewith details the results officially announced of the Argentine tractor trials held by the Sociedad Rural Argentino (Argentine Rural Society), near Buenos Aires, in which American machines predominated. They are of interest not only because of the operations and costs shown but also because they illustrate the growing interest in tractor use throughout the export market.

The tractor makers of this country have, in but few cases, gone energetically after export business to Argentina. Many makes which have been successful throughout the United States have not been introduced there and there has been an apparent failure to build up a good volume of business to this growing and rapidly developing country. Yet there is interest in power farming methods in the Argentine, as this table will show, despite the high costs of gasoline and kerosene and the cheapness of horses and labor.

But the need is great. The Argentine is an agricultural country whose chief product is wheat. With this grain, it must compete in the markets of the world with that produced in the United States, in India, in Australia, in Canada and in the other wheat-growing territories. Consequently, there is every reason why the great fertile plains of Central Argentina should be cultivated with the efficiency and economy of the tractor and, no doubt, as manufacturers realize the breadth of this market, they will turn to it with practical and effective educational, sales and service campaigns.

The Buenos Aires trials were held on rather difficult ground for plowing. The announcement of the results says on this score, "The land plowed was hard on the high land and chalky on the low, with an abundance of grass and roots, which made the test somewhat difficult." The fuel costs were very high, considering similar costs

in the United States. By converting the cost in Argentine pesos on the normal basis of United States currency and converting from the metric liter to the gallon, we find that the gasoline price was 63½ cents and kerosene 47½ cents. The tractors were required to plow a furrow 8 in. in depth.

Whatever may be the belief of the tractor manufacturers of the worth of such demonstrations in the United States, no doubt can be expressed of its efficacy in such foreign markets as those of Argentina. It is necessary to put the tractor before the

agricultural buyers and no better method has yet been worked out for its introduction. The agricultural interests of Argentina are not yet sold on the efficiency and economy of farm tractors; in fact, it is doubtful if the feeling is widespread that the tractor will plow at all.

The energy with which the American manufacturers prove their contentions will determine the volume of sales there. The motorization of the Argentine ranch and farm has started, but little more than a start has been made. Hard work and plenty of educational effort is yet necessary to put over the tractor idea.

TRACTOR TRIAL SOCIEDAD RURAL ARGENTINA—BUENOS AIRES

Make	No. Plows and Size	Area Plowed, Hect.	Fuel Used, Liters	Time	Fuel per Hectare, Liters	Cost per hectare, Argentine Pesos	Cost per Hectare, Dollars	Cost per Acre, Dollars	Remarks
W. D.-30	5 16"	2.4740	98	6hr. 30 min.	39.612	15.84	\$6.65	\$2.66	Plowed well on high land but gave up on low land.
Case 15/27	3 14"	1.605	2.5 G 42.25 K	5 hr. 25 min.	1.56 G 26.32 K	8.51	3.574	1.43	Plowed well on high and low land
Uncle Sam 20/30	4 14"	1.2696	2.5 G 41 K	5 hr. 27 min.	1.969 G 32.294 K	10.84	4.54	1.82	Plowed on high land but gave up on low
Case 10/18	2 12"	0.9537	4.6 G 29.5 K	5 hr. 6 min.	4.823 G 30.931 K	11.20	4.704	1.896	Plowed on high and low land
Twin City 12/20	3 14"	1.907	1.6 G 59 K	4 hr. 32 min.	0.839 G 30.937 K	9.62	4.04	1.62	Plowed on high and low land
Cletrac 12/20	3 14"	1.4534	2 G 40 K	4 hr. 48 min.	1.378 G 27.52 K	8.81	3.70	1.58	Plowed on high and low land and used all fuel in its tank
Renault 18/20	3 14"	1.303	43 G	5 hr. 5 min.	33 G	13.20	5.544	2.22	Plowed on high and low land
Oil Pull 12/20	2 14"	1.7087	3 G 45.25 Crude	5 hr. 11 min.	2.78 G 41.940 G	9.50	3.99	1.598	Plowed on high and low land
Monarch 18/30	3 14"	0.857	27 G	5 hr.	31.737 G	12.69	5.329	2.13	Plowed on high land on hill
Pageol 9/19	2 14"	0.7537	44 G	3 hr. 54 min.	58.379 G	23.35	9.76	3.90	Plowed on high and low land

In calculating the dollar costs, the Argentine peso was considered as of its normal value \$0.42 gold U. S. The oil and fuel costs were computed as below:

Argentine Pesos per Liter	Dollar per Liter	Dollar per Gallon
Gasoline 0.40	\$0.1680	\$0.635
Kerosene 0.30	0.1260	0.476
Crude 0.26	0.1092	0.40

(One gallon equals 3.78 liters)

# Engineering Features of a Popular British Runabout

Eight h.p. air-cooled Rover is properly classed as a cycle car, but it is a well-made chassis which appeals to a large class of British users. It is designed to take the place of the motorcycle with side car, but gives greater riding comfort and the running expense is only a trifle greater.

By M. W. Bourdon

EVER since the commencement of what was known as the cyclecar boom in 1912-13 there have been efforts to popularize light air-cooled engined runabouts in England. But not until a well-known British firm, the Rover Company, Coventry, took up this type did it attain any real popularity. At the present time, there are prospects of other big firms producing two-seaters on similar lines, for while at first they scorned to touch the type, they have become convinced, much against their will, that there already exists a big demand and that there is an immense potential market for low-priced miniature four-wheelers.

The type in question is appealing to quite divergent classes of motor users and prospective users. The "economy wave" and the comparatively high prices asked for four-cylinder water-cooled light cars has resulted in people who in the past have owned much more pretentious cars seeking something still less costly, even if a two cylinder engine be a necessary corollary. Then, the men who have hitherto been users or potential users of the higher powered and high priced sidecar outfits but who have always had a desire for four wheels, greater riding comfort and protection have realized that the type exemplified by the 8 h.p. Rover give those advantages plus practically all that they require in speed and hill-climbing ability at prime and running costs very little greater than the elaborate sidecar outfit.

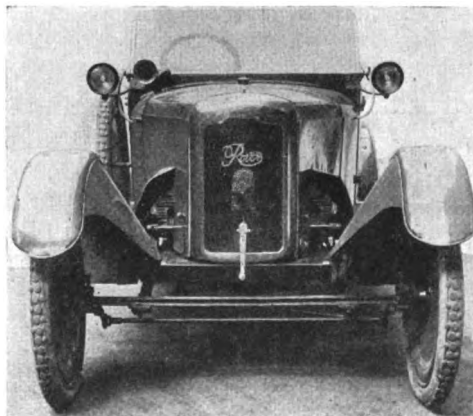
The Rover is unlike several of its prototypes in having a peculiar combination of characteristics. It is not only, as suggested, very little below the 8 h.p. sidecar in performance, being capable of 50 m.p.h. on the level and having a top-gear ability which is quite surprising. It forms also an excellent runabout for those staid and elderly, if somewhat impecunious, owners who desire no speed above 25 m.p.h. or so but demand smoothness of running, good suspension and roominess in a two-seater body. In other words, the little Rover appeals at one and the same time to the youthful "speed merchant" and the elderly "potterer"—as well as to other classes of users.

During this year, the output of this machine has reached and been maintained at 120-140 per week, which for a British plant is distinctly high for any type of car; in fact, it is probably in the neighbourhood of a record for one model.

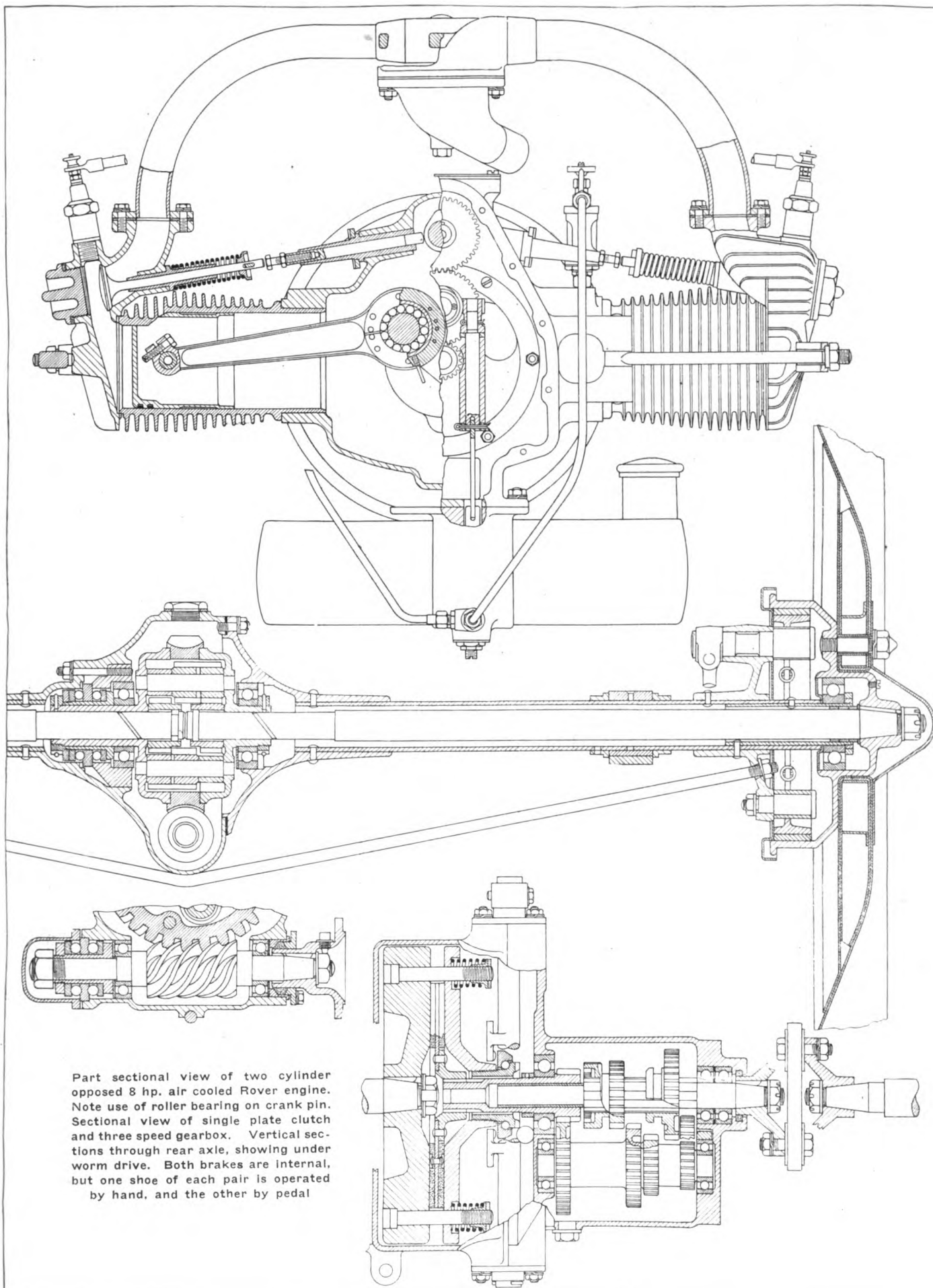
While practically all British cyclecars or air-cooled runabouts have in the past had two cylinder engines, these have been and still are mostly of the V-pattern with cylinders set at 60 deg. But the 8 h.p. Rover has horizontally, opposed cylinders, a feature which, although shared by the A.B.C. and one or two others, is not accompanied as in the latter cases by overhead valves; it has L head cylinders, with a bore and stroke of 85 x 88 m.m. (3 3/8 x 3 7/16 in.; approximately 60 cu. in. capacity). Engine, clutch and three speed and reverse gearset are mounted as a unit, with the crankshaft axis longitudinally arranged.

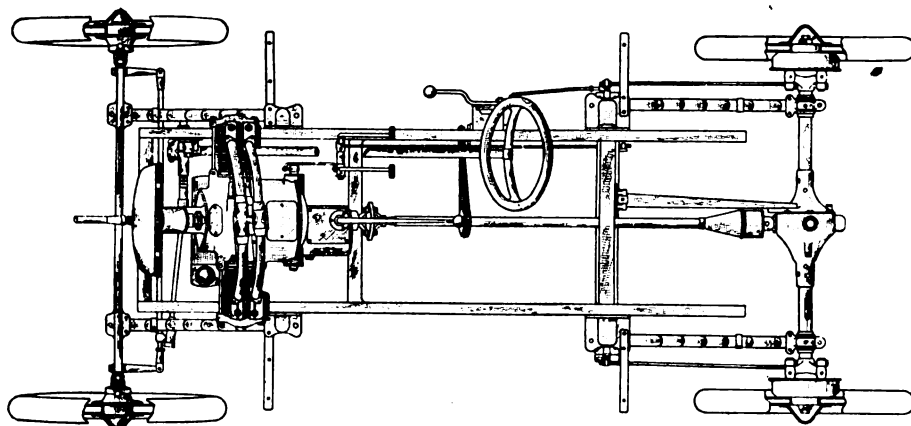
The crankcase is an aluminum casting carrying the camshaft overhead and having a separate oil sump bolted to it below. The cylinders projecting at each side have detachable heads, each of these and the cylinder barrels being held to the crankcase by two long hinged bolts and a yoke. The valves are somewhat inclined from the horizontal and the exhaust valve in each case is foremost of the pair. Screwed-in valve caps are used with a central radiating projection, sparking plugs being screwed into top of the combustion chambers as these lie in the chassis, this arrangement being obviously adopted to prevent the overall width becoming excessive; but even as it is the hood is fitted with an air scoop at each side and the cylinder heads project to an extent enabling them to be subjected directly to the air draught caused by the movement of the car—for no fan is fitted, the passage of the car through the air being entirely depended upon for cooling.

The two-throw crankshaft runs on ball bearings, a single row at the front and a double row bearing of the radial type at the back. A train of three straight-toothed gears drives the camshaft, a forward extension of which has a flexible coupling for the magneto drive. The intermediate timing wheel bears a worm gear through which is driven a circulating oil pump. The big-ends of the connecting rods have double-row straight roller bearings, the rollers running on the crank pins and within an outer race prevented from moving endwise by washers rivetted to the big-end, these washers also serving to locate the rollers, which, incidentally, are not caged. The wrist pin is locked by a pinch bolt in the small end of the connecting rod and oscillates in the bosses of the cast-iron two-ringed pistons.



Front view 8-h.p. air-cooled Rover





Plan view of 8 hp. Rover chassis

Although a bolted-on cylindrical oil reservoir or tank is used, the lubrication system is not of the dry sump type, for a constant level of oil is maintained in the crankcase, only the overflow from this running back into the tank through a filter. The oil pump already referred to is of the sliding vane rotary type. It lifts the oil from the tank to sight drip feeds. From the drip feed exterior pipes convey the oil to the left-hand cylinder and to the timing gear case. The greater part of the oil passes to the latter point and maintains the level in the crankcase, whence splash occurs to the right-hand cylinder, and to a certain extent to that on the left; the latter, however, without a separate feed is liable to be insufficiently lubricated, hence the special lead already mentioned.

A subsidiary oil pipe also runs to the clutch pit to lubricate the ball-thrust collar and pilot bearing, though there is no direct communication between the crankcase and the clutch pit, and except for the subsidiary pipe the oiling systems of clutch and gearset are distinct from that of the engine.

As the illustrations indicate the carbureter is mounted centrally above the crankcase, whence two somewhat lengthy pipes lead to the valve ports. The exhaust leads follow the curvature of the inlet branches and the four are united adjacent to the carbureter flange in order to assist vaporization, the exhaust gases passing back from this point through a single pipe to the muffler.

The clutch is of the single plate type with fabric friction surfaces. Spring pressure is direct from four adjustable springs. There is nothing unusual in the construction of the three-speed gearset, which has ball-bearings throughout, two single-row bearings carrying the rear end of the main shaft. The gear-shift lever is central, and by reason of the forward position of the box the lever is bent back almost to a right angle, where it leaves its spherical bearing. Thus gear shifting consists of movements of the hand which are almost vertical instead of longitudinal, while in "crossing the gate" the lever is moved horizontally in a lateral direction; but no difficulty in driving occurs for this reason once the difference has been appreciated by the driver.

The engine and gearset unit is carried upon two slightly dipped cross members of the straight-sided frame. There are four cross members in all, two carry the power plant, one is below the dummy radiator and the other at the spring anchorage near the rear. The frame is quite a simple structure. It carries extension brackets fore and aft for the four quarter-elliptic springs.

The open propeller shaft has a fabric disk joint at the front end and a sliding pot joint at the rear, the casing of this joint being mounted on the worm shaft of the under-worm final drive.

The back axle has two steel castings for its center,

with tubular extension sleeves and a truss rod below. At their rear ends the quarter elliptic springs are bolted up to bearing sleeves on the axle casing, for the springs do not take torque. A pressed steel torque member is bolted above and below to the axle casing and suspended at the front end from the rearmost cross member of the frame. Both sets of brakes are located within the rear wheel drums, but only one pair of shoes is provided in each drum. The pedal operates one segment on each side and the lever the other two segments. Detachable disk wheels with 28 x 3 in. tires are standard.

The front axle is an H-section drop forging with vertical steering pivots. The pins are secured in the axle ends with phosphor bronze bushes about which the forked end of the swivel axles move. The front wheels are carried on adjustable cup-and-cone ball bearings. The steering gear is of the rack and pinion type, which the writer has found from experience is quite satisfactory. The peculiar steering wheel, built up entirely of steel tubing with only two spokes, and as an integral unit with the column is quite serviceable for such a light car.

The electric equipment provides electric light only from a small generator and battery. Large side lamps and a tail light are fitted, the former having two filaments representing head and side lights. No starter is provided, but an air strangler has a control rod passing forward through the dummy radiator to a point close to the starting crank. The fuel tank is carried within the cowl, fuel being fed to the carbureter by gravity.

The standard equipment consists of a roomy two-seated body with a commodious toolbox behind, single panel hinged windshield and fabric top. The upholstery is in leatherette and the body as a whole, although somewhat roughly made according to British ideas, is comfortable and durable. Five wheels and tires are included in the price, which at the moment of writing is £250 (approximately \$1200). The wheelbase is 88 in., track 46 in. and the minimum road clearance 8 in.

It is particularly desirable to emphasize the fact that, apart perhaps from the bodywork, the 8 h.p. Rover is distinctly a good class, almost high-grade, production. There is nothing whatever shoddy about the mechanical features, and except maybe in respect of control rod linkage and such minor details, the 8 h.p. model is quite up to the high quality standard of the 12 h.p. four-cylinder Rover, which is undoubtedly in the first flight of its class. In respect of this matter of quality, many makers of cyclecars and light runabouts have gone wrong in the past. They have endeavored to make a low priced chassis by adopting a low standard of workmanship instead of aiming at a simplified design with higher quality.

**T**HE Metallurgical Institute of the University of Breslau states that the properties of cast iron can be materially altered by an addition of nickel up to a maximum of 1.2 per cent. The transverse strength is then increased by about 30 per cent, the compressive strength in about the same proportion, the tensile strength by about 25 per cent and the hardness by about 18 per cent. The addition is made in the form of electrolytic nickel to the molten pig iron. Amalgamation then proceeds without difficulty at only 500 deg. Cent. above the melting point of pig iron. The addition of cobalt in place of nickel has no favorable effect.



# Motor Bus Successful in Street Railway Use

An American built motor bus has proved economical and efficient for street railway service in San Salvador. The special wheel equipment is described here in detail, while the operating conditions and cost are also discussed. The car is equipped to haul a trailer if desired.

By Donald A. Hampson

**S**AN SALVADOR is the capital of that Central American republic which is the most densely populated area on this continent. A city of 70,000, it has a street railroad, or "tramway," that serves the public within and extends several miles outside, carrying thence not only suburban dwellers but large numbers of laborers at certain hours of the day. This tramway is of 147 c.m. (57.8 in.) gage and is operated by mule-drawn cars, though a change to electricity was contemplated prior to the war.

The steam roads of the country are all narrow gage. One of them connects the capital with Acajutla, on the Pacific, and to this and the other seaport towns there are good highways, the easiest to reach in this way being La Libertad.

During the early part of 1920 it was decided to try gasoline motive power on the San Salvador tramway. Accordingly, a Daimler and a Reo were purchased for trial. The latter has shown up so well for the work that from ten to twenty more of them are to be put on the line and the mules permanently retired.

The first of these Reos was the standard 1¼-ton chassis as equipped for railroads by J. Blaine Worcester of Middletown, N. Y., and having one of the Paterson Vehicle Co.'s stock 15-passenger bodies mounted upon it. Solid rubber tires were supplied with the car at the insistence of the railway company. These were used in driving the car something less than a hundred miles over the roads from La Libertad to the capital on the interior plateau. As solid tires do not interchange on demountable rims, special wheels were made up for them and mounted in the Reo hubs; these wheels will be used to bring the new cars overland when they arrive.

Some interesting points may be drawn from such an application of motor trucks, using the data on the San Salvador tramway as representing an average where animal power hauling obtains. Tramways, industrial, logging and plantation railroads present physical characteristics peculiar to themselves and to which motor car construction is particularly adapted.

The San Salvador line was originally equipped with American-made horse cars, seating 16, of 15 ft. length over all, and weighing from 3000 to 3500 lb. During the

laborers' rush hours 30 are crowded into them. Two mules draw the cars on levels, with two more hitched in front to help over the grades. The speed is never more than 8 or 10 miles an hour at best and is much less on the hills.

Being a street railway, there are numerous sharp curves, some of them having a radius of less than 8 meters (24 ft.). There are grades of varying intensity up to 6 per cent, with a few as steep as 8 per cent and extending for 100 meter stretches. The track is laid

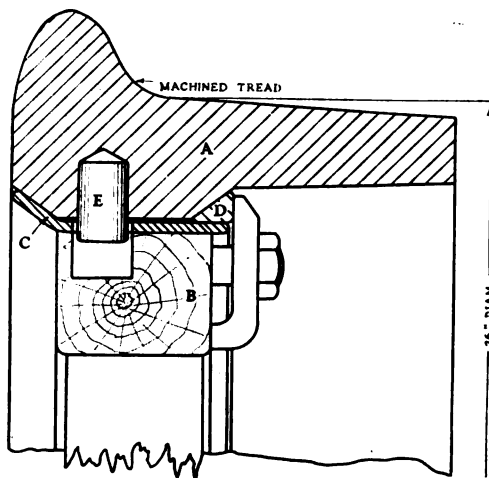
with 20-lb. rails on wood ties that are set into concrete foundations. In the city the footway for the animals consists of the street pavement—in the suburbs, it is mostly sand.

On arrival at San Salvador the rubber-tired wheels were replaced with the original factory wheels equipped for the rails, as shown in the accompanying cut. B is the felloe band and C the regular steel rim. A steel tire A is mounted between the inclines of C and the ring D just as in demountable rubber tire practice. This construction gives a solid bearing around the circumference and a grip sufficient to drive any load. In addition a 5/8-in. pin driven inside the tire is caused to engage a hole in the rim and thus prevents creeping should

any loosening of nuts occur. The size of the wheel center, together with a tire thickness designed for ample strength and maximum wear, brings the wheel diameter to 26 in., a decrease which reduces the road speed and increases the tractive effort about 20 per cent. In this instance, the speed is still higher than the maximum desired while the tractive effort with the smaller steel wheels is so high that most of the running can be done on high gear with its resultant economies.

The gasoline car is equipped front and rear with draw heads of the link and pin type so that a trailer can be hauled if desired. The trailers are the lighter cars of the old equipment. The motor car is sufficiently powerful to handle one of these trailers on high gear on the level stretches and over grades on indirect gears, with a full load in both cars, as noted from the following:

Tractive effort with 26-in. wheels—280 lb. on high gear. Tractive effort with 26-in. wheels—1200 lb. on low



Detail of special wheel equipment used on San Salvador street railway motor driven bus

gear. Now, assuming that the resistance of the cars is 35 lb. per ton in starting and 10 lb. at 8 miles per hour, we find that a pull of 245 lb. is required in starting, 70 lb. to run at 8 miles an hour and 1190 lb. to climb the 8 per cent grades.

Compare the above with animal haulage. A single horse car loaded as before has a weight of 3 tons, requiring a pull of 105 lb. to start it and 510 lb. to get it over the steepest grades. The average "draw bar pull" of a mule throughout a day's work is 90 to 100 lb., say the latter. It will thus be seen that the four mules will be fully loaded to get one car over the grades at a walk, whereas the motor car takes two cars at 10 miles an hour. Animals possess almost no "speed range," while the motor car, except on hills, can make any speed within reason and safety that may be desired or required.

Another factor resulting in decreased wear and tear is the motor car's flexibility in rounding curves. The horse car with two solid axles must skid half its weight on the rails throughout the length of the curve. For the 8-meter curves at right angle street intersections the difference in length between the inner and the outer rails is over 4 ft! The frictional resistance of skidding the 4-wheel cars of 3-ton weight on sharp curves is found by multiplying the weight on the outer wheels by the coefficient of friction—in this case it is 750 lb. and only by greasing the rails can the mule team successfully haul the car.

The Reo chassis referred to has the usual divided rear axle and equalizing gears, while the cross member that connects the front wheel knuckles is fitted with a "steering lock" that allows the front wheels to turn about the king bolts on curves, but automatically centers them on straight track. Thus such a car can negotiate the sharpest railway curve with a resistance of a thousand pounds less than the rigid axle car—a triumph for automotive engineering.

The Reo car was first run experimentally over the various lines of the company. At the end of the runs it was turned around by running off the rails and turning on the road. A connection handy to the driver enables

him to release the steering lock and cramp the wheels for turning. A regular run through San Salvador and to a suburb having been decided upon, turntables costing about \$300 in the United States were put down at each end of the run.

Figures as to operating costs in San Salvador are not at hand, but based upon costs in this country for similar service with American labor and adding the shipping charges to the investment, the cost per mile is approximately 20 cents. This includes fuel, labor, repairs, depreciation, overhead and miscellaneous. Assuming a daily mileage of 50 for both the motor car and the mule-drawn car, the former costs \$3,650 a year for a seven-day week operation. Compare this with animal costs.

Two mules' feed, harness, shoeing, care, etc., for one year is \$730 (365 days). One driver's wages, with extra Sunday pay, is \$682. The upkeep of the street or footpath for animals amounts to \$365 per team, making a total of \$1,777 per year for animal transportation without considering at all the first cost of animals and car. Such figures cannot but have their appeal, not only to horse car lines, but to the various privately owned and operated railroads that are using animal power.

Then there are a number of other items that must be considered in making a fair comparison of animals with motor cars. There is the relief from extra teams required to help over grades, and the possibility (as noted above) of doubling the carrying capacity by a trailer. The motor car makes so much quicker time that fewer cars are required for a given tonnage of freight or a specified number of trips per hour, and this effects a material reduction in the original investment.

The relative economy increases rapidly with the length of the line. While preferable the motor car would not have as great an advantage on a half mile line as on one two miles long. It has been found impractical to haul with animals much over half a dozen miles—with the gasoline car, the limit might be placed at a hundred and return. Roads now operating by animal power must carefully weigh the advantages of the gasoline car with those of electrification.

## Progressive and Compartment Dry Kilns

**A**LL dry kilns now on the market are either progressive or compartment kilns. In the progressive type the drying conditions increase in severity from one end of the kiln to the other, the material being moved into severer conditions as it dries. In the compartment type the same temperature and humidity prevail throughout the kiln at any one time, beginning with mild conditions and increasing in severity as the material becomes dry.

The kiln-drying data and experience of the Forest Products Laboratory indicate that each type has particular advantages on certain points, as follows:

The progressive type of kiln requires less skill in the operator. It consumes less heat per pound of water evaporated from the wood, but the saving of steam possible should not be considered so important as the question of ability to perform the work required with the best results. The progressive kiln reaches its greatest heat efficiency in drying from the green state and is most useful in circumstances which permit of its being supplied continuously with green lumber of one thickness and class. It is, however, impracticable with this type of kiln to give individual attention to special loads of lumber.

The compartment type of kiln is more flexible and affords greater control over the drying conditions, per-

mitting less change in temperature, humidity and circulation in the kiln with variations in the wind and weather. It is better adapted to meet the varying requirements of different kinds of material and is most useful where exact and careful drying is required, as in the handling of refractory woods.

## New Process for Marking Tools

**A**CCORDING to *Werkstattstechnik*, the surface to be marked, after being finished, is rolled in with a grease paste (similar to printers' ink), sprinkled with asphalt powder and covered with thin paper, whereupon a steel stamp is pressed down upon it. Upon lifting the paper the layer of grease paste comes with it at the points where the steel stamp pressed down upon it. Then the remainder of the grease paste is slightly heated to render it acid-proof; the etching is done by rubbing the surface in with red, fuming nitrosulphuric acid. If the parts must not be heated, they are not sprinkled with asphalt powder, but with resin powder, and the layer becomes acid-proof by exposing it to vapors of alcohol for a short time. This process results in very fine and clear lines.

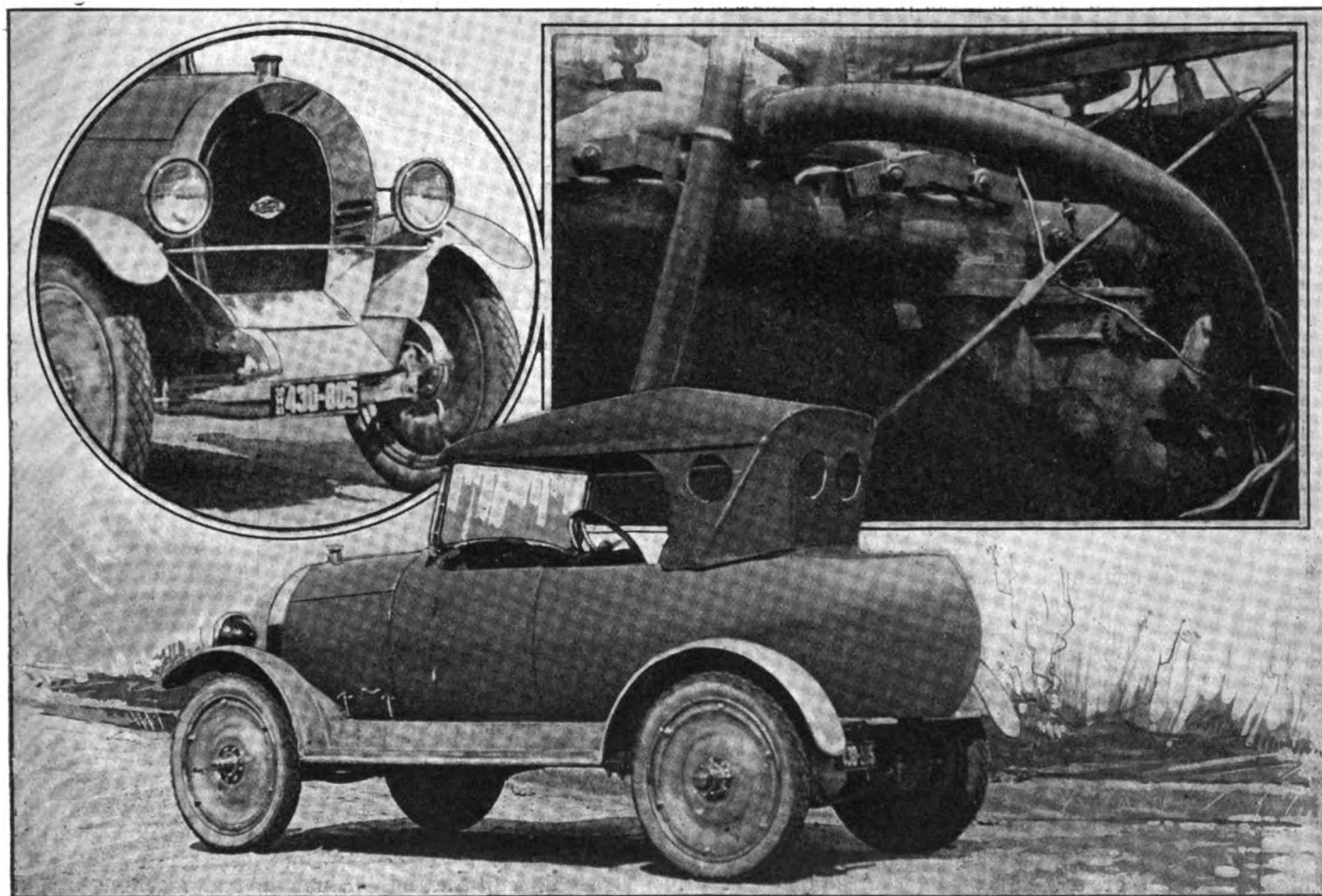
# A Car Especially Designed for Use in Australia

Will be assembled largely from American parts slightly modified to meet tropical climate and adverse road conditions. Provision for high economy in fuel as well as in water important. Much sheet aluminum used.

**T**HE conditions under which automobiles are operated in Australia are somewhat peculiar. Australia is a tropical country, and atmospheric temperatures are normally very high. This, taken in conjunction with the fact that the roads for the most part are in very poor condition and many are nothing but paths through the desert, results in unusual demands on the cooling system. We are informed that the cooling capacity of all imported cars is absolutely inadequate, and it is no uncommon experience for the whole of the cooling water to boil away in a few hours' driving. The situation is aggravated by the fact that water is very scarce in most parts of Australia. Another requirement of the Australian market is high fuel economy, because the price of gasoline is very high.

A car specially designed for these conditions is the Eco, illustrated in accompanying cuts. It was built in

Detroit and is now being driven across the Continent by its designer, G. Hamilton-Grapes, who intends to manufacture the machine in Australia. All of the chief mechanical components will be of American manufacture. The model comprises a Turmo engine, Warren clutch and transmission, Peru axles, Zenith carburetor, Philbrin ignition, Bijur starting and lighting system and a U. S. Cartridge Co. radiator core. The wheelbase is 108 in., but this will be increased to 110 in. Three types of bodies will be fitted, a sport runabout like the one shown, a regular four-passenger and a regular five-passenger body. All bodies will be made in Australia from rolled instead of pressed sheets. A peculiarity of the design is the extensive use of aluminum. The fenders, for instance, are of aluminum sheet and are rolled by the same machine as the body plates. The running boards, toe boards and instrument board are of sheet



Views of the Eco car, designed for use in Australia. Note peculiar shape of radiator case which forms a scoop to facilitate greater flow of air through the core. Insert at upper right corner shows the exhaust heated retort employed to assist in vaporizing the fuel

aluminum on wood. This combines lightness with attractive finish and immunity to corroding influences which are especially strong in the hot climate of Australia.

Various changes have been made in the standard components of the model machine. Thus the iron pistons have been replaced by aluminum pistons weighing 13½ oz. each. Each piston is provided with three piston rings at the top and one scraper ring at the bottom, each ring being ⅛ in. wide. With a view to increasing the fuel economy the compression has been made 5 to 1. The reduction on high gear is 4.25 to 1. The flywheel of the engine was cut down in weight from 60 to 40 lb.

The frame members are straight in the vertical plane but are inclined 3 deg. to the axis of the chassis. Half-elliptic springs are fitted in front and cantilever springs at the rear. Both sets of springs are eccentred, the front springs most. In order to prevent sympathetic vibration of the springs, the leaves of the left-hand front springs are made smooth while those of the right-hand front spring are left rough. At the rear the procedure is reversed, the leaves of the right-hand spring being smoothened and those of the left-hand one left rough. The rear springs, moreover, are set at an angle of 3 deg. to the axis of the car, which is expected to exert a damping action. At the front square section helical supplementary springs will be fitted, so designed that they will close up when there are three or more persons in the car.

The wheels are of the aluminum disk type, the reason for selecting this type being that they help to radiate the heat from the tires.

The radiator has a greater frontal area and greater cooling surface than stock cars of the same horse power, and in addition an air scoop is fitted in front to increase the circulation of air. The splash apron, instead of being arranged vertically as is customary, is placed at an angle to conform to the angle of the air scoop and thus further add to the air circulation.

One of the most interesting features of the car is the special vaporizing means. In this, use is made of a retort within which the temperature is maintained substantially constant by means of a thermostat. The retort

may be described as a cylindrical chamber through which the combustible gases is passed on its way to the manifold. The mixture enters the top portion of the retort through a radial inlet and leaves it through a radial outlet. In passing through the retort the mixture current is subjected to a number of sharp bends, which has a tendency to separate out any unvaporized particles, and these collect on the walls of the retort and drain to the bottom of same. The lower part of the retort is surrounded by the exhaust pipe, and the heat transmitted through its wall has the effect of boiling off all the heavy constituents of the fuel that collect at the bottom of the retort. In the upper part of the retort is located a thermostat of the dissimilar metals type which is connected to a butterfly valve in the main exhaust pipe. As the temperature of the retort increases, this valve is opened and some of the exhaust gas is allowed to escape directly without passing through the jacket of the retort. Thus the amount of heat is automatically regulated. The thermostat can be adjusted by means of the star wheel clearly seen in the illustration of the vaporizing system. An extra air inlet is also fitted, which in the model car is operated by means of a pull knob on the dash board but which in the stock car is to be interconnected with the throttle valve in such a way that it will open after the throttle has opened about halfway. Fuel feed is by gravity from a rear tank, with an additional tank in the cowl, which latter can be connected to the carburetor by means of a two-way valve located convenient to the operator, whenever an unusually steep hill makes the feed from the rear tank uncertain.

An economy test of the car was made by two engineers of the Zenith Carburetor Co. A test chassis was used weighing 2050 lb., which with 300 lb. for the two occupants made a total weight of 2350 lb. It was found that the car ran 34.9 miles per U. S. gallon. During the test the average temperature of the mixture at the entrance to the cylinders was 125 deg. Fahr. and the average temperature within the retort, 310 deg. Fahr. A fuel of 58 deg. Baumé was used, of which 90 per cent distilled over below 410 deg. Fahr. The atmospheric temperature during the test was 84 deg. Fahr.

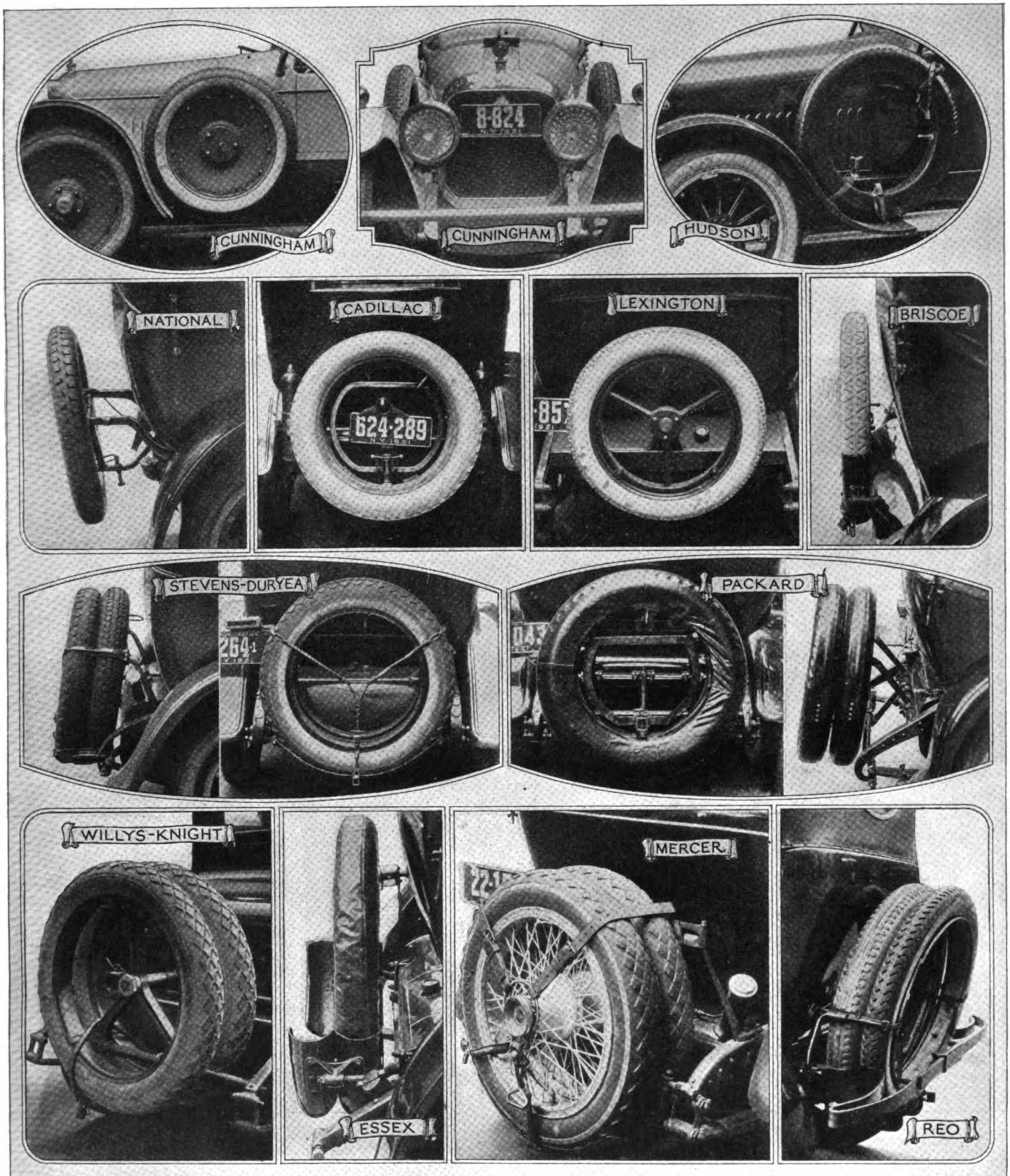
## Alcohol Fuel Problem in Britain

THE liquid, or to be precise, the spirit-fuel problem continues clamant for some solution in Britain. The consumption of gasoline is increasing at an accelerated pace largely due to the big fillip given to jitney and other public service coach development from the recent hold up of the railroads and the high cost of rail traveling which is now averaging 75 per cent more than before the war. Last year's total oil production according to very recent figures, was 97 million tons (British), of which 64.8 per cent was American. Beyond this value the fuel requirements of the world are so large that the oil output is only 7 per cent of the existing requirements. Benzole from coke ovens is necessarily dependent largely on the consumption of coal for gas-making and for smelting or metallurgical coke. Therefore it is essential to find another fuel which will assist out of the shortage. Research into the merits and commercial possibilities of alcohol has gone on for a long time in Britain and latterly is one of the items in charge of the Fuel Research Board. So far little of concrete value has emanated concerning it; the only practical and economical evidence of the fuel being the spirit called "Natalite" from South African waste molasses. It is now found that one of the formidable restraining in-

fluences to this development is the result of a 60-cent per gallon preference tariff imposed on foreign imported alcohol, i.e. spirit from countries not within the British Dominions. Moreover, it was stated by a deputation to the Minister of Finance (the Chancellor of the Exchequer) this week that alcohol must be allowed in duty free if it is to compete with gasoline. As there can be no progress until, and unless, there is evidence of a dependable supply of alcohol and as such is not, nor seems like being forthcoming from British Dominions, the situation suggests that it is now more important to settle the economic and fiscal problem than those concerned with the chemical and mechanical aspects of power-alcohol. It is a fair instance of how Great Britain stands to suffer by departing from her free trade traditions.

A BILL now before the Spanish Chamber provides for an expenditure of 648,000,000 pesetas on roads and bridges, 493,000,000 for the repair and upkeep of main roads, 157,000,000 for local roads, 900,000,000 for hydraulic works, 60,000,000 for lighthouses, etc., 110,000,000 for agricultural establishments and machinery, and 44,000,000 pesetas in connection with the mining industry.





## What's the Best Way to Carry Spare Tires?

**B**BETTER methods of carrying tires are being introduced gradually but there is still room for much improvement in many instances as will be seen from a study of the faults and good points in the carriers illus-

trated in the accompanying cuts. There are advantages and disadvantages in nearly every type so that it is not easy to draw conclusions which will apply in all cases, but certain general observations may prove useful.



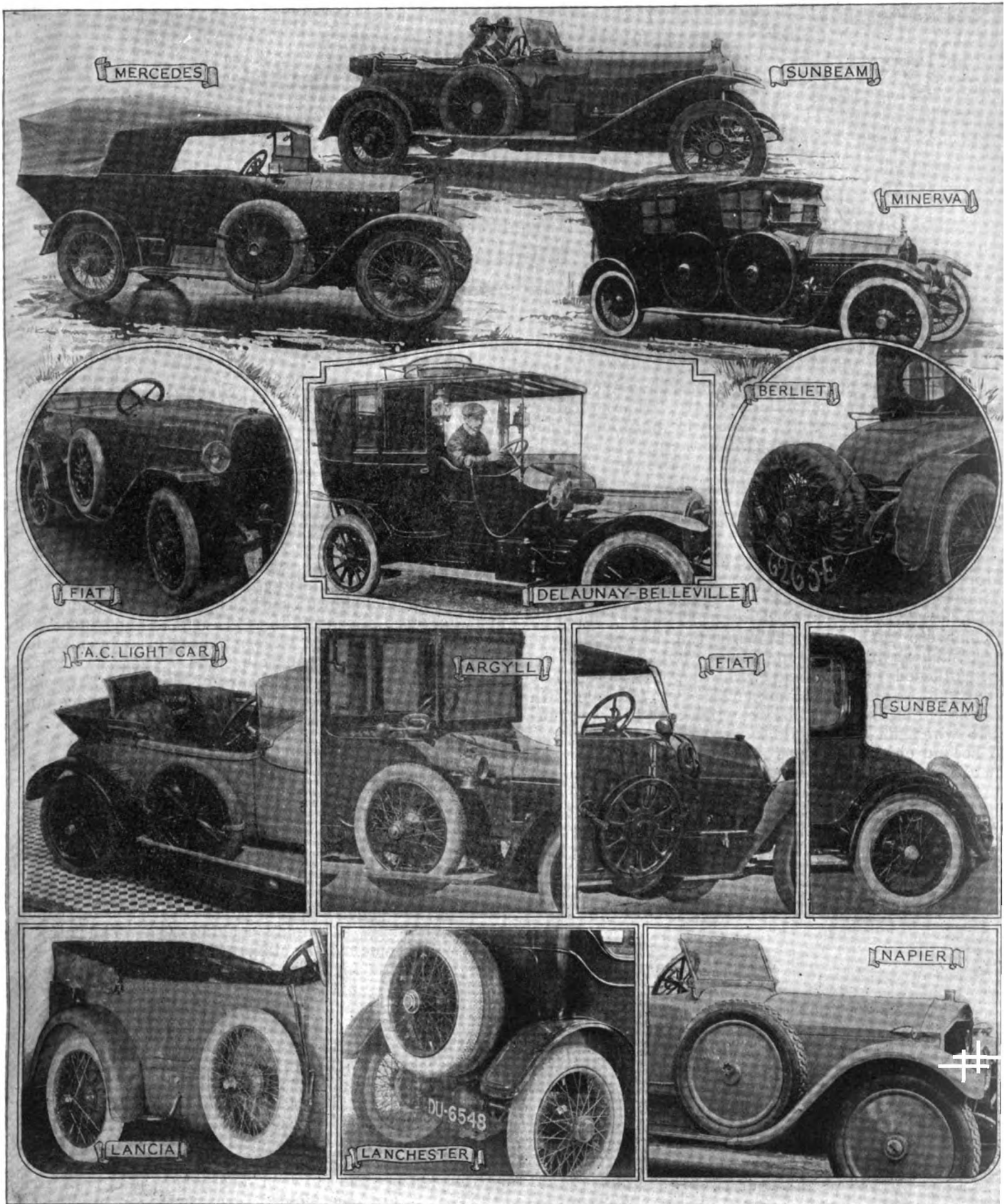


First, the carrier should be so placed that it and the spare tire or tires will be in harmony with the body lines and not offend the eye. The bracket should be substantial in appearance and in reality and not give the impression that it was "stuck on" as an afterthought.

Second, the carrier should be accessible and require as little lifting of the tire as possible. It should not have

to be held on the bracket with one hand while the fastening device is screwed up or locked with the other. These are important points especially in the case of cars driven by women.

Third, the locking device should be simple and effective, free from rattle and preferably so arranged as not to require a tool to operate, unless operated by the same



wrench used in removing the wheel from the axle or the rim from the wheel. The cylinder lock used on the Wills-St. Claire is covered by a dust and waterproof cap and is an improvement over a padlock.

Fourth, devices which bear against the shoe or the shoe cover are preferably eliminated. Sockets or depressions in which the spare is placed, and in some cases the

carrying irons, tend to chafe the casing or its cover. Depressions are apt to hold some moisture which causes deterioration. Straps collect dust and soil the hands.

Fifth, in most cases it is better to attach the support to the chassis than to the body, for such mounting is apt to be more secure and there is less danger of injury to the body frame and panel in case of a rear end collision.

# Plywood as Material for Automobile Body Construction

The qualities of plywood as material for automobile body construction have been the subject of much discussion. Certain disadvantages have been frequently pointed out. In this article, the case for plywood is presented by a man in a position to understand the situation thoroughly.

By Armin Elmendorf\*

**T**HE manufacture of plywood antedates the beginning of the automobile industry. The question is therefore sometimes asked why plywood is not more extensively used in the manufacture of automobile bodies. It was known during the development period of the motor car body, for it had been used for years in the construction of carriages and other vehicles.

There are at least three reasons why plywood failed to meet the competition of sheet steel for automobile body panelling. The first, and probably the most important reason, lay in the fact that in the early stages of the development of the automobile body plywood panels, or "veneer panels," as they are frequently called, were manufactured with the non-waterproof glues, such as hide or bone glues. Separation of the plies followed in time and with that the automobile industry lost faith in the material. Panels made with non-waterproof glues failed to withstand the weathering to which an automobile is exposed.

A second objection raised against plywood lay in the difficulty of forming it to the curvatures required in automobile body design. Styles in automobile bodies early tended toward severe compound curves. Methods in vogue at that time for the manufacture of plywood in double curvature would not permit the shaping of panels to the severe curvatures demanded.

A third, and probably less apparent reason for the success of steel in competition with plywood lay in

the enterprising manner in which manufacturers of sheet steel adapted their product to automobile requirements. They met the special problems of body construction by concerted efforts and technical service, while manufacturers of plywood knew little about the mechanical properties of their product and were not in position to give technical co-operation.

It is significant to note, however, that even though plywood carriage bodies were originally made with non-water resistant glues, when properly made and protected by thorough painting, they gave good service. The Edison Electric, shown in Figure 1, has a plywood body made of three plies, totaling 5/16-inches and glued with hide glue. The panels were manufactured by pressing them between heavy concrete cauls. Their curvatures are, however, slight. Some cars of this kind have now seen more than ten years of continuous service and show no signs of deterioration in the panelling.

## Waterproof Glue Development

The present interest in the use of plywood for automobile bodies is a result primarily of the perfection of highly water-resistant glues during the war. Airplane requirements called for plywood which would withstand considerable weathering and which could be soaked or boiled in water without separation of the plies. Glue formulas were perfected which enabled the Navy and Army airplane departments to specify plywood which would withstand a ten-day soaking test. The success with which some manufacturers met these requirements later led to the investigation of plywood for other industrial uses.

Early in the war a process for manufacturing canoes out of 3-ply plywood had been perfected by the Haskellite Manufacturing Corporation. Plywood panels which had been softened by steaming or boiling were pressed between heated dies and allowed to dry in the pressed condition. This process was adapted to the manufacture of fuselages during the war and a modification is now used for making roofs of closed passenger cars. When plywood has been steamed or soaked in boiling water and is then pressed between dies, where it is permitted to dry, it retains the molded form permanently. In the operation of molding, the fibers in various parts of the panel are upset similar to the upsetting of the wood fibers in a chair rocker or in a wood felloe of a wagon wheel. It is well known that the back or the rockers of a chair do not change their form with changing moisture content of the wood. The same is true of plywood when made in the manner described.

The perfection of waterproof glue removed the first

\*Consulting Engineer. Haskellite Manufacturing Corporation.

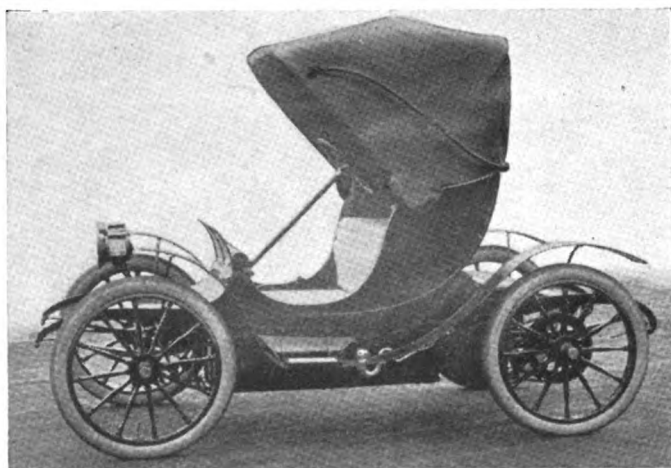


Fig. 1—Old Edison electric, body panels made of 3-ply plywood. Cars like this have been driven for more than ten years without deterioration of the body panels



objection to plywood for automobile bodies, and the new process for molding removed the second objection to a large extent.

### Increased Technical Knowledge

That the third objection mentioned as formerly militating against the use of plywood for automobile bodies does no longer hold to the same extent as formerly, is evidenced by the number of plywood bodies that have been built in the last two or three years. Manufacturers are beginning to understand the properties of plywood and with increased knowledge of its properties comes confidence. While the physical and mechanical properties of steel and aluminum have been known for years with considerable accuracy, the corresponding properties of plywood were not known until they were investigated during the war by the United States Forest Products Laboratory and by a few private research laboratories. As the result of the information obtained in the research laboratories of these institutions, and also as a result of the improvement in methods of manufacture, the following advantages of plywood over sheet metal are now apparent:

1. Plywood panels eliminate the forming of the body panels by the body manufacturer.—This, of course, greatly reduces the cost of equipment of a body factory. It not only eliminates considerable factory equipment, but it also reduces the amount of floor space necessary for the production of a given number of bodies. Manufacturers of plywood body panels furnish them molded to the correct curvature and size, so that they are ready to be applied to the body frame.

2. The strength of plywood per unit of weight is greater than that of sheet steel or aluminum. By dividing the average tensile strength of 3-ply gum plywood, both parallel and across the face grain, by its specific gravity, a tensile strength of 10,800 pounds per square inch per unit of weight is obtained. The same figure for rolled aluminum is 7,200, and for mild steel, 7,650. The substantial superiority in the tensile strength per unit of weight of 3-ply plywood is apparent from these figures.

3. The plywood body weighs less than the steel or aluminum body. Two thicknesses of plywood are used in body construction—the  $\frac{1}{4}$ -inch 3-ply stock being for light bodies, and the  $\frac{5}{16}$ -inch stock for medium weight bodies. Corresponding to these we have No. 22 and No. 20 steel; and No. 16 and No. 14 aluminum, respectively. The following table shows the decided saving in weight effected by the plywood body:

#### Weight per square foot

Light weight bodies, 22 ga. steel 1.27 lbs., 16 ga. alum. 0.87 lbs.,  $\frac{1}{4}$ -inch Haskellite (Plywood) 0.73 lbs.  
Medium weight bodies, 20 ga. steel 1.50 lbs., 14 ga. alum. 1.09 lbs.,  $\frac{5}{16}$ -inch Haskellite (Plywood) 0.89 lbs.

4. Plywood reduces the weight of the body frame. While sheet steel or aluminum function only as a covering, plywood serves both as a covering and as part of the body structure. Metal panels are, as it were, merely a dress and contribute very little to the body strength, while plywood panels contribute materially to the strength. The principal stresses to which an automobile body is subjected while in motion result from the twisting or racking of the car. A simple analogy will make clear the superiority of plywood in contributing to the rigidity of the body. It is only necessary to compare two open boxes, one made of plywood and the other of sheet steel of the same weight. It will be assumed that satisfactory corner members are used in each case to give good strength in the corners. By twisting two boxes of this kind, the one made of plywood and the other of steel, it will be seen that the

plywood box is very much more rigid than the steel box. Body designers, in fact, disregard the stiffening imparted by the sheet metal paneling. In the case of plywood, however, the contribution to the rigidity of the body is so great that the designer can take advantage of it by reducing dimensions of some members of the framing, and thereby reducing the weight of the body framing.

5. Plywood deadens sound. By striking two sheet metal panels freely supported, one of steel and the other of aluminum, it will be seen that the steel panel gives out a harsher and more ringing sound. The difference that exists between sheet steel and sheet aluminum in respect to sound exists in a still more marked degree between aluminum and plywood. By striking a plywood panel similarly supported, it will be seen that plywood resounds with the dull sound of wood.

The metallic clang of sheet steel is particularly noticeable in an automobile when slamming a door. The absence of the metallic sound when closing a plywood automobile door is one of its most striking characteristics. The same property of deadening sound vibrations contributes in general to the dignity and quietness of the whole body. Vibrations due to rough roads are damped out.

6. Plywood has superior insulating value against winter weather. There are various ways in which the heat in the interior of a closed body coming from the engine, exhaust, heater, etc., escapes from the body. Some of it passes out due to convection through door and window crevices. The rest of it is conducted away directly through the window panes, the roof, and the body sides. Steel is a good conductor of heat, so that the heat in the interior of the car is rapidly carried through the metal to the cold air outside. Plywood, on the other hand, has pronounced value as a heat insulator. For every heat unit, which is conducted through plywood, the sheet steel of the same weight conducts about 2,000 heat units out of the body.

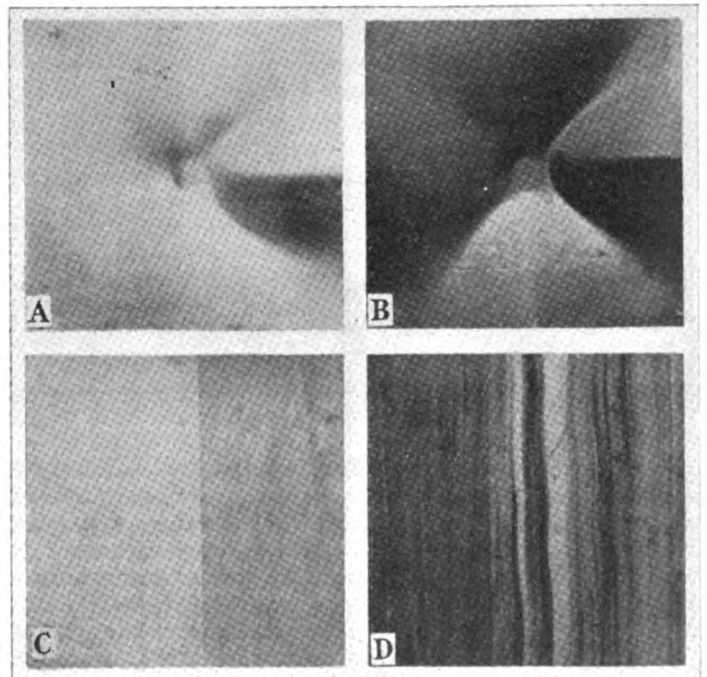


Fig. 2—Results of impact tests on steel, aluminum, and plywood panels, all of about the same weight and subjected to the same blow. A, aluminum; B, steel; C and D, Haskellite (plywood). The markings on the plywood panels are the figures in the wood. The steel and aluminum panels are badly dented, while the plywood panels remained flat.

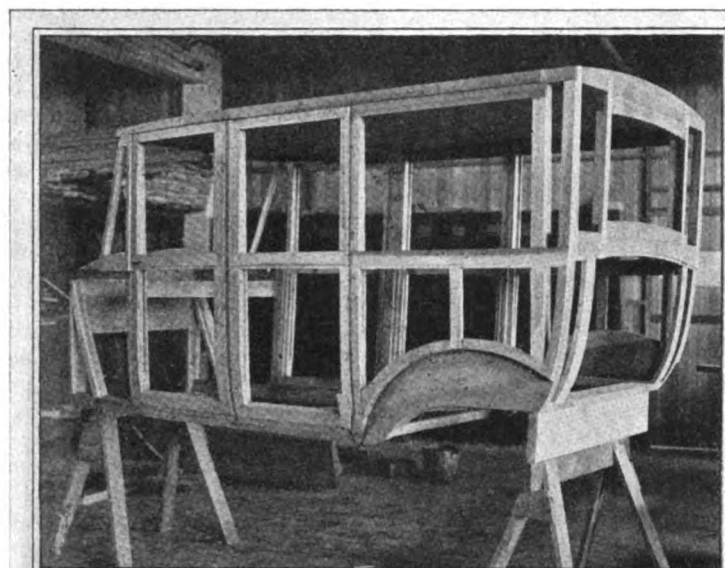


Fig. 3 - Assembled frame for plywood sedan body.

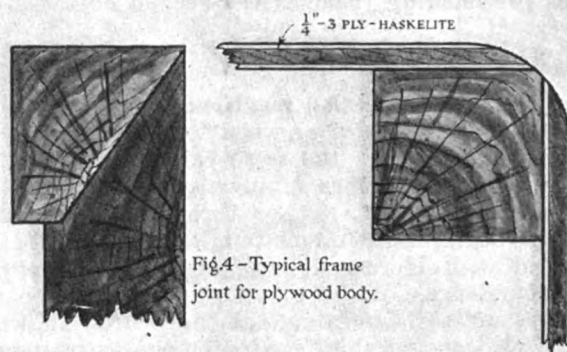


Fig. 4 - Typical frame joint for plywood body.

Fig. 5 - Method of making rear body corners.

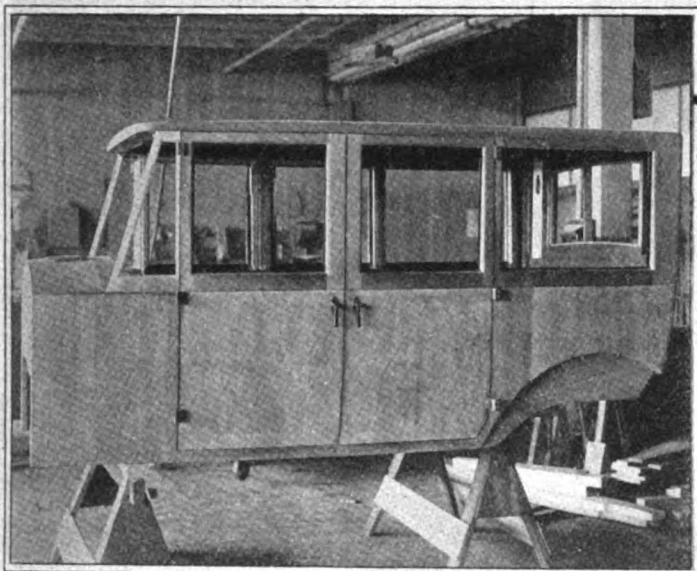


Fig. 6 - Body with  $\frac{1}{4}$  inch plywood panels attached to frame. Weight 485 pounds.

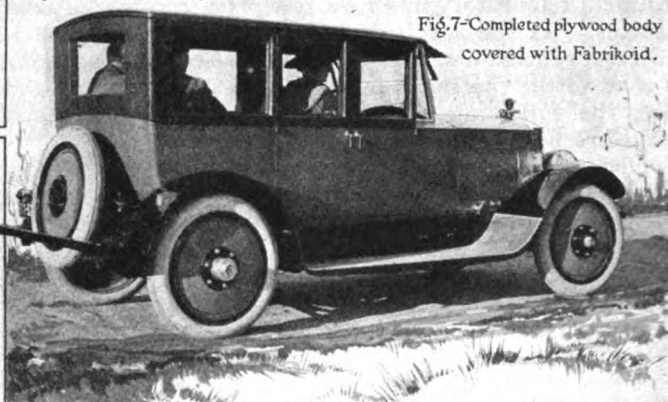


Fig. 7 - Completed plywood body covered with Fabrikoid.

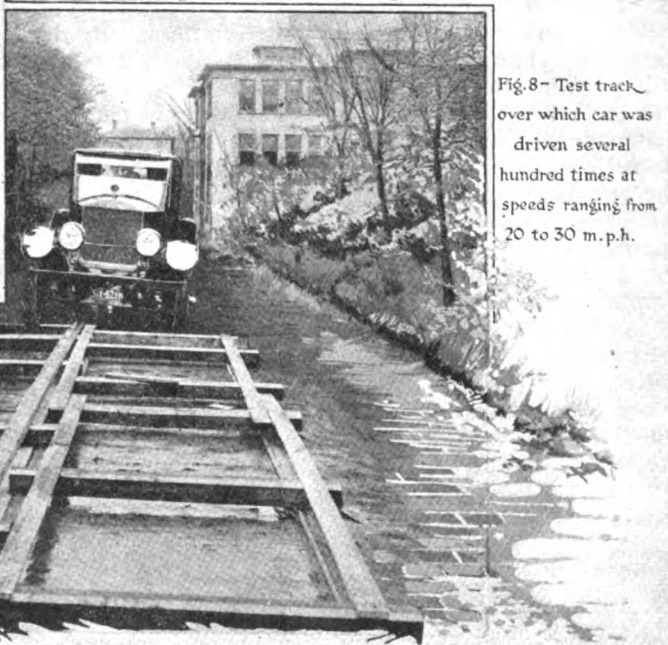


Fig. 8 - Test track over which car was driven several hundred times at speeds ranging from 20 to 30 m.p.h.

7. Plywood is much stiffer than sheet metal. By pressing against the surface of a metal door, the sheet metal deflects a certain distance, depending upon the magnitude of the pressure. If the same pressure is brought to bear upon body panels made of steel, aluminum, and plywood, respectively, all of the same weight, it will be found that the plywood deflects only about one-thirteenth as far as the aluminum, and about one one-hundredth as far as the sheet steel.

8. Plywood is more resistant to blows. When a panel of any material is struck, the amount of energy it will absorb and still spring back to its original position without suffering a permanent dent, is spoken of as its elastic energy. It corresponds to the energy in a spring

absorbed upon applying a sudden pressure to the spring. Upon removing the pressure the spring returns to its original position. In the case of metal panels, as well as for plywood, there is a certain deflection which if exceeded will cause the panel to receive a permanent dent. Under such conditions the elastic energy has been exceeded. Extensive tests have been made to compare metals and plywood in this respect, and it was found that the energy which will cause a plywood panel to receive a permanent dent is usually seven or eight times as great as the blow which will seriously dent sheet steel or aluminum. This means, of course, that many blows which will dent a metal body would not cause a depression in the plywood body. The energy



which will cause actual rupture of plywood has been found at times to be fifty times as great as that which will dent a sheet steel body so badly that it has to be repaired. Fig. 2 shows the effect of blows of the same magnitude upon steel, aluminum, and Haskelite (plywood) panels of about the same weight.

9. Repairing. When a sheet metal body is badly dented by striking an obstruction, the upholstering has to be removed and the dent hammered out. The success with which the damage is concealed depends largely upon the skill of the mechanic upon the job. In the case of plywood, which will only rupture under a much more severe accident, the particular panel in which the fracture occurred is simply removed bodily from the side. It is then replaced by a new panel of the same kind and size.

10. Finishing. Users of plywood for body purposes prefer either one of two methods of finishing. The first calls for covering the body with a muslin cemented on to the wood. The muslin is subsequently primed and filled with putty glaze or "rough stuff," and is then enameled according to standard procedure. The second method consists in applying some type of artificial leather, such as Fabrikoid, to the surface. Such materials are glued on and require no further finishing. They have the advantage over the paint shop finishes in that they greatly reduce factory floor space. It is estimated that the amount of floor space necessary for finishing is reduced to one-twentieth the paint shop space and drying rooms. Such materials are particularly applicable to the plywood body because they are easily glued onto wood.

11. Cost. While aluminum is comparable to plywood in some of its properties, it costs about twice as much. A complete set of plywood panels, molded and ready to be applied to the body frame, costs about the same as a set of steel panels ready to be applied. The fact that the cost of plywood compares so favorably with that of steel will no doubt in the future contribute to its more extensive use.

One of the most successful designs of a plywood body recently developed is that worked out by the Wright-Fisher Engineering Company of Detroit, for the Birmingham Motors Corporation of Jamestown, New York.

The body frame is shown in Fig. 3. Several features are worthy of note in the construction of this frame. The reduced thickness of the sills should be noted in particular. The wheel housing is of 3-ply Haskelite made with waterproof glue. All horizontal wood members of this frame are of poplar, and the vertical members as well as the sills are of ash. The roof rail is of poplar and the bows are of ash.

The method of framing the horizontal and vertical members is shown in Fig. 4. The two members were glued and screwed together. The method of making the rear corners is shown in Fig. 5. The plywood panels were first glued by clamping to the corner posts, and after the glue had hardened the corners were rounded as shown. A joint of this type overcomes an objection sometimes urged against plywood for body purposes in that it removes the blunt end of the panel and substitutes for it a feather edge. In this way the stresses at the end of the panel set in by any racking motion of the body are very small. Experience in the construction of carriages showed that this was the best type of joint to prevent joint openings.

The body with the panels fastened on is shown in Fig. 6. The panels were glued along the edges to the frame and clamps were applied at frequent intervals, holding the plywood to the frame until the glue had set. The operation of screwing and unscrewing the clamps requires little time and compares very favorably with the time of applying metal panels to the frame.

The weight of the body, as shown in Fig. 6, is 485 pounds. This includes the hardware, fittings, cowl, etc. All body panels are  $\frac{1}{4}$ -inch 3-ply poplar Haskelite.

The body is mounted on to the chassis frame with three bolts on each side in the conventional manner.

The completed car is shown in Fig. 7. It weighs 3,000 pounds as the manufacturer delivers it, without accessories but with front and rear bumpers. The car has a wheel base of 124 in.

As evidence of the great rigidity and strength of the body to withstand the racking motion of rough roads, the test track shown in Fig. 8 was laid and the car was driven over it no less than 500 times at speeds ranging from twenty to thirty-five miles per hour. The body did not suffer even under such a very severe test.

## Casein Glues Exceptionally Durable in Damp Places

CASEIN glues are as a class more water-resistant than animal and vegetable glues, but they are not, strictly speaking, waterproof. There is no glue that is waterproof in the sense that it is absolutely unaffected by water after a long immersion. Nevertheless, there are casein glues that are so water-resistant that plywood glued with them will withstand soaking for many weeks in water or exposure for many months to a warm, damp atmosphere. Under similar conditions, animal and vegetable glues would lose their strength in a short time.

When casein glue joints are kept fairly dry, they can be expected to retain their strength and remain unchanged for an indefinite period, as is the case with animal and vegetable glues. Water-resistant casein glue in a joint, kept constantly wet, will, after a long time, weaken, but it will ordinarily regain a great deal of its strength if the joint is dried. In a study aimed to discover the reason why casein glues ultimately decompose when kept moist, the Forest Products Laboratory found that under certain conditions the decomposition seemed to be due to a hydrolysis of the casein, undoubtedly brought about by the sodium hydroxide that is always present in casein glues.

This explanation when published recently was misunderstood to some extent. It should not be taken to mean that casein glues are unreliable, and not durable enough for use in manufacturing plywood and other glued products. On the contrary, casein glues are considered as permanent as any under dry conditions, and the water-resistant casein glues are more permanent than animal or vegetable glues under wet or damp conditions.

PENCIL drawings are light grey and easily erased; for many purposes, as, for example, reproduction drawings, workshop drawings, etc., it would be desirable to convert pencil lines into dark black lines adhering firmly to the paper. According to the patented process of Doctor Gruner this can be easily accomplished by laying the drawing side of the pencil drawing on a clean zinc plate and rolling over the back side with a metal roller. The zinc plate is connected to the positive pole, and the metal roller to the negative pole of a direct-current house circuit. The current detaches some zinc from the zinc plate and this zinc is deposited in a finely spread form on the graphite of the pencil lines, adhering closely to the fibers of the paper.

# High Altitude Aircraft of the Future

The possibility of keeping engine output constant at high altitudes is discussed in this article, together with the relation of this factor to various types of flying. The writer compares the probable function of the airplane and dirigible. The article was translated from *Der Motorwagen*.

By Professor C. Eberhardt

THE output of an ordinary gasoline engine decreases with increasing altitude substantially in proportion to the density of the atmosphere. The result of this is that flying speeds decrease materially at higher altitudes. Curve  $v_x$  in Fig. 1 shows this decrease in flying speed. It will be seen that the plane on which this diagram is based has a flying speed of 93.2 m.p.h. close to the ground. With increasing altitude the speed increases at first and attains its maximum value of 94 m.p.h. at an altitude of 2500 ft. However, up to an altitude of 6000 ft. there is no appreciable speed variation. But beyond 6000 ft. the speed decreases rapidly; at the maximum altitude which the machine is able to attain, the "ceiling", it is only 75 m.p.h.

If the airplane on which this diagram is based serves for commercial purposes there is no object in seeking to attain a greater altitude than 6000 ft. The machine flies most rapidly and most economically at about 2,000 ft.

The conditions are entirely different if the output of the gasoline engine is maintained constant for changing altitude. This is now possible within certain limits, up to between 16,000 and 20,000 ft., by providing the engine with an air compressor which supplies it with the air necessary for the complete combustion of the gasoline vapor at all altitudes. At an altitude of 20,000 ft. the air pressure is equal to only about  $\frac{1}{2}$  atmosphere. In order that at this altitude the engine may draw in the same weight of air as at ground level it is necessary to precompress the air to 1 atmosphere.

This, however, does not suffice to ensure the desired result. There is also required a propeller with variable pitch, as a non-adjustable propeller is incapable of absorbing the whole output of the engine in the tenuous medium. The engine would race. Such propellers were under development in Germany toward the end of the war, by Prof. Reissner, the Lorenzen propeller firm, A. Boerner and others, but the experimental work on them was not completed.

Adjustment for a steeper pitch with increasing altitude is then accomplished either manually or automatically, through the intermediary of the declining pressure of the outer atmosphere. Under these conditions we obtain for the same machine as that previously considered, the flying speeds plotted in Curve  $V'_x$ , Fig. 1. It will be observed that there is a continual increase in speed with increasing altitude nearly up to the ceiling. With constant engine output the ceiling is exactly three times as high as that in the first case, in which the engine output decreased normally.

If it were possible to keep the engine output constant up to this altitude, the maximum flying speed at 50,000 ft. altitude would be 143 m.p.h. instead of 94 m.p.h. as in the first case.

It will be seen, however, that even within the altitude

limits within which it is possible to keep the engine output constant, about 20,000 ft., there is a material gain in speed. While, therefore, it would be useless in the first case to ascend to a higher altitude than 6,000 ft., the object now is to fly the main part of the trip as high as possible, for the speed curve  $V'_x$  shows the maximum speed to be reached at an altitude close to the ceiling, while the curve  $v_x$  shows it to be attained near ground level.

The materially reduced air resistance at high altitudes, in conjunction with the constant engine output, as well as its complete absorption by the propeller, are the causes of the considerable increase in speed. It is presumably the same mechanical reasons which induce all migratory birds in their migrations to fly at considerable altitudes. Even the comparatively low-flying curlew has been observed to fly at an altitude of 16,000 ft. But it is believed to be very likely that many migratory birds fly at the surprising heights of 30,000 to 40,000 ft.

It is to be assumed that the characteristic five pairs of air bags within the bodies of birds serve the purpose of supplying the air required by the animal engine in order to keep its output of muscular power constant at

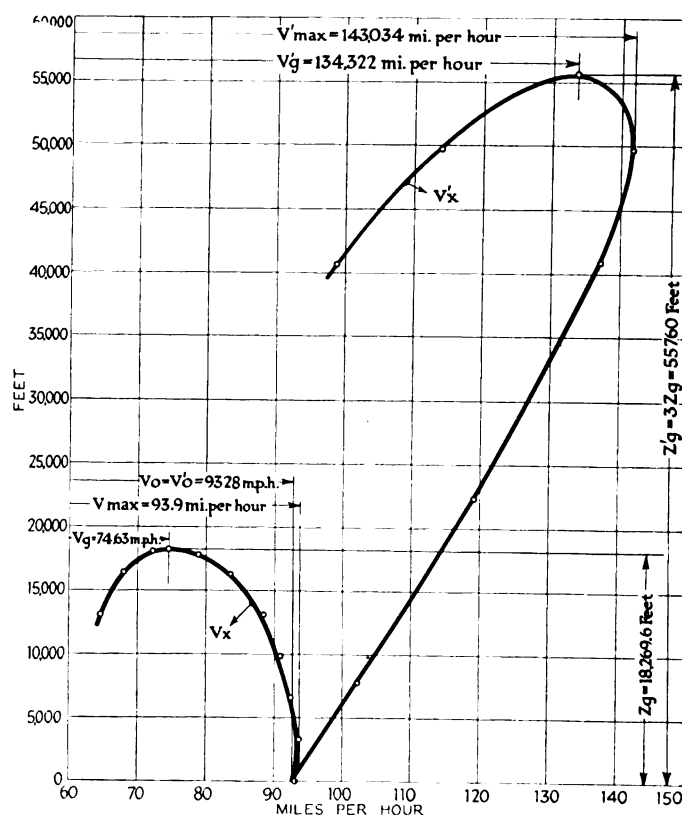


Fig. 1—Relation between flying altitude and speed under various conditions

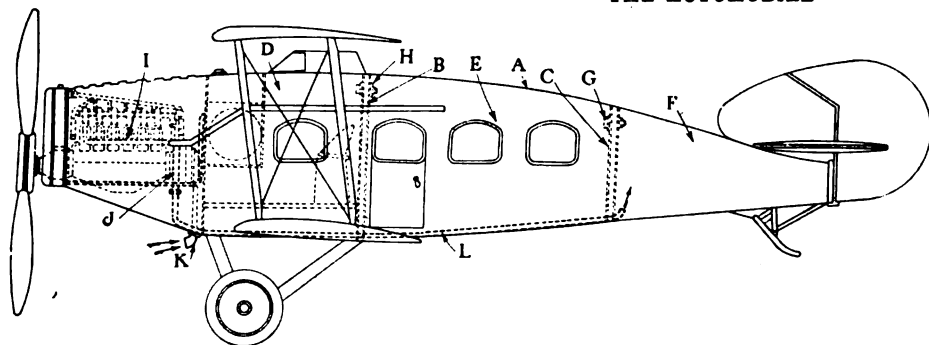
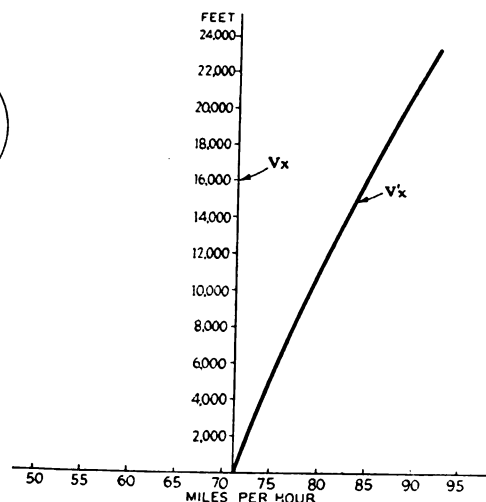


Fig. 2—Airplane with closed cabin in which constant air pressure is maintained at all altitudes. Fig. 3—At right, relation between altitude and speed of a dirigible



high altitudes, thus increasing the flying speed. This is undoubtedly the object of flying at such high altitudes, where the air pressure is barely one third atmosphere and the temperature as low as minus 58 deg. F.—a temperature which the migratory bird, protected by its warm feather coat, can withstand without difficulty, especially when it is considered that it is doing continuous intensive muscular work.

As regards altitude flights by airplane we would have to consider for the present altitudes of 20,000 ft., at which the air pressure is about one-half atmosphere and the temperature from minus 4 to minus 22 deg. F. An extended trip at such altitudes therefore is possible only if an airtight cabin is provided for the pilot and passengers, within which the temperature and pressure are maintained normal. Continuous replenishment of the air required for breathing is another requirement.

The technical solution of this problem is essential to the production of the altitude flying machine. According to a plan of Boerner, this problem is solved in a simple manner as follows: The air pumped by the compressors, instead of being fed directly to the engines, as has been the custom heretofore, is forced into an air-tight space at the rear of the fuselage which serves as an air reservoir. From there the air, which is compressed to about one atmosphere and considerably raised in temperature, passes through a reducing valve into the main cabin, so that the passengers are constantly supplied with fresh air at constant pressure and a temperature of about 68 deg. F. Through a second reducing valve the air then passes into the engine space and pilot's enclosure, from where it is drawn into the engine.

The accompanying drawing, Fig. 2, is a side elevation of a flying machine within the cabin of which a constant air pressure can be maintained in the manner described. The fuselage A which is intended to be made absolutely airtight, and with all moving parts extending to the outside passing through stuffing boxes, is divided by two air-tight partitions B, C, into three compartments, D, E, F. Compartment D contains the engine I and also serves as the pilot's and mechanic's compartment. Compartment E is the passenger cabin, while compartment F serves as a reservoir for the compressed air. In partition C there is a reducing valve G, in the partition B a reducing valve H. Upon the crankshaft of the engine is mounted a centrifugal air compressor J whose suction line ends in a trumpet-shaped mouth piece K outside the fuselage.

For a 2000 hp. plane there would be required from 60 to 70 cu. ft. of air per second, which would have to be supplied by the compressor. For an altitude of 16,000 to 20,000 ft., at which the air pressure is only about one-half atmosphere, assuming adiabatic compression, there will be a temperature rise of 83 deg. F., and if we assume the outside temperature to be minus 15 deg., the temperature within the fuselage will be 8 deg.

The compressor capacity for this altitude figures out to 190 to 220 hp.

From these figures it will be seen that there is nothing in the way of a practical realization of the Boerner conception. No trouble need be anticipated from the excess pressure of one half atmosphere within the fuselage, as regards rigidity, weight and airtightness of the walls. As the problem of maintaining the power output of the engines constant and that of the ability of the propellers to absorb this power at all altitudes may be regarded as solved, there are now no longer any fundamental difficulties in the way of a realization of the altitude airplane.

The importance of the high altitude airplane for the future is to be judged on the ground that it probably will be called upon to open up transatlantic routes through the air—a field which at present seems to be reserved for the dirigible, on account of its greater load capacity at equal speed. Owing to its higher flying speeds, the high altitude airplane offers the possibility of crossing the ocean with a limited yet commercially practical useful load, even though regular transatlantic air traffic will always remain the chief problem of the dirigible. On the other hand, the chief problem of the giant airplane, commercial traffic over prepared continental routes, in stages of suitable length, would be materially facilitated by the use of altitude airplanes, and the economy of the service would be greatly improved by increasing the length of the stages from 600 to 1200 miles.

It is true that a dirigible also gains by the use of engines with supercharger and adjustable pitch propellers. But with the use of ordinary engines, without supercharger, the speed remains constant at all altitudes, in contrast to the airplane, as the air resistance decreases with increasing altitude in the same measure as the engine output, and therefore as the propeller thrust.

Fig. 3 shows the variation of the speed of a dirigible with altitude up to 23,000 ft. In the case of decreasing engine output we obtain for the  $v_x$  curve a straight line parallel to the y axis, that is, a constant speed. In the case of constant engine output the increase in speed with the altitude may be seen from the curve  $v_x'$ . The speeds are given in miles per hour.

But for dirigibles the use of supercharging engines is not of nearly the same fundamental importance as for airplanes; mainly because flights at high altitudes are rendered commercially impracticable by reason of the reduced load carrying capacity. The gain due to the increased speed at altitudes is entirely out of proportion to the loss due to the reduced buoyancy and the corresponding loss in load carrying capacity. But the large load factor, which in the case of large dirigibles amounts to as much as 60 per cent, determines the superiority of

the dirigible over the airplane for certain purposes and insures to it for the present the absolute supremacy on transatlantic routes.

The development of the altitude airplane may, however, change the situation in that the dirigible will no longer be without competition on transatlantic air routes.

The chief problem of the dirigible and the giant airplane were outlined above. These will hardly be materially changed in the future. It is evident, however, that the limits of these two, physically so widely different, types of aircraft cannot be drawn with any degree of accuracy. The determining factor is always the economy of the service, which depends upon the geographical, cultural and climatic conditions of the route to be covered.

Aircraft alone of all vehicles of transport is not tied down to any road; it therefore travels, when at all possible, along the large terrestrial circle which connects the point of departure and the goal. But how important a factor the geographical conditions just referred to are, when the question of a relay flight in a giant airplane or a continuous flight in a dirigible is to be decided, will be realized when it is stated that the shortest route from New York to Peking, for instance, leads across the

North Pole, which makes it plain that at present this trip could be made by airship only.

The fundamental difference in the use of giant airplane and dirigible may be best outlined as follows: An uninterrupted trip around the earth, that is, without intermediate landings, say on the parallel of Berlin, could even today be made by a German dirigible specially built for the purpose, presumably with perfect safety, in the direction from West to East, in from 10 to 14 days. A modern giant airplane can cover this distance only in stages by circumventing the large ocean areas, and under the condition of prearranged and, therefore, expensive landing fields at distances of 600 to 900 miles. The altitude airplane of the future may be able to fly the oceans and greatly reduce the number of stages, hence compete with the dirigible over long distances—not in respect to the useful load carried but in respect to speed.

It will therefore be seen that, disregarding the small airplane on long trips, only the dirigible is in position to choose the shortest route and to cover it without stop, and that in consequence it can compete with the greater speed of the airplane, which loses time by delays at the landing places and by possible changes of machines.

## A Cushion Coupler

**A** CUSHION coupler device has been devised to absorb the first blow or shock transmitted by letting the clutch in suddenly on a rapidly revolving engine, or, on the other hand, to take up the torsional shock which comes in the other direction from the driving wheels of a car, due to quick breaking, or road irregularities. The device is so arranged that it will absorb the torque whether it is from the right or left; whether it originates at the engine or rear wheels, or from both ends at once.

The manufacturers claim that the coupler protects the differential, axles and tires from the jerks and wrenches of over-acceleration and also smooths out the irregularities in the power flow from the engine.

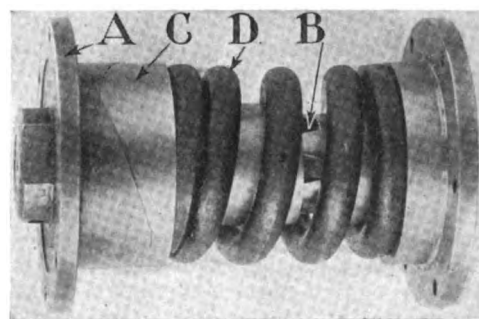
The drive passes from the driving member to the driven member through cam faces held in contact by a powerful helical spring. Sudden applications of power will cause the cam faces to move in relationship with each other, and compares the helical spring, which absorbs the blow.

Referring to the illustration, the torque is applied to the flange of the cam member, A, which is freely mounted on the coupler shaft, B. As A begins to rotate, the cam member, C, is forced away from the upper member, thus compressing the spring D. This action continues until the pressure of the splines on the shaft B equals the torsional force, where the drive becomes positive. The reverse action, although opposite in direction, is identical. One of the important features of the design is that the shaft B extends through the entire coupler and the distance between the flanges is constant.

The design of the cam faces permits a rotary or torsional movement of 70 deg. This means that from one to ten or twelve power impulses from the engine, depending upon the engine speed and gear reduction, occur before the drive becomes positive. In other words, it is possible for the engine to expend a portion of its energy in winding up the springs on the coupler, thus tending to prevent stalling of the engine.

The device is fitted with a tubular grease tight cover so that lubricant for the splines is always present. The coupler can be placed on the rear end of the propeller shaft, or on trucks having the gearset amidship, the

equalizer can be placed on a jack shaft between the gearset and engine as well as on the propeller shaft. In production jobs the coupler can be built in as an integral part of the propeller shaft, rear axle or gearset assembly, as desired. The device is manufactured by the Flexo-Motive Corp.



Flexo-Coupler with grease cover removed showing the construction and assembly of the cam and drive members

## Research Work on Electroplating

**D**URING the month of May a number of meetings were held by the American Electrochemical Society in the interest of research work on electrodeposition, these meetings being attended by a representative of the Bureau of Standards. Plans were made for the formation of a division of the society to be concerned wholly with this kind of work. If such a division is organized it will be a distinct advantage in bringing together persons interested in this field and thereby stimulating research work along electrochemical lines.

Letters have been sent out by the National Research Council to about 200 representative manufacturers in whose plants electroplating is an essential process. The purpose of these letters is to inquire whether they would be willing to furnish financial support toward research work on electrodeposition. If such support is received, it is expected that the funds will be expended for research work conducted at the Bureau of Standards under the general supervision of an advisory board.

# Grinding in the Automotive Industry

## Part IV—Finishing Engine, Transmission and Chassis Parts

In this, the concluding article in this series, the subject of methods used in grinding crankshafts, flat faces, camshafts, gear teeth, splines and other parts are considered and allowances for metal removal are given.

By P. M. Heldt

**T**HE crankshaft is one of the most important parts of the engine so far as grinding operations are concerned. As has repeatedly been stated, by grinding it is possible to form a truer and smoother surface than by means of cutting tools, and as the crankshaft comprises from six to thirteen bearings operating at high speed, these better bearing surfaces result in a considerable reduction in friction losses and an increase in the life of the bearings. Crankshafts are heat treated and show a considerable degree of hardness, which is one of the reasons that it is impossible to get the desired finish with lathe tools. Of course, even in the untreated state the bearings cannot be turned sufficiently smooth and must be filed and polished afterwards. This method of hand finishing is rather tedious and also is inaccurate unless a very skilled operative does the work. Therefore the draw-filing and polishing were replaced by grinding. Sometimes the rough turning is done before the shaft is heat treated, when it can be machined more readily.

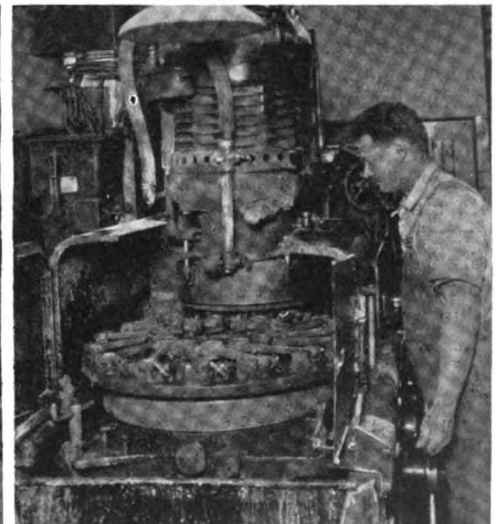
### Crankpin Grinding

Grinding the main bearings presents no particular difficulty, as the shaft can be put into an ordinary cylindrical grinder. A few manufacturers use case hardened crankshafts, in which case finishing by grinding is absolutely necessary. Among the latter is the International Motor Company, manufacturers of the Mack truck. The crank is forged from open hearth steel with 0.10 to 0.20 per cent

carbon content, and after carbonizing and quenching it shows a scleroscope hardness of 80 or more. In the rough turning 0.050 in. of stock is left on the diameter, and this is removed in two grinding operations, a rough and a finish grind. The roughing operation removes 0.035 in. of this and the finishing operation the rest. Practice as to the amount of material or stock allowed for the grinding operations varies considerably. Thus another manufacturer having an engine of substantially the same size as that just referred to removes 0.045 in. of stock from the front and rear bearings and 0.060 in. of stock from the center bearing in the rough grinding operation and from 0.005 to 0.008 in. on all bearings in the finishing operation.

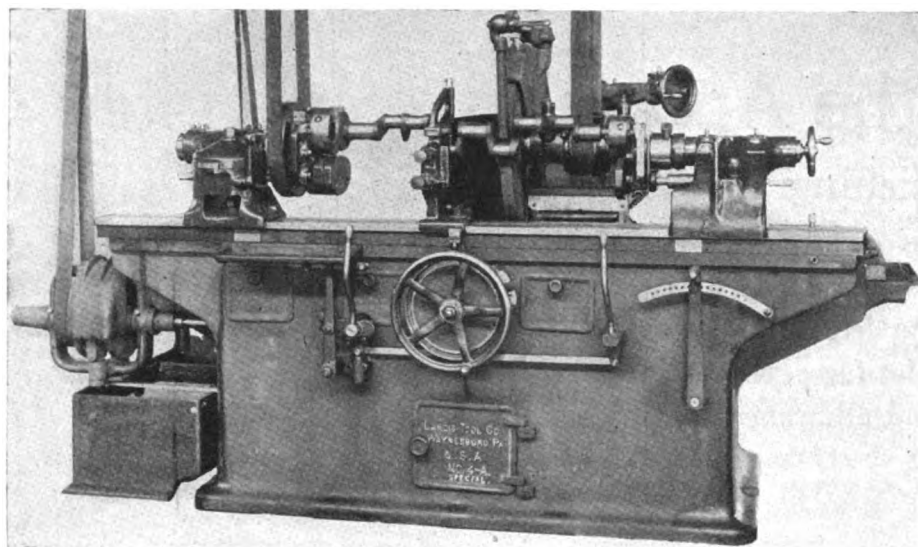
### Standard Fillets

In the grinding of both main bearings and crankpins, wheels of large diameter must be used, so that the wheel clamping collets will not interfere with the adjacent crank arms. It is customary to use the wheels for other classes of work after they have worn down to a diameter such that they can no longer be used for crank main journal and crankpin grinding. All crank journals must be provided with fillets, and when the grinding wheels are trued up they must have their corners rounded to a corresponding diameter. Too great a variety in the sizes of fillets used has caused considerable annoyance in the past, and in consequence the S. A. E. a year ago standardized the fillet radii for crank bearings as follows: The wheels are



(Left) Grinding bottom flange of cylinder block in Blanchard grinder. (Right) Grinding ends of connecting rod head in Blanchard grinder





Grinding crank pins in Landis crankshaft grinder

to be made in nominal widths of  $1\frac{1}{2}$ ,  $1\frac{5}{8}$ ,  $1\frac{3}{4}$ , 2,  $2\frac{1}{8}$ ,  $2\frac{1}{4}$ ,  $2\frac{3}{8}$ ,  $2\frac{1}{2}$ ,  $2\frac{3}{4}$ , 3,  $3\frac{1}{4}$ ,  $3\frac{1}{2}$ ,  $3\frac{3}{4}$  and 4 in. and the radii of the edges are to be  $\frac{3}{32}$  in. max. Grinding wheel manufacturers allow 0.029 in. extra width for truing.

As an example of production in crankshaft grinding the following may serve: In the Buda plant  $2\frac{1}{2}$  in. four cylinder crankshafts with three main bearings are put through the rough grinding operation on the main bearings at the rate of 55 per eight-hour day and through the finish-grinding operation at the rate of 58 per eight-hour day. All bearings are inspected and must be concentric to within 0.001 in. A scleroscope test is also made and must show between 41 and 45 points hardness. This, of course, is a heat-treated shaft.

### Production in Crankshaft Grinding

For grinding the crankpins the crankshaft must be placed in the grinding machine with indexing and balancing fixtures. Roughing and finishing operations are also required by the pins. In the case of the Buda crankshaft above referred to, 0.060 in. stock is removed in the roughing and 0.010 to 0.015 in. in the finishing operation. The tolerances are plus and minus 0.001 in. and the production is 60 per day of eight hours for each of the two operations.

On most automobile engine crankshafts only the journals, the flywheel flange and a possible clutch pilot are finished, the crank arms being left in the rough. In aircraft engines, however, and in general European practice the crankshafts are finished all over. Since the war some of the manufacturers of high grade cars in this country have begun to finish their crankshafts completely, and this involves additional grinding operations. Thus the Packard Motor Car Co. finishes the contour of the crank arms of its single-six model in a grinder operating on the same principle as a cam grinder. In this operation the crankshaft is revolved at the rate of 9 r.p.m., about  $\frac{1}{8}$  in. stock is removed and the contour is held to within 0.010 in. of blue print dimensions. The faces and circumferences of the thrust flanges and flywheel flange are also ground.

Poppet valves are ground both on the seat and on the stem. Special grinding machines and special fixtures for grinding the seats of such valves have recently been introduced by a number of manufacturers. The valve is held by its finished stem in a chuck and the grinding wheel, set at the proper angle, is fed up toward the seat. The stem is turned and ground between centers, but the lower center is usually cut away later.

Camshaft grinding is a branch of the grinding industry

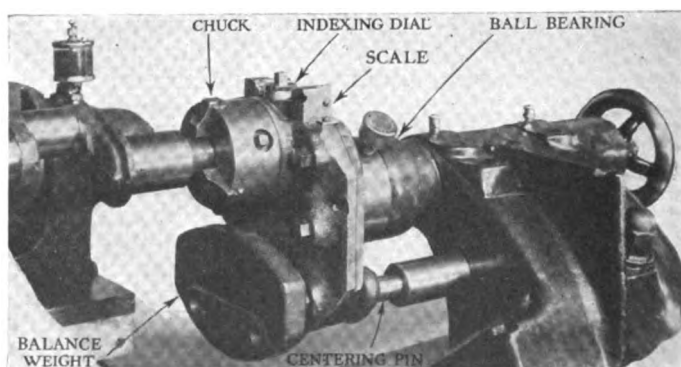
by itself. Not only the contours of the cams but also the bearings are ground, but the first operation, of course, involves the greatest difficulties. These surfaces are case hardened and, therefore, call for a comparatively hard wheel. The usual plan is to mount the grinding wheel spindle on a slide which is actuated by a master cam four or more times the size of the cam to be ground and an exact enlargement thereof. Cam grinding machines and cam grinding attachments for universal grinders are made by the Landis Machine Co. and the Norton Co., and the Rolls-Royce Co. make a machine of this kind for their own use under their own patents. Sometimes a so-called constant acceleration cam is used, in which case the flanks of the cam are concave and small diameter grinding wheels are required. Occasionally the camshafts

carry an eccentric for the oil pump and are provided with an end thrust flange, both of which must also be ground. If the cam contours are ground with a cylindrical surface, the diameter of the grinding wheel has an influence on the form of contour produced, and wear of the wheel must therefore be allowed for.

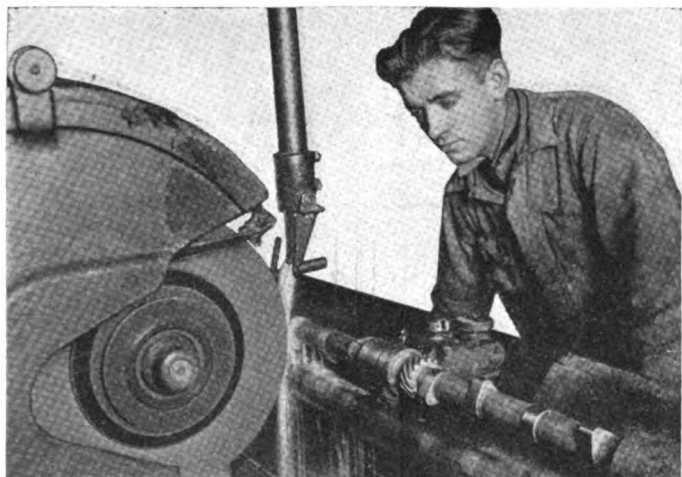
The remaining parts of the valve gear, that is, the push rods and the rollers, therefore, are also ground. In the works of the International Motor Co. two grinding operations are performed simultaneously on the hardened cam roller. While the roller is held in a chuck the hole is ground with a  $\frac{3}{8}$  in. wheel of  $\frac{3}{8}$  in. face, which runs at 30,000 r.p.m. and removes 0.003 in. of metal. As this wheel feeds into the hole a saucer wheel running at 1800 r.p.m. comes into contact with the face of the wheel and removes from 0.002 to 0.005 in. of material. The production is 50 rollers per hour.

### Face Grinding of Housings

Until recently the joint surfaces of machinery casings were generally finished in continuous milling machines, and this is still the practice where soft materials, such as aluminum, are concerned. However, if the cases and their covers are made of relatively hard material, particularly cast steel, there is now a tendency to finish the joint surfaces by grinding. Cast steel and semi-steel casings are used to some extent in truck and tractor practice, and it is in the truck and tractor industry that equipment for surface grinding housings and covers is most frequently seen. A part in point is the cover for the camshaft gears which, if the engine has three-point suspension with one point in the form of a trunnion on the hub of this cover,



Foot stock, clutch, balance weight and indexing device on Landis crankshaft grinder



Cam grinding in Norton grinding machine  
(Note back rest)

must be made quite strong. Such covers can be ground to advantage in surface grinders with vertical wheel spindles, a special fixture being required for holding the work on the table. This fixture supports the cover under the flange which is to be finished off so it cannot spring away, thus helping to secure an oiltight joint. Similar surface grinding operations are performed on the oil pan joint, water jacket covers, bell housing and exhaust manifold.

The above will suffice to show that in the manufacture of automotive engines as carried on to-day there is hardly a part of any importance, with the exception of the fly-wheel, in the production of which one or more grinding operations are not performed. Cost of production is an important factor, and no doubt the introduction of grinding has done its share toward the reduction of manufacturing costs and thereby to make possible the enormous outlets for automotive equipment. But it can also not be denied that grinding has resulted in better work and made for a superior product.

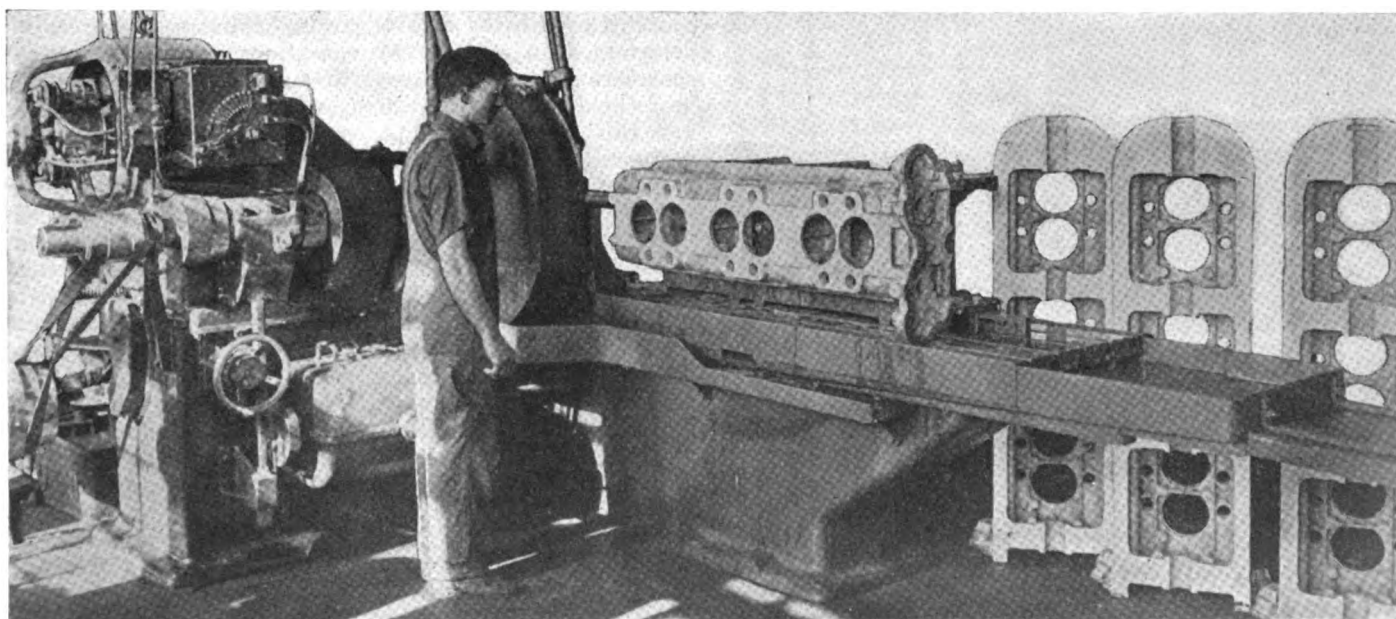
### Gear Grinding

In passing from the engine to the transmission parts, we may skip the clutch, for although there are a number

of operations on a typical design of clutch that can be done to advantage in the grinding machine, there are very similar operations in the gerset, and we thus avoid useless repetition. In the manufacture of the gerset, grinding also plays an important part, for one reason because hardened steel parts are largely used. The gears of the gerset are either oil hardened or case hardened after they are cut, and as this tends to distort the teeth, it is a good plan to allow a slight amount of surplus stock in the cutting operation and grind the teeth after hardening. In a recent article we described the Maag method of grinding the teeth of hardened gears, in which the wear of the saucer-shaped grinding wheels is compensated for automatically by means of an electric contact device. In this country the Gear Grinding Machine Co. has developed a system of grinding gears after hardening which has met with considerable success.

There are two basic methods of gear grinding. One is based on the fact that the rack tooth of the involute system has straight side flanks; hence a gear wheel cutting with its straight side, when placed at the proper angle relative to the pitch circle at the tooth flank being ground and moved tangentially to simulate the motion of a rack tooth relative to the gear, will give the correct tooth outline. The other method consists in the use of a grinding wheel with a formed grinding surface and is very similar to the cutting of gears by means of a milling cutter. The grinding surface of the wheel is trued by means of three diamonds, the truing operation being performed without removing the wheel from the machine. One of the diamonds is traversed across the straight top of the grinding wheel which grinds the bottom of the tooth space and the other two true each one of the sides of the wheel by which the involute flanks of the teeth are ground. The level of the traversing diamond is the datum line of the machine, the grinding wheel arbor being mounted above it and the work arbor below. As the grinding wheel cutting surface wears away its center is lowered to bring its lower edge down to the datum line again. The two truing diamonds for the sides of the grinding wheel are guided by means of cams enclosed within the machine, whose outlines correspond to the form of the teeth to be cut.

It is obvious that a different pair of cams are required for each form and pitch of tooth. In making these cams, templates of aluminum of eighteen times the size of the tooth are first made; these are then mechanically reduced



Grinding top half of aluminum crankcase in Diamond surface grinder

to six times actual size and duplicates of these reduced cams are fixed in the machine.

### Stock Allowance for Grinding Gears

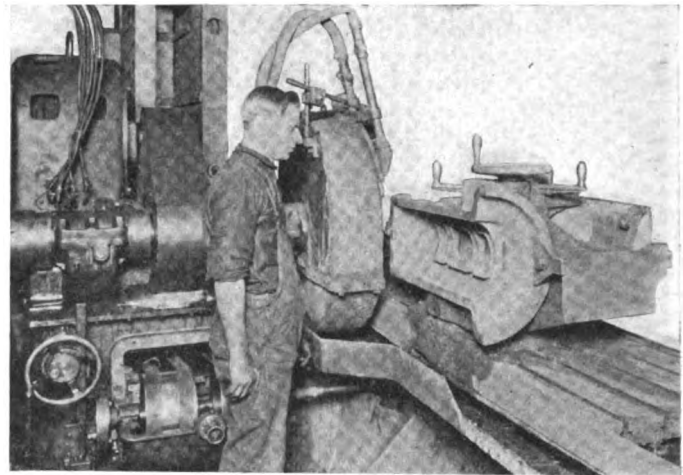
When gears are thus ground after case hardening, no attempt is usually made to get a very accurate tooth outline in the cutting process and stock for grinding is allowed in the cutting. At the bottom of the tooth gap about 0.010 in. of stock is allowed for grinding in the case of transmission gears, and on the tooth flanks, from 0.006 to 0.009 in. The allowance at the bottom of the tooth space is a matter of no great consequence, as this is not a working surface; on the other hand, the allowance on the flanks must be strictly limited, because otherwise the grinding wheel is apt to cut through the case of a case-hardened wheel and thus cause a soft spot in the flank.

Gears are generally ground in gangs, and in order to ensure accuracy it is necessary that the bores be ground out accurately and that the ends be ground square with the bores. These gear grinding machines are not manufactured for the market, but built by the Gear Grinding Machine Co. merely for its own use, the company contracting to grind customers gears that have previously been finished up to the grinding stage.

### Grinding of Splines

The shafts of gearsets are generally mounted in ball or roller bearings, and the seats for the bearing rings, both on the shafts and in the housing, should be ground. The primary shaft of the transmission, moreover, is provided with driving splines, and as the shaft is hardened after having the splines milled, the latter are likely to be distorted, hence the finishing operation should preferably be by grinding. This operation can readily be performed in a universal grinding machine with a wheel having its circumference dressed to the exact form of the groove between splines. Lately the Gear Grinding Machine Co. has also been grinding splined shafts on the same principle as that employed by it in grinding gears.

For a long time there was a great deal of controversy as to whether the sliding gears of the transmission should bear on top of the splines or on the bottom surface of the grooves. There was not much advantage one way or the other, because while the top surface of the splines on the



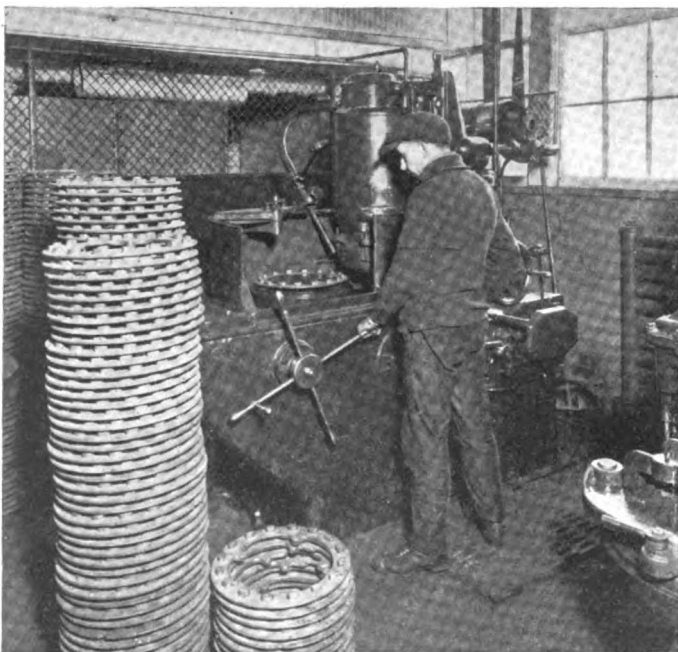
Grinding crankcase bottom half in Diamond surface grinder

shaft and the inner surface of the teeth in the gear could be finished quite accurately, it was quite difficult to accurately finish the bottom of the grooves on the shaft and the bottom of the keyways on the gear, so in either case one surface was not very accurate. Since the splines on the shaft are ground this difficulty has been overcome, and it is now the general practice to support the gears on the bottom of the spline grooves, which necessitates the grinding out of the bores of the gears. This is done in an internal grinding machine, and the most interesting feature in connection with this operation is the method of holding the gear while it is being ground. Evidently, for quiet running, the gear must turn concentrically with its pitch circle, and how to get the bore of the gear after its final grinding concentric with the pitch is the problem. There are three methods of holding the gear in the grinding machine for grinding the bore, namely, by the top of the teeth, by means of rolls contacting between the teeth at the pitch circle and by means of wedge blocks with narrow teeth entering between the gear teeth and bearing against the bottom of the tooth spaces.

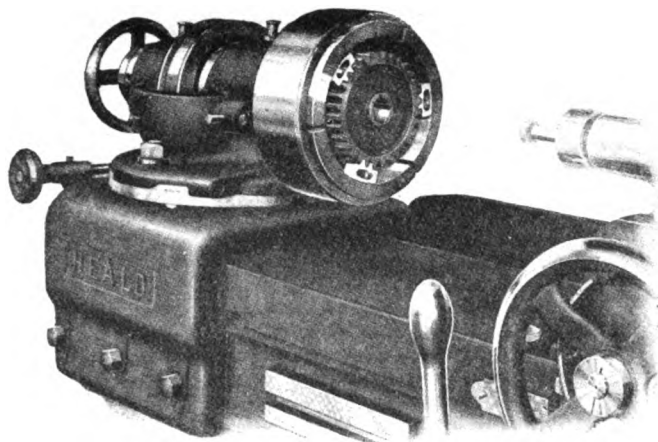
### Holding Gears for Grinding Bores

Holding the gear at the top of the teeth does not give accurate results, because the pitch circle is not necessarily concentric with the outside circle, having been formed or determined in a different operation. From theoretical considerations it would appear that the best way would be to hold the gear by rolls contacting between the teeth, and this is undoubtedly correct if the gear is an unhardened one. But if the gear is hardened the teeth are likely to have become distorted, with the result that the tooth spaces are no longer of uniform width. Each roll will then enter between the teeth to a different depth, and the circle of the roll centers will no longer be concentric with the pitch circle. For such cases the best method is undoubtedly what is known as the root control method. The root circle and the pitch circle are formed in the same operation and their concentricity is not materially disturbed by the hardening process. It may be pointed out here that the accuracy of the pitch line roll support method may be improved by the use of a greater number of rolls than the three which is the least possible number that can be used. The line cut on page 426 shows two methods of holding gears in the grinding machine for grinding the bore that have been worked out by the Heald Machine Co. When using the roll method, the rolls must of course be all of exactly the same diameter.

The roll method can be improved upon by having two or



Grinding clutch disks in Blanchard grinder



Heald method of holding gears in chuck for internal grinding

three rolls on each collet jaw which will average up any irregularities that may exist in the teeth. The rolls are provided with tapering ends so as to make it easy to insert them between the teeth and also to make it easy to get them into the chuck along with the gear. They are carried loosely in a light metal ring or retainer, which allows them to enter freely between the teeth of the gear and adjust themselves to any irregularities. The mounting of the rolls in a retaining ring instead of on the collet jaws enables the operator to more easily keep dust and grit from getting behind the rolls where they would be likely to affect the accuracy of the chucking. For the sake of accuracy the rolls must be backed up by hardened steel blocks to take the pressure of chucking, as they would bed into soft material and become inaccurate. This hardened surface must be reground occasionally to maintain the accuracy. In addition to plain single spur gears, so-called spool gears, and also bevel gears must be held in the machine for grinding the bore, and fixtures for doing this have been worked out.

The halves of the gear case and the cover therefor can have their joint surfaces ground on a surface grinder, and a machine with a horizontal wheel spindle would ordinarily be used for the heavier parts.

In connection with the final drive and rear axle there are also many parts that are finished by grinding. If the machine has a bevel gear drive the crown gear is usually ground on the flange where it fits to the differential flange; the rear axle driving shafts and the pinion shaft are ground, and so are the seats for the bearings on the differential housing and in the axle housing. Grinding is also resorted to for correcting distortion due to heat treatment of the worms of worm drives. Passing to the front axle, the steering knuckle spindles are ground, as are the ball joints of the drag link, both on the ball surface and the taper surface by which they are fitted into the knuckle arms.

### Snagging Castings and Forgings

Aside from precision work, a great deal of snagging is done on automotive parts, both castings and forgings. Formerly, when a lot of castings came from the foundry, a man with a cold chisel and hammer was set to work on them to take off the rough edges by chipping, but the snagging process is a great improvement on that

method. For very heavy parts portable grinders are used, while light parts are toted to a stationary grinder, either of the floor stand or the bench stand type. Snagging is done on practically all castings and on some of the larger size forgings.

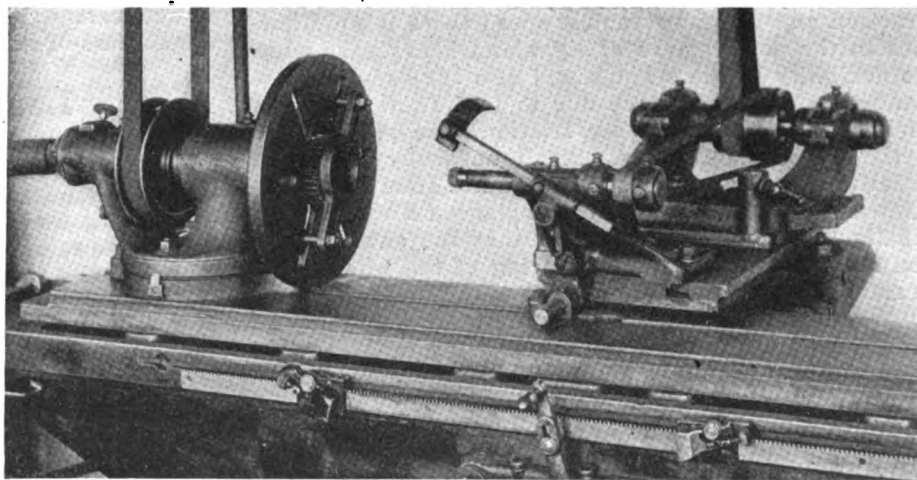
### Trimming Joints

A further use of grinding machinery in automotive shops is in trimming the rough edges of fitted joints, whether these joints be between castings, sheet metal parts or forgings or between parts of different kinds. For instance, in the Mack trucks the spring hangers are clamped to the frame and the joints are then caulked. The roughness of the caulked joints is then smoothed off by means of a medium coarse wheel. The engine bonnet and the cab of the Mack truck are built up of a combination of sheet and strip steel, and the rough edges are smoothed by means of portable grinders. The bodies are similarly gone over with the portable grinder and all projecting screw heads, burs and sharp edges are smoothed.

Grinding machinery is extensively used in the plants devoted to the production of the components thereof and of accessories the same as in plants producing complete automotive vehicles. This applies to none of the parts or allied industries so much as to the manufacture of anti-friction bearings. In fact, with the exception of the ball or roller cages, these are finished completely by grinding. Steel balls for use in ball bearings are made in special machines developed by the manufacturers of the balls themselves. The balls are made of chromium steel, hardened all through. They are ground to an approximate size and then graded by gaging.

### Grinding Ball Bearing Races

The races are turned roughly to size and are then heat-treated. After the hardness test the sides are surface-ground on rotary surface grinders with magnetic chucks; in fact this operation is somewhat similar to grinding the sides of piston rings. The S. K. F. Ball Bearing Co. uses silicon ring wheels for this operation, 18 in. in diameter by  $1\frac{1}{4}$  in. rim, running at 950 r.p.m., and removing approximately 0.006 in. of stock from each side of the ring. For turning the ball grooves in the inside rings and turning off the outer surface of the outside rings the rings are mounted on arbors in gangs. The ball grooves in the inner rings are ground by means of silicate wheels with an oscillating wheel mount which shapes the groove. One groove is ground at a time. A wheel speed of 6000 ft. per min. is used and from 0.020 to 0.025 in. of stock is re-



Grinding out the bore of a gear wheel in a Brown &amp; Sharpe universal grinding machine

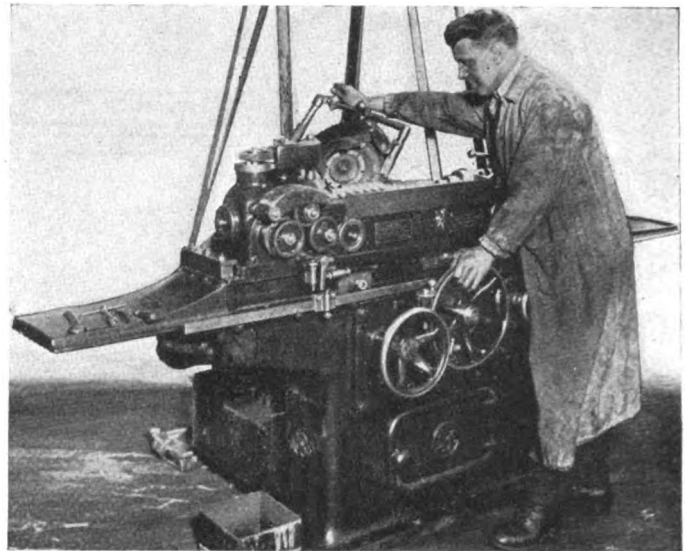


moved. Both a roughing and a finishing operation are required for the outer surface of the outer ring. In roughing, the diameter is reduced by about 0.020 in., and in finishing by 0.010 in. A circumferential speed of 5500 ft. is maintained.

The grooves in the outer rings are also ground in an oscillating grinding machine. In this case, instead of the wheel carrier, the work carrying head is oscillated, and a true spherical groove is formed. Bores in inner rings are ground in automatic machines, and for the smaller sizes naturally very small diameter wheels must be used. In grinding the bores from 0.006 to 0.008 in. is removed if measured on the diameter.

#### Grinding Parts of Electrical Equipment

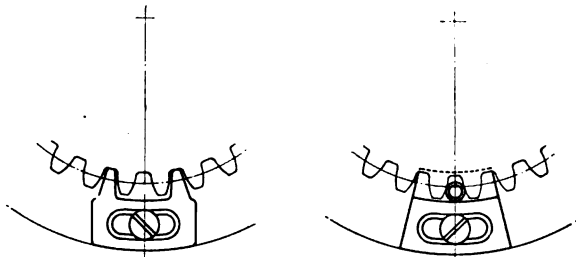
One of the newer subsidiaries of the automotive industry, the electrical equipment industry, also makes use of grinding to quite an extent. Formerly the completed commutators, after being turned down in the lathe, were filed and lapped with fine emery paper. To-day they are finished by grinding. The armature cores of generators and starters, which are built up of thin soft iron laminations slightly separated by an insulating varnish, so as to prevent good electrical contact between them, are now finished by grinding. Owing to the softness of the steel used for the disks and the difference in the cutting qualities of the steel and the insulating layer in between, this was always a rather unsatisfactory lathe job. In the



Grinding steel worms for truck drives (Timken-Detroit Axle Co.)

grinder, not only can the job be done more expeditiously, but there is probably less burring of the edges of the disks, with consequent better insulation. The pole pieces of generators and starters are ground to the required diameter, and often the field frames are ground for the attachment of the field poles. The grinding out of the pole pieces is a particularly delicate operation in the case of the magneto, as there the clearance is made exceedingly small.

Non-metallic parts of electrical equipment also can be finished to advantage by grinding. Thus the distributor with its molded-in metal segments is preferably finished by grinding, and the carbon brushes, which are made from extruded bars, are cut off to length by means of thin elastic wheels. The radius is ground on the bearing surface of these brushes by means of silicon carbide wheels so they do not have to be fitted to the commutator surface by hand by the consumer.



Methods of centering gears for grinding of bore (Root control and pitch line control)

## Dependence of Riding Qualities on Car Weight

**A** MATHEMATICAL investigation of the problem of vehicle suspension is published in *Der Motorwagen* of June 20 by Prof. H. Reissner. The question particularly investigated is whether it is possible to so design small cars that they will ride as comfortably as large cars. It is found that for the same road obstruction and the same vehicle speed there is no difference in the performance of light and heavy cars when the flexibility of the springs and also the damping constant (the frictional force due to leaf friction or leaf friction and shock absorber friction) are proportional to the weight of the car. Small unsprung weight of wheels and axle are of great importance from the standpoint of prevention of wheel bouncing on a rough road. Finally the conclusion is drawn that the shock reduction and the freedom from bouncing of the wheels may be made independent of the weight of the car if the static compression (which should be a maximum) of the springs under load and the ratio of the unsprung to the sprung weight (which should be a minimum) are made the same for both types of car.

Prof. Reissner says he has found that small cars in general are less well sprung than large cars, and he admits that the objection may be made to the principle laid down by him that it is more difficult from a design standpoint to provide the same static spring deflection

in a small as in a large car, because it is generally desired to have the light car lower; also that in the case of the light car there is a greater difference between empty weight and loaded weight, and if the car is sprung for full load the springing will be poor when running with small load. However, the solution of the problem of adequately springing the light car is so important to the success of this type of vehicle that it must be found.

#### Further Lamp Standardization by S.A.E.

**T**HE standardization of tail-lamp overall dimensions and mounting screws has been undertaken by the S. A. E. Standards Committee. At the present time there are a great variety of mountings used which could easily be reduced to one standard design, acceptable to both the lamp and the automobile manufacturer.

Standardized tail-lamps can be mounted on either the right or left-hand side of the license plate, thus eliminating the necessity of making right and left-hand lamps which is the practice at present. The tail-lamp dimensions recommended are in accordance with present practice.

It has been suggested that the present S. A. E. Standard for lamp glasses, be extended to specify the dimensions of the locking lugs of the head-lamp glass rim so as to prevent the glass turning in the lamp, which is a matter of importance in other than plain lamp glasses.



# A Forward Step in Practical Merchandising Research

The general phases of territorial analysis were discussed recently in *AUTOMOTIVE INDUSTRIES*. This article describes how one automobile manufacturer is getting practical results from commercial research. The scope of the work is outlined and valuable suggestions are given.

By Norman G. Shidle

**T**HERE are two big questions waiting to be answered accurately in detail at most automotive manufacturing plants. The first is, "What data have we at hand upon which to base an intelligent and intensive merchandising plan?" The second question is a continuation of the first and may read, "What other data do we need, how can we get it and how can we use it effectively after having obtained it?"

To adequately answer these questions means to establish and develop a sound merchandising program which will carry on successfully through the period of competition which lies ahead. Because the need for an answer is so pressing, it is interesting to examine the work which various companies are doing along this line. The beginnings of a broad plan, for instance, are now well under way at the H. H. Franklin Mfg. Co., and some constructive results have already been achieved after only a few months of effort.

A Commercial Research Department has been established at this plant to carry on a substantial part of this work in co-operation with the sales and advertising departments. All these are supervised and co-ordinated by the Director of Distribution.

The functions outlined for the Commercial Research Department at its inception indicate concretely the scope which its work is to take. These functions are as follows:

1. To lay out boundaries of dealers' territories along scientific lines and review contracts negotiated by the sales department.
2. To gather statistics bearing on the markets in which the company buys and sells.
3. To predetermine what the sales performance should be for the market as a whole and for each dealership.
4. To figure quotas and schedules for the market as a whole and for each dealership.
5. To keep statistical records of dealers, subdealers and salesmen's performance.
6. To analyze sales performance and point out faults and remedies.
7. To forecast economic conditions in markets in which the company buys and sells.
8. To analyze, construct or carry out routines and sales promotion plans, investigate methods, practices and policies.

The striking thing about this outline is the definite manner in which it states the various angles of the merchandising problem which confronts the automobile manufacturer. It indicates the basic lines of research to be laid down as a foundation for the conception and development of sound selling plans. To properly perform these functions, the department has been divided into four divisions, each of which performs a specific function.

One division takes care of general work, such as research investigation, questionnaires, charts, methods, routines, forecasts, general file, sales promotion ideas and all special work referred to the department. In regard to the last item, it is interesting to note that this department has become a sort of clearing house for merchandising problems of various kinds referred to it by all branches of the selling and advertising organization.

A second division takes care of the various selling campaigns which are continually being operated. The entire dealer organization and dealer salesmen, for example, has been mobilized into the "Franklin Army." The salesmen take rank in this army in accordance with the results of their sales effort and, on the basis of his monthly sales record, a man may rise in rank from private to general.

The work of this division, assisting as it does the advertising and sales departments in promoting and devising these monthly and other periodic sales campaigns, has been a large factor in stimulating sales during the dull times and has been one of the most effective means of keeping the factory at capacity production during recent months. The work of this division includes awards of bonuses to salesmen and dealers, "Army" sheet records, dealers' and salesmen's records for prize campaigns, monthly sales campaigns, special reports to advertising department, special notices for *Salesometer*—the salesman house organ of this company—custody of order and delivery reports, etc. These order and delivery reports are discussed in greater detail at a later place in this article.

A third division handles all routine reports not included in the second division, such as cars in transit, dealers' and subdealers' stock on hand, demonstrators, wholesale and retail deliveries, car-record cards, car owner cards, etc.

The fourth division handles what is perhaps the most interesting phase of this commercial research work. Its task includes territorial studies, quota studies, schedule studies, review of new contracts, outside statistics, such as population, registration, wealth and economic production; map records, etc.

## Territory Layout

The work of properly laying out territories has been one of the major tasks. Proper territories cannot be laid out with reference only to a map. Factors such as transportation lines, major highways, urban spheres of influence, etc., must all be considered. The ideal merchandising plan, however, is one which is predicated upon small territories, intensely cultivated.

This new department has taken up the work of scientifically laying out territories. Although it is operating

Form B-401-Rev. 10-1-21

**THIS IS YOUR RECORD**

3

**FRANKLIN DEALER'S or SUB-DEALER'S** | This Sheet to Remain in Book | **Report**

Dealer \_\_\_\_\_  
Sub-Dealer \_\_\_\_\_

NOTE: If you are a Sub-Dealer, please fill in Dealer's name and location also.

**PART I Dealer's or Sub-Dealer's record of order and delivery (or cancellation) of a new Franklin to a customer (retail) or of a new demonstrator to his salesman.**

Date of Order \_\_\_\_\_ Date Wanted \_\_\_\_\_ Date Promised \_\_\_\_\_  
Name \_\_\_\_\_  
Street Address \_\_\_\_\_ City, Village or P. O. \_\_\_\_\_ County \_\_\_\_\_ State \_\_\_\_\_  
Car Previously Owned \_\_\_\_\_

**QUOTATION**

Type \_\_\_\_\_  
Extra Equipment (Specify Items): \_\_\_\_\_

PRICE	QUANTITY

**DETAILS OF TRADE-IN**  
(This space is for convenience of Dealer. Information not shared by factory.)

Freight \_\_\_\_\_  
War Tax \_\_\_\_\_  
Total \_\_\_\_\_

Is this car to be used as a demonstrator? \_\_\_\_\_ Deposit Made \$ \_\_\_\_\_  
Car Number of Car Delivered \_\_\_\_\_ Type \_\_\_\_\_ Date of Delivery \_\_\_\_\_

NOTE: It is most important that car number be correctly read and correctly written.

**PART II Dealer's record of order and delivery (or cancellation) of a new Franklin to a Sub-Dealer (wholesale).**

Sub-Dealer \_\_\_\_\_  
Date of Order \_\_\_\_\_ Date Wanted \_\_\_\_\_ Date Promised \_\_\_\_\_

**QUOTATION**

Type \_\_\_\_\_  
Extra Equipment (Specify Items) \_\_\_\_\_

PRICE	QUANTITY

Freight \_\_\_\_\_  
War Tax \_\_\_\_\_  
Total \_\_\_\_\_

Is this car to be used as a demonstrator? \_\_\_\_\_ Deposit Made \$ \_\_\_\_\_  
Car Number of Car Delivered \_\_\_\_\_ Type \_\_\_\_\_ Date of Delivery \_\_\_\_\_

NOTE: It is most important that car number be correctly read and correctly written.

Fig. 1

Form B-402-Rev. 10-1-21

**MAIL WITHOUT FAIL**

**FRANKLIN DEALER'S or SUB-DEALER'S WEEKLY REPORT NO. 26**

FOR WEEK ENDING SATURDAY, FEBRUARY 26, 1921.

**SUB-DEALER:** Mail this report to your dealer the Friday night preceding above date without fail.

**DEALER:** Mail this report to the factory together with the reports of ALL your sub-dealers on the above date without fail.

Dealer's Name \_\_\_\_\_ Dealer \_\_\_\_\_ Location, City and State \_\_\_\_\_  
Sub-Dealer's Name \_\_\_\_\_ Sub-Dealer \_\_\_\_\_ Location, City and State \_\_\_\_\_

NOTE: If you are a sub-dealer please fill in Dealer's Name and Location also.

List below **CAR NUMBERS OF FRANKLIN CARS USED AS DEMONSTRATORS:**

List below **CAR NUMBERS OF NEW FRANKLIN CARS IN STOCK:**  
(Do not include cars used as Demonstrators.)

List below **CAR NUMBERS OF FRANKLIN CARS IN TRANSIT:**  
(If you have cars coming but do not know car numbers of cars shipped, please indicate how many cars.)

OTHER CARS ON HAND	
MAKE	QUANTITY
Used Franklins	
Used Cars of Other Makes	
New Cars of Other Makes: (Spec.)	

GENERAL BUSINESS CONDITIONS IN YOUR TERRITORY:

Fig. 2

conservatively and is correlating its studies with the necessities of present conditions, excellent progress has been made.

One of the first problems encountered by this department was that of bringing up-to-date data concerning the number of Franklin cars already in use in each of the various sales territories. This work was done outside the company by a statistical organization employed for the purpose. The information was essential, however, to the making of future plans and to the establishing of quotas.

Next a plan for keeping this information up-to-date at all times was worked out. This is accomplished by means of three forms, each one of which is filled in by the dealer. The first is an "Order Report" and is filled in by the dealer and mailed to the factory at the time an order for a car is taken. The second is similar to it, except that it contains an extra line, which records the actual delivery of the car. The third is kept by the dealer as his record and contains all the facts on the other two. A sample of this third form is shown in Fig. 1.

By means of the form in Fig. 2 the factory is kept informed as to the exact status of every Franklin in every dealer's territory, including those cars which have changed hands. This weekly report is filled out by the dealers and mailed to the factory. Fig. 2 shows both sides of this form.

On the basis of the data compiled and kept up-to-date from these forms, it is possible to make up one factor in the formula for determining quota. Moreover, a close examination of these forms will reveal to the sales manager a number of other advantages to be gained from so highly developed a system of dealer control and co-operation.

The form shown in Figs. 3 and 4 are, to a large extent, explanatory and illustrate further the possibilities of close merchandising control of the dealer organization. Fig. 3

shows the form on which county deliveries and registration are recorded from month to month, the county being a fixed territorial unit, whereas dealer boundaries include often several counties and are subject to change.

By means of this record it is possible at any given time to determine readily how the dealer who controls this county is keeping it up to quota, the variation in his sales curve, and the quality of his performance in this county as compared with that of competitive cars. The blank columns are used for posting performance of competitors.

Fig. 4 is a comparative record of the dealer's sales performance for his whole territory. At the top of the sheet is placed the sales quota for the year, the number of Franklins to a unit of population and the percentage of total deliveries that should be Franklin sales. An examination of the details of this form will show the variety of valuable merchandising information which its record gives to the sales manager.

Before such a form can be used, however, it is obvious that considerable foundation work must have been done; certain standards of performance must have been set up. The work of this research department, consisting partly of the gathering of the data described in Figs. 1 and 2, is to set up such standards and to change them from time to time on the basis of newly ascertained facts.

#### Territorial Analysis

One of the chief problems of interest to the automobile sales manager is that of accurate territorial analysis; the determining as closely as possible of just how much business is actually available in a given dealer's territory. Thus, a quota can be established and sales performance checked against this standard.

The establishing of territorial quotas has been studied closely by this new Franklin department and a satisfactory formula for present practical use has been worked out on

Fig. 3

Fig. 4

**A** BILL now before the Spanish Chamber provides for an expenditure of 648,000,000 pesetas on roads and bridges, 493,000,000 for the repair and upkeep of main roads, 157,000,000 for local roads, 900,000,000 for hydraulic works; 60,000,000 for lighthouses, etc., 110,000,000 for agricultural establishments and machinery, and 44,000,000 pesetas in connection with the mining industry.

# French Manufacturers Turn to Medium-Priced Cars

Many French automobile manufacturers, previously producers of high-priced models, are about to take up the production of cheaper and more economical cars. Panhard-Levassor is expected to bring out new model with very small Knight engine, while Peugeot has in preparation a small rotary valve engine. Use of overhead valves increasing.

By W. F. Bradley

**S**ALES revived during June and July in the French automobile industry, but have dropped off for August, and are not expected to pick up again until after the fall shows. All factories are now working on the new or modified models which will be revealed to the public at the Paris show, scheduled for Oct. 5.

Speaking generally, all firms are getting down to smaller and more economical types. A few of the factories having started out after the war with medium size cheap cars will round off their production with a high class model, but in a greater number of cases firms having started with costly types will take up the production of cheaper and more economical cars. Among those coming into this category are Hispano-Suiza, Voisin and Delage, all of whom catered in 1920 for the luxury class only. Panhard-Levassor is expected to bring out a car with the smallest Knight engine ever built, the bore being only  $2\frac{1}{2}$  in. Peugeot is preparing a small rotary valve engine.

There will be a big increase at the next show in overhead valve engines, many of these having the camshaft in the basechamber, the valves being mounted in the detachable head. This design is preferred because of the cheapness of construction compared with the overhead camshaft. There will be an increased number of three-speed gearboxes; magneto ignition will lose a certain amount of ground, and four-wheel braking systems will gain. Cyclecars are receiving a lot of attention, but the big movement will not be for next year. Although the old prejudice against straight side tires is dying, there are no indications that Continental makers will adopt these tires as standard for next year. The change, when it comes, will at first be gradual, and it is premature to expect even the beginning of it for 1922.

The Brasier factories, both in Paris and at Grenoble, have been closed and it is doubtful if they will be reopened. This firm, which is one of the oldest in France, increased enormously in importance during the war, and had to erect a special factory at Grenoble for the production of airplane engines. Conditions have been very unsatisfactory since the Armistice, and notification of the winding up of the concern is expected daily.

Peugeot announces a considerable increase in sales during the past four months, the turnover being on a steadily increasing scale and the month of July breaking all records since the company existed. For the Paris district alone the sales were 3,180,000 francs for the month of July. Production at present is 700 automobiles per month, as follows: 400 10 hp. cars, 90 to 100 14 hp. models, 175 small two-seater Quadriettes, and about 30 of the six-

cylinder 25 hp. model. There is a growing demand for the cheap Quadriette, and arrangements are in hand for an increase of this model only to 600 per month. Peugeot is building 250 motorcycles and 9000 bicycles per month. In the experimental department work is being completed on a 50-hp., two-cylinder, two-stroke engine which will run on any fuel from high-grade gasoline to crude oil, and will start up as quickly on heavy as on light fuel. This engine is at present being used for stationary work, but it is intended later to fit it into a 5-ton chassis.

Renault, in addition to passenger car production, is devoting a lot of attention to stationary engines and factory equipment. Among the new productions is a 10 hp. stationary engine running on either gasoline or kerosene, entirely enclosed for service in factories and workshops containing inflammable material, such as saw mills and wood working shops. A marine type heavy oil semi-Diesel 40 hp. engine is also in production, as well as a horizontal 80 hp. semi-Diesel. Renault is also devoting attention to small house lighting sets, the electric part of these being furnished by the S. E. V. Company, in which he holds important interests.

The Gobron Company, which has been dormant since the war, will shortly come on the market with a high grade six-cylinder valveless type. Berliet, while continuing passenger car and truck production, is devoting more and more attention to the repair of locomotives and the building of light railroad material.

Ballot, who up to the present has devoted himself to engines, announces that he is putting into production a series of 100 chassis exact duplicates of the two-litre four-cylinder machine with which Goux won third place at an average of 72 miles an hour in the recent French Grand Prix. This car is a four-cylinder of 69 by 130 mm. bore and stroke, of the same general design as the eight-cylinder models seen at Indianapolis, and is fitted with front wheel brakes. Deliveries will begin in November.

Bugatti is working on a high grade overhead valve eight-cylinder in line job, which probably will be out in time for the shows. An eight-cylinder in line is also in production at the Cottin-Desgouttes factory at Lyons.

Bayard-Clement and Lorraine-Dietrich, two firms which united forces about a year ago, have recently separated and are working independently. Lorraine-Dietrich is under the technical management of Engineer Barbarou, who has produced a six-cylinder overhead valve car of high quality but designed with cheap production in view. In addition, the firm is producing a limited number of two types of high grade costly cars.



## Uniform Braking on Four Wheels

Editor, AUTOMOTIVE INDUSTRIES:

We have been following, with considerable interest, your articles in discussion of brakes, particularly the article on Four-Wheel Brakes in your annual engineering number, together with the letters accompanying it, and your recent article on Brake Lining Tests.

The trend is, apparently, in the direction of four-wheel brakes, and any engineer who has driven a car at a reasonably high speed on a rough down grade appreciates the tremendous advantage of four-wheel brakes, enabling quicker stops, smoother stops and less of that vibrating chatter of the rear axle and sliding of tires that are so noticeable with two-wheel brakes on rough hills.

In your article on Brake Lining Tests at the Bureau of Standards, Mr. Carson, of the Johns-Manville Company, points out one of the big factors that has restricted the development of four-wheel brakes on American motor cars—that is, the variation in co-efficient of friction of the brake lining, which makes it impossible with present braking systems to get even braking on four wheels without continual adjustment.

American designers know their public very well and know that the average owner would never give this adjustment proper attention; but will, instead, complain of the car when he suffers from the effects of his carelessness and neglect. This fact, combined with the cost of the average four-wheel system, with its complicated equalizers, has been, we believe, one of the reasons why four-wheel brakes have not been more widely adopted by American designers.

This company has made a very extended study of brakes and has come to the conclusion that the only manner in which to safely handle the high speeds of modern automobile practice—both trucks and passenger cars—is to brake on all wheels. The difficulty of equalizing—not the pulling on the brake rods but the actual braking—resulted in our devising a system of self-adjusting brakes for automobile use; that is, brakes in which the friction between the drum and the shoe regulates itself, thereby assuring absolutely uniform braking on all wheels; and, if combined with an automatic take-up on the brake rods, the elimination of any attention to the brakes from the time the car leaves the factory until it is necessary to reline the shoes.

H. L. HIRSCHLER, Manager,  
Horace Remote Control Co.

## Testing Aluminum Castings

Editor, AUTOMOTIVE INDUSTRIES:

The article by Dr. Walter Rosenhain, printed in your issue of Aug. 4, presents a controversial issue which is always associated with a preparation of test specimens. The Engineering Standards Committee of Great Britain specifies that aluminum test bars shall be cast in a permanent iron mold and that the mold shall be heated. Dr.

Rosenhain evidently indorses this view. On the other hand, the American Society for Testing Materials and most bodies with which the writer is acquainted, who exercise the function of specifying for test specimens, call for the bars to be poured in green-sand molds.

It is certainly the carefully considered opinion of most engineers on this side that the sand-cast coupon will, in spite of superficial judgments to the contrary, prove to be more consistent in its results than the specimen cast in a metal mold and most particularly is this true of aluminum. Only those who are intimately associated with the business of producing aluminum castings in iron molds know the multitude of factors which modify the product. Such influences as the temperature of the mold and the rate of pouring will seriously affect the quality of the casting, and it is no doubt this reason which has led standardizing committees in the United States to adopt the sand-cast test bar as the standard.

In spite of what Dr. Rosenhain says to the effect that a designer is not apt to be misled by the higher qualities arising from a permanent mold casting, I feel it would be open to criticism if out of two pretty good methods of testing, we were to choose deliberately the less conservative one.

In the light of our present experience, therefore, the best form of test bar for aluminum alloys is certainly the one cast in the green-sand mold, designed with a medium-sized riser at one end and pouring gate on the other, the mold inclining upward at a very small angle from the gate to the riser. ERNEST V. PANNALL.

## Poor Batteries an Economic Waste

Editor, AUTOMOTIVE INDUSTRIES:

I have read the editorial in the AUTOMOTIVE INDUSTRIES of July 21st, entitled, "What's the Difference." It was very good and to the point and I am glad to see that this question is being taken up and discussed because there is a big economic waste in the unnecessarily short-lived storage batteries which is coming out of the user's pockets, as was indicated in the editorial.

Observation has shown me that overcharging a battery shortens its life more than anything else.

Some years ago I developed a system of taper-charge-regulation that would overcome this deteriorating fault. This method of regulation and the adoption of a battery of proper size for the work would give a system that on the average would make the battery last five or six years.

I compliment you for tackling this question.

VINCENT G. APPLE, Proprietor,  
•Vincent G. Apple Laboratories.

THE Electrical Research Association of Great Britain is actively interested in furthering the manufacture and use of electrical insulating materials made from synthetic resins and varnishes and having the well known heat resisting characteristics associated with some of these materials. Leading manufacturers and users of the raw materials and finished products are co-operating.



# The Human Element as Related to Standardization and Uniformity

A standard is something as nearly accurate as we can secure, by which similar processes may be measured. Uniformity implies a repetition of the same process. The effect of uniformity upon the human element in production must be considered or false premises may be established.

By Harry Tipper

**A** LITTLE discussion has been occurring in the Forum of AUTOMOTIVE INDUSTRIES in regard to standardization that has interested me because the question of standards has been brought up a great many times in connection with the efficiency of industry.

We are apt to think that we have a very clear and logical terminology in connection with our scientific applications, particularly in engineering, chemistry and similar branches. When definitions are sought, however, we begin to discover curious differences in these definitions as they are produced by the various authorities. The terminology indicates a degree of inexactitude not quite consistent with our general understanding and leading to a good deal of misconception in the discussions that occurred.

In this question of standards and standardization there seems to be a confusion between arriving at a standard and merely agreeing upon a uniformity. There is a vast difference between the two and a proper discrimination is necessary if we are to proceed along the right lines and to correct our past mistakes as we go along with future development.

A standard is something as nearly accurate as we can secure, by which every similar process can be measured in an endeavor to determine its accuracy. It is an ideal to which we expect to work as nearly as the practical limitations make it possible. This standard has nothing to do with the method of development, or the uniformity of the process. It makes the result as nearly interchangeable as the approach to the standard insures its accuracy, but it does not argue a similarity of method or process or a uniformity of development.

Uniformity, on the other hand, implies a repetition of the same process without any variation or change and without any reference to the ideal situation. The uniformity of the method may be the poorest means of arriving at a high standard, if the standard is difficult and requires a large measure of delicate understanding.

The object of all endeavor is to arrive at a high standard, one more accurate or closer to perfection.

The uniformity of the method is not dictated by the necessity of reaching a high standard, but is made necessary by the employment of machinery subdividing the work. Under these circumstances a uniformity in similar operations is necessary to the more rapid production.

No one would say that the standard of accuracy reached by the old instrument maker was any less than the standard reached by the producer of instruments

to-day. In fact, the skilled instrument maker of the craftsman period produced instruments of a higher degree of effectiveness than anything we have been able to produce under present conditions.

There are few men who can make a standard of mathematical measurement so accurate that it is fit to be used as an ideal by which to measure other work. These instrument makers in the past worked by hand. They did not use uniform methods of producing their instruments. Nevertheless, they reached a high standard of efficiency in the result.

As soon as one man was told off to make a small portion of the instrument and to confine his attention to that only, uniformity became necessary in order that the pieces he made should be interchangeable, permitting of their use in the assembly of any instrument.

Standardization as an ideal of efficiency and accuracy is a very important element in the improvement of production.

Uniformity of operation is only important as it serves the conveniences of industry, and events may prove it to be detrimental if it is carried too far in its development.

The continued improvement in industry is dependent upon the continued discovery of more efficient methods of production, more readily adaptable to the particular problem of production. This improvement depends, therefore, upon the alertness of the human being and his continued incentive for alertness in connection with his work.

Uniformity may destroy that capacity from complete disuse or so weaken it from lack of necessity that it becomes practically non-existent.

Furthermore, skilled labor must retain a fair degree of adaptability in order that the laboring population should be adapted to the requirements of the various industries under any ordinary conditions. Machinists would not be skilled at any other trade except machining, but they ought to retain within that trade a certain measure of adaptability in order that the varying requirements of employment in the different branches of machinery may be taken care of by the flow of this more or less flexible skill.

Uniformity has a distinct tendency to remove this adaptability so that the worker is unable to become skillful in any except the operations to which he is accustomed.

It is under these circumstances labor becomes more and more inflexible and unemployment a more serious problem because of this rigidity.

In Great Britain where complete employment of all the working population is a rare condition, the increasing rigidity of labor in its specialization is a very acute problem and adds its difficulty to the other elemental troubles in the situation.

Only the supervisors who have struggled with the rearrangement of operations of a highly repetitive character are aware of the unbelievable specialization which comes out of this repetitive work and which makes it almost impossible for the workers to adapt themselves to any kind of change.

The question of a standard is a different one from this question of uniformity of operation and must be approached from a different standpoint.

**The designing of the mechanical appliances must, in the course of time, take account of the difficulties arising out of the uniform methods of operation and the inaccuracies that may result from the confusion between the uniformity of method and standardization of result.**

**The costs of manufacturing are affected themselves to a very great degree by the increasing rigidity of labor arising out of this uniformity of operation.**

Some time ago four men interested in large manufacturing concerns were lunching together. One of the men was an important executive of a company which controlled the majority output of that field. They had just bought out a new small company. They were confronted with the problem of discontinuing the special brand, the property of the company they had acquired, and absorbing it into their general brand, or maintaining it as a special brand and selling it through their own organization. Incidentally to this problem the men remarked that if they absorbed it into their general brand, they would be obliged to charge

more for it. This remark interested me very much. I said, "How is it that with all your facilities, ability to buy in quantity, special machinery, and other items of production improvement, you are unable to manufacture as cheaply as a small competitor?"

His reply was, "I don't know the exact reason, but I am beginning to suspect that we get less efficiency out of the individual."

Flexibility of labor is one of the elements of efficiency.

No factory can be so balanced in its work at all times that there is an equal necessity for labor in all departments and that the business of each department occupies fully the time of the workers to an equal degree.

Some flexibility of the workers' time is necessary if the costs are to be kept down, even in this respect; although the biggest element of cost is the tendency toward the establishment of a minimum pace and the fatigue arising out of the monotony.

**Interchangeability is necessary to modern production to a considerable degree. A fair degree of specialization is necessary, but when those elements begin to reach a rigid uniformity of operation, system and method, supervisors and workers are inhibited by that uniformity so that they become rigid in their capacity and narrowly specialized in their thought, with the result that alertness is destroyed, flexibility of thought and operation are limited, and the general efficiency materially lowered.**

To reach a high standard of manpower efficiency is just as important as to reach a high standard of product efficiency. Both of them should be measured and uniformity of operation should be considered in its proper place as a convenience of development depending for its value upon its reaction in connection with both these standards.

## Effect of Dilution of Charge by Spent Gases

**A**FTER a long study of the effects of fuel economy of automobile engines, the Bureau of Standards' experts have concluded "that the dilution of the charge by the spent gases remaining in the clearance volume makes it impossible at low throttle to employ those air-fuel ratios which if they could be fired would yield the maximum efficiency. If the exhaust gas that is present during normal operation forms a barrier to the use of high-efficiency mixtures, then surely the designer ought to avoid any devices for adding still more dead gas to the charge."

In adding exhaust gas to the induction system, a higher thermal efficiency has been the goal. Some investigators have found that increasing the amount of inert gas in the charge tends to prevent fuel knock and hence enables a high compression ratio to be employed. Since thermal efficiency depends upon the expansion ratio, which in the conventional engine equals the compression ratio, it should be higher with a higher compression ratio.

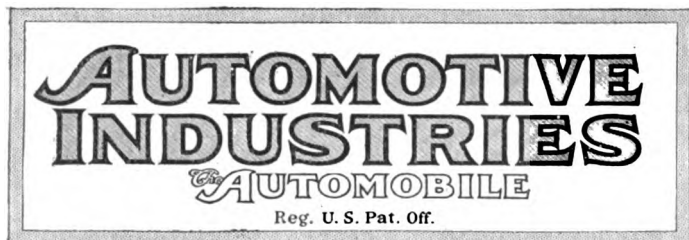
Full throttle tests apparently show such to be the case and from these results it has been concluded that the addition of exhaust gas will be even more beneficial at part throttle. It is assumed that under such conditions a decrease of power is of no consequence and that the heat of the exhaust may be of considerable aid in vaporizing the fuel. Since in service the automobile engine is operated at part throttle most of the time, it is under this condition that economy of fuel consumption is most important. Therefore, the Bureau has given considerable attention to the effect of admitting exhaust gas under such circumstances.

Nearly all investigators have noted that under light loads the engine will not fire mixtures having as high a rate of air to fuel as that which gives the best economy at higher loads. This is probably because the inert gas with partially opened throttle forms so large a proportion of the total charge. The compression pressure is, of course, also too low and many experimenters have ascribed the poor efficiency to this cause.

To prove that the proportion of the exhaust gas is the predominant influence, an engine partly throttled was operated with the leanest air-fuel ratio with which it would fire regularly. The engine was again operated with a sufficient amount of exhaust gas admitted with the charge to reduce the engine power to the same value as had been obtained in the first test by throttling. Although the pressures in the latter case were considerably higher than before, not nearly as high an air-fuel ratio could be fired and lower thermal efficiency was the result.

**A**RECENT investigation conducted by the Bureau of Standards had for its purpose the demonstration of the structural changes which occur in hardened steels upon tempering. It has now progressed far enough to show that there is a decided change (best seen in high-carbon steels) brought about by tempering at approximately 240 deg. C.

In other cases the changes which occur are relatively inconspicuous and this accounts for the surprising lack of data of this kind in the literature, although an immense amount of work has been done upon the subject of hardened and tempered steels.



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## Convenient Crankcase Drains

ONE of the oil companies has called attention to the need for more convenient oil drains on crankcases. The present provisions for draining the oil on the majority of cars are certainly very unsatisfactory. Not only is the job tedious and very dirty, so that the operator instinctively shrinks from it, but in the case of cars having splash lubrication it is impossible to drain the splash troughs in which a good deal of the sediment collects. In earlier designs of engines having oil pans with the splash troughs cast in, drain cocks were occasionally provided for each trough. A boss was cast through the oil well from the lowest point of the splash trough. This was drilled and tapped and a drain cock was then screwed in. But later the cast oil splash troughs were practically discarded and sheet metal troughs substituted therefore. These troughs are pressed in a plate which is inserted into the lower half of the crankcase, and it is therefore impossible to drain them through the bottom of the crankcase. All sediment collecting in the troughs remains there until the lower half of the

crankcase is removed for the purpose of adjusting the bearings. Of course, as long as the engine is in operation the oil in the splash troughs is kept constantly stirred up and any solid particles held in suspension by it have hardly time to separate out, but sedimentation will certainly occur while the engine is standing.

As long as splash lubrication is used in conjunction with sheet metal splash troughs it will be almost impossible to provide means for draining the troughs. The remedy would seem to be to discard splash lubrication altogether, and engine design is now headed in that direction. The problem of providing convenient means of draining the sump remains, however. At the present time, instead of a mere plug, a plate is often provided to which the oil strainer is secured. As soon as one or two of the nuts holding the plate in place are loosened the oil begins to drip, if not to run, and the person removing the plate usually gets a good deal of oil on his clothing.

The solution of this problem is difficult. An ordinary drain plug, operated through an extension handle from the side of the car, would hardly suffice, as the drain passage would be too small and little of the sediment would be carried along by the flow of oil. Poppet valves opened and closed from the side of the crankcase would meet the requirement of easy operation and rapid flow, but it is hardly likely that an oil-tight closure could be effected with them, as particles of grit would be almost sure to adhere to the surface of the valve and prevent good seating.

## Careless Wiring of Cars

CAR manufacturers whose product has the best reputation in the trade as well as some whose product is not so well thought of are coming to understand that a car which is free from trouble caused by careless or indifferent work in production or assembly, is a great asset, while the worst of "black eyes" may result when the reverse is true. Thousands of repeat orders come with little energy to the maker whose car has a well-founded reputation for dependability, but the sales resistance to a product which continually calls for the attention of the repairman is greatly increased. There can be but little question that time and money spent in overcoming resistance of this kind might far better have been spent in eliminating the source of trouble in the first place.

One prolific source of trouble in many makes of cars to-day is due to poorly laid out and carelessly executed jobs of wiring for the electrical units. Grounds, short circuits and loose connections occur at times in the best of jobs, but they are much more frequent in the job which is indifferently done. In general wiring should be enclosed, but still left as accessible as possible. In every case it should be well supported to prevent abrasion from vibration, and so located as to be protected from oil and other mediums which tend to cause the insulation to deteriorate.

The average garage mechanic is far from adept in locating electrical troubles, and some of these troubles have often puzzled the most proficient electrician. An

intermittent ground or short may require many hours to locate, and sometimes a number of trips to the shop before the difficulty is finally run down and repaired. In the mean time the owner, who understands little or nothing about electrical apparatus is chafing and impatient because his car is laid up, perhaps when it is only a few weeks old, and the things he thinks and often says about the manufacturer are hardly to be construed as good advertising material.

Most of such difficulties can be overcome by:

1—Seeing that the wiring layout and the materials used are the best possible under the conditions imposed as to price, etc.

2—That the workmanship is first class.

3—That rigid inspection and check tests are applied before the job is approved.

In the performance of the modern car so much depends upon the proper functioning of the electrical equipment that care in seeing that it is well selected and installed will assuredly pay the car builder who gives it requisite attention.

## The ZR-2 Disaster

THERE can be little doubt that the fatal disaster to the ZR-2 at Hull, England, last week will prove a great setback to commercial aviation. The ship was the largest of her kind ever built; she had apparently passed successfully through her preliminary trials and was getting ready for her trip across the Atlantic when the accident occurred. The great loss of life is to be deeply deplored, the more so because among those killed were some of the most experienced men in England and America in the art of operating dirigibles. The heavy material loss involved in the accident also will act as a deterrent to enterprise in the development of commercial aviation.

From the accounts of eye witnesses and survivors it is fairly obvious that the primary cause of the disaster was insufficient rigidity of the girder structure. It may seem surprising that an accident due to this cause should have come only after the ship had been in the air for 35 hours. The probable explanation is that up to just previous to the time of the accident the big ship had never been operated at full power. From all accounts at the moment of the accident the engines were being "let out," and the controls were being tested. Now, the girder structure of a rigid type of airship is naturally subjected to the greatest strains when either the elevators or the rudders are set at sharp angles and the engines are simultaneously going at full speed. There had been reports of the development of structural weaknesses previous to the accident, but it appears that reinforcements had been made and it was thought that a sufficient degree of safety had been attained, which unfortunately proved incorrect.

Many of the reports had it that a gasoline tank exploded, but it is much more likely that the explosions which occurred were due to the hydrogen. If the breaking of the girder work occurred before there was an explosion, as seems to be the case, the gas bags containing the hydrogen were rendered very vulner-

able, and once one of these bags was ripped open, ignition or the escaping gas by flame from the exhaust would be almost inevitable. Liquid gasoline cannot explode, and there is only comparatively little gasoline vapor in the fuel tanks at any time. The tremendous force of the explosion further supports the assumption that it was the hydrogen that exploded.

During the war a great deal was written regarding the possibilities of helium gas for use in dirigibles, and much money was spent in experimental work on the extraction of this gas from natural gas, both in this country and in Canada. While a non-combustible buoyant gas would be of particular value in war time, because it would render a dirigible practically immune to attack with incendiary bullets, it would also greatly add to the safety of peace time air travel. Had such a gas been used in the ZR-2 it would not have prevented the accident, though it is conceivable that under the conditions under which it occurred it might have considerably reduced the number of fatalities. Still, if the failure of the hull had occurred on the ocean trip—and the ZR-2 was intended mainly for ocean cruises—the final result would probably have been substantially the same with a non-combustible gas.

There is one lesson of the disaster that should not be lost on designers and promoters of enterprises connected with dirigibles. For the sake of safety the limits of size and flying range should not be advanced too rapidly. Weakness in the girder structure may be ascribed to the desire to obtain the greatest possible buoyancy, so that the ship would have a large flying radius and could carry a large crew and cargo. While the transatlantic flight was shown to be possible by the trip of the R-34, it must be remembered that that vessel made the westward trip with only a very narrow margin in fuel capacity—so small, in fact, that a wireless call for aid was sent out. It was obvious after the trip that for safety under all weather conditions a greater relative fuel capacity was necessary, and with a ship of the same displacement this could be obtained only by lightening the hull or other parts which means a lower factor of safety structurally, unless the state of the art is materially advanced. A more gradual increase in flying range, together with extensive use of all types developed before undertaking new and more ambitious designs, would result in reducing the risks that must of necessity be incurred in this line of work.

## The Unemployment Conference

THE proposed conference on unemployment announced by Herbert Hoover will be followed with great interest by automotive manufacturers. That a certain moral obligation rests upon manufacturers in this connection is rather generally recognized. Ways and means of meeting that obligation in fairness and justice to all concerned are not readily visible.

If the proposed conference can throw any light upon this phase of the question it will be performing an excellent work.

# Improvement Seen in M. A. M. A. Survey

## Prospects for Fall Given in Analysis

### Industry Actually Moved Forward in Face of Normal July Slump

NEW YORK, Aug. 30—During July the automobile industry not only held its own in the face of the normal seasonal slump, but actually moved forward. The basic betterment of underlying conditions, as revealed by a searching analysis of current financial and commercial factors, gives promise for continued improvement, which should be more marked in September and October.

This is the significant feature of the regular monthly survey made public today by the Motor and Accessory Mfrs. Association.

The concentrated experience and precise financial reports of more than 300 representative manufacturers of units and equipment for passenger automobiles and motor trucks form the basis for the association's statistical charts.

### Parts Buying Increases

Purchases of parts, units and accessories by the vehicle builders increased 1½ per cent during July over June. Further encouragement was seen in the fact that the totals of notes outstanding decreased almost 8 per cent. The only unfavorable factor indicated by the month's figures was an increase of 10 per cent in the totals of past due accounts reported.

The month-by-month percentage changes, beginning last January, follow:

Month	Per Cent Change*	Per Cent Change**	Per Cent Change***
January..			
February 66.15 Inc.		17.07 Dec.	39.08 Inc.
March .. 33.30 Inc.		16.57 Dec.	16.38 Dec.
April ... 32.93 Inc.		4.49 Dec.	5.94 Inc.
May .... 60.13 Inc.		15.64 Dec.	16.77 Dec.
June .... 15.19 Dec.		4.79 Inc.	10.37 Dec.
July .... 1.68 Inc.		10.79 Inc.	7.90 Dec.

\*Purchases of parts, units, equipment, etc. by automobile passenger car and motor truck makers from 300 parts and accessory manufacturers by months—per cent change.

\*\*Totals of past due accounts reported—per cent change.

\*\*\*Totals of notes outstanding—per cent change.

### Managers Optimistic

Credit managers and general executives of parts manufacturing concerns are now inclined to take a more optimistic view of the present situation and immediate prospects, and they point to releases on deferred shipments, new orders and better collections to justify their constructive outlook. The vague feeling of alarm and discouragement

which was evident in some circles several months ago has been largely eliminated.

"We are too busy making business to have time for the blues," remarked one official in touch with many of the largest concerns in the industry.

The prevailing sentiment in the automotive field is reflected by the following typical statements, reported verbatim, at credit interchange group meetings held within the last fortnight:

### All Reports Favorable

"Business with us is somewhat better than it has been for some little time; in fact, we notice quite a substantial improvement with the reduction in prices on popular priced cars, although our sales are not anything like what they were a year ago. We have business booked now going until Sept. 15 or longer."

"Our sales have improved gradually from April 1 up to the present time; in fact, our sales for the month of July were very good and they are still holding up. June and July exceeded our sales for the same months last year. Of course it is true that our sales did not amount to a great deal in those months last year. Our collections have also been very good. We were a little doubtful about August, but were very much gratified up to yesterday. So our business, really, is showing a decided improvement."

"Our business this year in our products has been, of course, not anywhere near what it was last year but July has been much better than June. In fact June took quite a slump under May; but July was some better than either May or June. Collections are good as a whole. Some small accounts are feeling the strain of their own poor collections; on what we term miscellaneous business, collections are hard to get. We have had to take weekly payments and do a lot of things that we didn't a year ago. However, the losses, handling it in that way even, have been small. So the little fellow apparently has been able to make some collections and do some business; in other words, he is getting a living but probably not much more."

## Appoint Committees for M. A. M. A. Convention

NEW YORK, Aug. 30—Committees for the "Back to Normal" Credit Convention of the Motor and Accessory Manufacturers Association, were announced to-day by General Manager M. L. Heminway. The Detroit Committee of Arrangements will consist of: C. W. Dickerson, (chairman), vice-president, the Timken Detroit Axle Co.; E. R. Ailes, treasurer, Detroit Steel Products Co.; M. A. Moynihan, secretary, Gemmer Mfg. Co.; William Hendrie, secretary, Detroit Gear & Machine Co.; Thomas M. Simpson, credit manager, Continental Motors Corp.

The honorary committee, consisting of the association's board of directors in Detroit, has also been appointed. These will comprise: A. W. Copland, (chairman), president, Detroit Gear & Machine Co.; C. H. L. Flintermann, vice-president, Detroit Pressed Steel Co.; E. P. Hammond, president, Gemmer Mfg. Co.; F. Glover, vice-president, Timken-Detroit Axle Co.; G. W. Yeoman, vice-president, Continental Motors Corp.

## Court Order Removes Kelly Tire Receiver

### Bankruptcy Affairs Again Left in Hands of Bridgeport Bank and Attorney

BRIDGEPORT, CONN., Aug. 30—Former Congressman Augustine Lonergan of Hartford, named receiver of the Kelly Tire & Rubber Co. of New Haven three weeks ago, has been removed by an order filed in the United States District Court in that city by Judge Edwin S. Thomas. The bankruptcy affairs are left, as they formerly were, in the hands of Attorney Albert H. Barclay of New Haven, and the City National Bank of this city, who were appointed by the Superior Court of New Haven County.

The appointment of Mr. Lonergan as receiver, it is explained, was made without notice to the corporation or the State receivers, the latter appearing before Judge Thomas at Norwalk the 22d and, through counsel, moving to vacate the appointment on the grounds that there was no legal reason for Mr. Lonergan's appointment. The State receivers, through counsel, set up that the appraised value of the company is more than \$540,000 and the indebtedness less than \$200,000. They also allege that the parties who brought the involuntary petition in bankruptcy are not creditors but four stockholders with small holdings, that the company is not insolvent and a receiver in bankruptcy would interfere with the adjustment of the corporation's affairs.

Former Congressman Lonergan was appointed receiver of the Kelly Tire & Rubber Co. by Judge Thomas at South Norwalk, Aug. 4. The appointment was made on petition of Benedict M. Holden of the Hartford law firm of Holden & Peck, representing the stockholders' protective committee, consisting of Nathan D. Prince, vice-president of the Hartford-Connecticut Trust Co.; C. L. Holmes, president of the Waterbury Trust Co., and John T. Manson, president of the First National Bank of New Haven.

### TOOL SALVAGE TRADE GROWS

DETROIT, Aug. 30—Canadian Tool Salvage Co. has been organized in Windsor, Ont., to operate as a branch of the National Grinding Co. of this city. The company specializes in the reclaiming of worn down cutting tools used in the automotive industry. The Detroit company has been in operation over a year and is extending its facilities to meet increased business demands. Affiliated in the company are H. M. Ash, W. G. Cook, H. W. St. John and A. J. Moquin.



# Motor Cars Used on 30.7% of U.S. Farms

## Survey Also Shows Truck Popularity

Per Cent Has Increased Since  
Census Taken 18 Months Ago  
Big Gain Since

WASHINGTON, Aug. 30—Statistics compiled by the Bureau of the Census, Department of Commerce, as of Jan. 1, 1920, show that 30.7 per cent of farms in the United States have automobiles. The data proves the utility of the motor vehicle, for it shows that of the 1,979,564 farms reporting there were 2,146,512 automobiles in use Jan. 1, 1920, or 332.9 automobiles per 1000 farms.

The Federal figures also show the growing popularity of motor trucks and tractors on farms. About two farms out of every hundred in the United States as a whole possess motor trucks. Motor trucks were reported on 131,551 farms in 1920, making a total of 139,169 trucks in use on that date. Pennsylvania led the field with 9372 motor trucks in use on farms; New York, with 9259; Iowa, with 8910; Ohio, with 7319; Nebraska, with 6548; California, with 6416, and Illinois with 6154.

Automobiles were reported by more than one-half of the farms in eight states, namely, Nebraska, Iowa, South Dakota, Kansas, Minnesota, North Dakota, California and Illinois.

The following States reported more than 100,000 automobiles on farms in 1920: Iowa, 177,558; Illinois, 139,090; Ohio, 128,384; Kansas, 111,055; Minnesota, 107,824; Texas, 105,292; Nebraska, 104,453, and Indiana, 102,122.

### Figures Over Year Old

It must be remembered that these statistics were gathered as of Jan. 1, 1920, and more than 18 months have elapsed since the compilation. Therefore, the data cannot be considered as indicative of present conditions, for enterprising salesmen have conducted active campaigns in this period and as a consequence thousands of machines have been added to farm equipment. Neither can the figures be regarded as comprehensive, because they are passed on only 30.7 per cent of all farms, and as reports have not been received from an impressive majority the figures cannot be used in any accurate determination of motor vehicle sales.

The record of the Bureau of the Census shows that one farm out of every 28 owns a tractor as of Jan. 1, 1920. There were 246,139 tractors in use on 229,334 farms on the census date. More tractors were in use in Illinois than in any other State, as statistics show 23,102 tractors in that State, with Iowa next,

possessing 20,270 tractors; Kansas, 17,177; Minnesota, 15,503; California, 13,852; North Dakota, 13,006; South Dakota, 12,939, and Nebraska, 11,106. These eight States reported more than one-half of all tractors on farms in the United States. For the country as a whole, there were 38.2 tractors for every 1000 farms in 1920, and for the eight States above mentioned, taken together, 106.8 tractors for every 1000 farms.

The States with the highest percentage of all farms reporting tractors in 1920 were as follows: South Dakota, 16.3 per cent; North Dakota, 15.2 per cent; Montana, 12 per cent; California, 10.3 per cent; Kansas, 9.8 per cent; Illinois, 9.3 per cent; Iowa, 9.1 per cent.

## Withdraw Ten Headlight Devices from State Law

BRIDGEPORT, CONN., Aug. 30—Withdrawal of ten headlight devices from the Connecticut-approved list, under the authority granted at the last session of the legislature, was announced recently by the motor vehicle department at Hartford and through its representatives here. The devices placed under official ban by this latest ruling, effective Jan. 1, 1922, are: Ford Green Visor, Nevablind, Mac Ne Glare Bulb, Raydex (type B), Onlee, Full Ray, Deflector, Safetee, Roadlight, Dimmre, Homemade Device. The Warner Pathfinder, Dillon (old type) Morelight, Clamert (old type) with frosted glass front and plain glass fronts with frosted bulbs are listed as illegal devices, "which are not approved and can not be used in this State."

Announcement is also contained in a comprehensive booklet on "Regulations Governing the Use of Headlights on Motor Vehicles," which has been prepared by the motor vehicle department for general distribution. Only advance copies have yet been given out.

## Mohler Heads Motor Division of Chamber

MEXICO CITY, Aug. 17 (*By Mail*)—A. B. Mohler, of Mohler y DeGress, has been named chairman of the new Automotive Division of the American Chamber of Commerce here. The chamber reports that the division is progressing rapidly and that definite results for the automotive industries should be expected from it. Chairman Mohler's firm is the Mexico City agent for Overland, Willys-Knight, Chalmers and Cadillac cars. The chamber reports that the total value of automobiles and parts bought by Mexico, as shown by the Governmental statistics, from the United States were valued at 15,162,266 pesos for the fiscal year ending June 30.

## Denby Refinancing Plan Agreed Upon

President Says New Capital Will  
Place Company in Good  
Position

DETROIT, Aug. 30—Stockholders of the Denby Motor Truck Co. agreed yesterday to the refinancing program outlined by directors, by which \$300,000 first mortgage bonds and \$650,000 first preferred stock will be issued to meet current liabilities and to provide working capital. The new stock issue will bring the company's capitalization to \$1,400,000. None of the stock will be offered at public sale.

In a statement to stockholders, 85 per cent of whom were represented at the meeting, President A. S. More said the new capital would place the company in an advantageous position to seek new business. Operations at the factory will be increased in September to meet demand for the ¾-ton and 1½-ton models.

The \$300,000 first mortgage bonds are five-year 7 per cent, \$100,000 Class A and \$200,000 Class B. The new stock is 8 per cent non-accumulative, par \$10. All of the new stock and bonds, except for the \$100,000 Class A bonds, will be used to meet creditors' claims, the stockholders waiving their rights to subscribe to the new issue.

## General Motors Export Back in Old Quarters

NEW YORK, Aug. 29—General offices of the General Motors Export Corp., which has been for some months at 120 West Forty-second Street, will be moved within the next few days to the former location in the General Motors Building at Fifty-seventh Street and Broadway. Four floors of this building, it was stated, have been vacated by the Chevrolet group of General Motors, thus leaving free the space for use of the export company. The export company reported, coincident with the announcement of the removal, that foreign sales were showing somewhat of an increase and that a good volume of business was expected not later than the beginning of the new year.

### DUESENBERG IS BUSY

INDIANAPOLIS, IND., Aug. 30—The Duesenberg Automobile and Motor Co., Inc., has progressed so far with its plans that it is about ready to close contracts with some distributors in the metropolitan territory. The price of the Straight Eight has not yet been definitely fixed, but it is understood that it will be around \$6,000.

## Ford's Power Plant May Be Abolished

Engineers Consider Transforming  
It Into All-Steam Plant—  
Seeking Economic Remedy

DETROIT, Aug. 30—The enormous power plant at the Ford Highland Park factory, long the pride of Henry Ford, is soon to be transformed from a gas-steam plant to an all steam plant, or is to be abolished entirely, Engineers, headed by William B. Mayo, are now determining the most economic method of handling the power situation.

The gas-steam plant has been in operation for over ten years and a point has been reached where gas-steam power is no longer as economical as steam power alone.

Two plans are under consideration. The first involves the junking of the producing gas plant and installation of additional steam boilers. This would cost approximately \$2,000,000. The second plan is to eliminate the Highland Park power plant entirely and bring high tension power from the River Rouge, which would require an addition to the latter plant. This cost approximates \$3,000,000.

There will be no interference with operations at the Highland Park plant while the power changes are under way. The Detroit Edison Co., which has a power house nearby, would furnish 90 per cent of the present peak power, which runs about 75,000 hp.

## Detroit Trailer Has New Heavy Duty Model

DETROIT, Aug. 30—Detroit Trailer Co. has brought out a heavy duty semi-trailer capable of carrying a load of 50 tons, which it is now preparing to go into production. The semi-trailer was given a thorough trial last week and found fully practicable for the work designed. Several orders for first production were placed following the trial.

The semi-trailer departs from the conventional in that it has four wheels in line instead of two. This gives it a total tire surface of 48 in. and permits a load disposition of about 800 lb. per sq. in. Each of the four wheels are mounted on special Mansfield axles with radius rods on ball joints. Double spring action is provided.

Specifications of the semi-trailer, in addition to Mansfield axles and steel frames, call for Timken bearings and Detroit springs. List price has been fixed at \$2,750 and the company regards the field for the new vehicle as unlimited. Through the use of the four wheels to carry the load, the trailer overcomes overloading legislation.

The new trailer was designed by J. B. Mansfield, president of the company, and patents covering all features have been applied for.

## REPUBLIC OF BRAZIL PLACES TRAILER ORDER WITH DETROIT FIRM

DETROIT, Aug. 29—An order for fifty 5-ton trailers with combination steel and wood bodies has been received by the Detroit Trailer Co. from the Republic of Brazil for instant delivery. In addition, the company has received an order for 47 bodies for G. M. C. trucks, the latter order also for the Brazilian Government, being placed with General Motors, specifying Detroit bodies. The trucks and trailers are to be used for hauling cement into the interior, a distance of 250 miles.

The order is said to be the largest export order received in Detroit for some time, and is the largest trailer order of the year. Outlook in the trailer business is considered promising.

## Seiberling Is Silent on Republic Rumors

AKRON, OHIO, Aug. 30—F. A. Seiberling, former Goodyear president, today said he had nothing to give out for publication upon his reported negotiations with C. H. Booth, receiver of the Republic Tire & Rubber Co. at Youngstown for rumored acquisition of the Republic plant.

It has been reported for some time that Seiberling planned acquisition of the Republic plant and the Marion Tire & Rubber Co. of Marion, Ohio, which with the Lehigh Tire & Rubber Co. of New Castle, Pa., and the Star Rubber Co. of Akron, would form the nucleus of a chain of rubber companies. Seiberling has assumed control of the Lehigh plant and it is now in operation. He has a large interest in the Star at Akron.

It is also reported that Seiberling interests will bid in the Marion plant if it is sold at receiver's sale on Oct. 3, as now scheduled by D. D. Grindle of Lima, referee in bankruptcy. Akron men are prepared, however, to meet with creditors and stockholders before the date of sale and offer them a plan whereby the company's bankruptcy can be relieved and high priced inventories utilized without heavy loss. Claims against the company now aggregate \$600,000.

## SEVERNS KNOX RECEIVER

MT. VERNON, OHIO, Aug. 30—F. W. Severns, former county treasurer, has been appointed receiver for the Knox Tire & Rubber Co. The petition for a receivership was filed by Edward Elford who claimed to have a mechanic's lien on the property for \$6,754. Severns will continue operation of the plant under the direction of the court.

The plant has been running and will continue with possibly more men.

## Defer Payments of Miller Dividends

Rubber Company Will Issue No  
Preferred Stock Checks  
September 1

AKRON, OHIO, Aug. 30—Miller Rubber Co. officials have announced that their preferred stock dividend due Sept. 1 would not be declared owing to a present book deficit. Owing to the uncertainty of business conditions officials of the company also say it will be impossible to indicate when payment of dividends can be resumed, advising that this will depend entirely upon the amount of business that can be secured at prevailing prices.

Since Jan. 1 the Miller Rubber has reduced its inventory sufficiently to reflect a reduction in total indebtedness from \$8,676,000 to \$2,400,000, of which \$1,400,000 is owing to banks, according to a letter just issued to stockholders. Against this the company has accounts receivable of approximately \$3,100,000 and \$1,200,000 cash in banks. Neither of the indebtedness figures accounts for commitment losses, which have been reduced about \$400,000, it is stated.

During the first five months of the current year Miller business was 55 per cent of the corresponding period of last year, but since June 1 business has revived, officials claim, and now averages 82 per cent of the corresponding period of last year, at reduced prices.

"In accordance with the requirements of the preferred stock contract, the directors contemplate purchasing in the open market, so far as is deemed advisable, the amount of stock which the company is required to redeem during the current year. Funds for this purpose can be taken from the assets of the company independent of a surplus account. In fact, such action will hasten the accumulation of a surplus, from which alone dividends can be paid," states William F. Pfeiffer, secretary and treasurer of the company.

## Allis-Chalmers Gets \$200,000 Ford Order

MILWAUKEE, WIS., Aug. 29—The Allis-Chalmers Mfg. Co., Milwaukee, has booked a contract from the Ford Motor Co. to furnish and install four turbine type electro-generators with an aggregate output of 8000 hp., in the new tractor plant which is being established at Troy, N. Y., on the banks of the Hudson. The contract is valued at \$200,000. This is the second big contract for machinery placed by Ford with Allis-Chalmers. The first was to equip the large new saw and planing mills of the Michigan Land, Lumber & Iron Co., division of the Ford Motor Co., at Iron Mountain, Mich. The mills are now in operation and are producing virtually all of the lumber and stock required for Ford bodies, wheels and chassis woodwork.

## Seek Reduction on Motorcycle Duty

### Manufacturers Also Request Separate Classification—Many in Protest

WASHINGTON, Aug. 30—Representative motorcycle manufacturers have appeared before Senate Finance Committee to request a separate classification in paragraph 371 of tariff bill instead of being placed with bicycles, parts, etc. They also asked that the 30 per cent duty provided in House bill on motorcycles be reduced to 15 per cent.

Walter Davidson of Milwaukee, representing the Harley Davidson people, asked for a reduced rate, saying their object is to build up domestic production by preventing foreign makers from placing high rates against American motorcycles. He said there are scarcely any imported motorcycles for use in this country and figured that within a short time his company's exports would be two-fifths of its output.

William G. McCann of Springfield, Mass., representing the Hendee Mfg. Co., asked for reduced rates. He said England, Belgium, Australia, Spain and Italy had placed duties on motorcycles which amounted to an embargo on motorcycles, but Spain has lower rates, so this import market would be open to American producers. McCann said England is the only maker of motorcycles comparable in quality with American machines and that domestic makers here invite importations from Great Britain to aid in expense of development of motorcycle industry. It was his contention that American motorcycle makers have succeeded in having a number of countries reduce tariffs and expects to get further reduction from the countries and concessions from countries which are now holding out.

L. B. Fauber of Elyria, Ohio, representing Troxel Mfg. Co., did not approve of the reductions, but said they should not be lowered from House rates. He declared in favor of 45 per cent duty.

### Parker Motor to Make New Car in Montreal

DETROIT, Aug. 29—Parker Motor Car Co., Ltd., has been formed in Montreal to manufacture the Parker car, a 6-cylinder assembled vehicle, with a new adaptation of spring suspension designed by Wright-Fisher Engineering Co., this city, to meet special road conditions in Canada. The company is capitalized at \$10,000,000.

Production plans are being hurried through so that cars may be available at the time of the Montreal show. It is expected to build about 4000 cars a year and the price on the open models will not exceed \$3,000. The company plans to buy at least 65 per cent of its parts in Canada.

### PACKARD GIVES EMPLOYEES TWO WEEKS' VACATION; SOME WITH PAY

DETROIT, Aug. 29—Packard Motor Car Co., in compliance with a manufacturing plan formed early in the season, has closed for a two weeks' period to give its employees a two weeks' vacation. The factory will reopen on Sept. 10 on its regular manufacturing schedule.

Employees who have been with the company ten years are receiving full pay for the vacation period, those five years with the company are receiving half pay. Between 500 and 600 men will be kept at work to turn out rush orders, those entitled to vacations receiving double compensation.

### Royal Rex Truck Has New Shipment Scheme

CHICAGO, Aug. 30—The Royal Rex Motors Co., Chicago, building motor trucks and motor buses, is featuring a new departure in truck shipments between the factory and dealers. The outstanding feature is the shipment of trucks in boxes and cases instead of total units. By the use of this method the transportation charges are very materially reduced and the shipments are arranged and packed in such a way that the truck can be assembled at the point of destination with a minimum amount of time and labor.

Aside from the shipping features of the trucks, there are several other up-to-date features. The chassis are in 1, 1½, 2, 2½, 3½ and 5 ton capacity. The intake air purifier for the purpose of eliminating dust is one of the engineering points. The frame is assembled without rivets, has no holes in the top web of the side rails and has a sub-frame of wood. The engine is supported in a steel cradle which in turn has a three-point suspension.

### Perron Forms Company to Market Invention

SPARTA, WIS., Aug. 29—A. J. Perron, founder and president of the Perron Spark Plug Co., Sparta, Wis., organized two years ago, has formed a new corporation to manufacture and market another of his important inventions, consisting of a vacuum traffic signal for passenger and commercial cars. It is known as the Perron Signal Co., and its officers are: President and general manager, A. J. Perron; vice-president and secretary, John W. Jones; second vice-president, M. Reisinger; treasurer, S. A. Steel. The Perron Signal will be put into production at once. Patents were applied for April 2. The signal is placed on the front and rear of vehicles and consists of right, left and stop arms, which are operated by a steering wheel control deriving power from the manifold.

## Money Market Eases in Indiana District

### Receiver at One Indianapolis Manufacturing Plant Will Be Discharged Soon

INDIANAPOLIS, IND., Aug. 30—Considerable easement in the money market has been noted throughout Indiana in the last thirty days, and this week two especially significant stories came to the ears of automobile men, creating considerable interest.

One of the local motor car manufacturers has been in the hands of a receiver. The receivership soon will be discharged, it is expected. This, too, came as surprising, for the speed with which this company has readjusted has been unusual. The chief executive of the company, by telephone on Wednesday, was offered \$125,000 which the person making the inquiry said "would be available soon."

Now, that much money six weeks ago or so would have seemed impossible of obtaining in Indiana. To top off that story is the second, which came from the official of an Indianapolis bank which has been handling motor vehicle paper.

"Right now we can use \$50,000 worth of automobile paper," he said. The fiscal year of the company is just closing. Its record will show one loss of \$1,500. This came because of the forced repossession of a big stock of automobiles. An opportunity came to dispose of them quickly at a price \$1,500 less than the bank's equity. Credits have been "frozen" so long in Indiana that these "thaws" create no little comment.

### Ford Planing Mills Now Shipping to Main Plant

MILWAUKEE, WIS., Aug. 29—The new saw and planing mills at Iron Mountain, Mich., owned and operated by the Ford interests under the name of Michigan Land, Lumber & Iron Co., are now making regular shipments to the main Ford plant at Detroit, and as production increases, distribution to branch plants will be effected. The mills were formally opened with due ceremony early in July. All of the machinery and equipment is of special design to suit requirements of the Ford plants, principally for body stock, other woodwork and crating and box material.

Shipments are being made by rail from Iron Mountain to Menominee, Mich., where the carlots are picked up by Ann Arbor carferries and go by lake to Reed City, Mich., where the main dry kilns of the Ford organization are situated. After treatment, the lumber is transferred to Detroit. To feed the new Iron Mountain mills, the Ford company has recently let contracts for 2,000,000 feet of logs, principally hardwoods, to Upper Michigan timber and logging jobbers. Deliveries to Iron Mountain have already begun.

## \$4,875,223 Deficit for Rubber Company

### President Seger of U. S. Explains Statement for First Half of Year

NEW YORK, Aug. 30—C. B. Seger, president of the United States Rubber Co., is sending to the stockholders a statement relative to the operation and results for the first six months of the calendar year 1921.

After explaining that "in ascertaining the result for the first six months of 1921, the cost of goods sold was computed on the basis of the cost of goods carried in inventory as of the first of the year, plus the cost of goods manufactured during the period, thus absorbing in cost any depreciation that may have occurred in inventory after the first of the year and also the higher cost of goods manufactured during the period," he says that "computed in the manner hereinbefore explained, the results for the first six months of 1921 show a deficit of \$4,875,223 after all interest and other charges." Continuing, Mr. Seger said:

#### Seger's Statement

"Against this the company has reserves, heretofore created out of income to cover contingencies that might arise, sufficient to offset this deficit, but it is deemed proper to report the actual results as stated above and await the realization of the results for the last six months of the year, which we hope and believe will show substantial improvements, due largely to the liquidation of stocks effected during the first six months and the lower cost of manufacturing during the last six months of the year, which will result from the reduction in price of basic raw materials, wages, and reduction of overhead made possible by increase in volume of production.

"It should be borne in mind that if the reductions in selling prices and other disadvantages referred to could have been anticipated they could have been provided for by appropriation of corporate surplus, applied to the further writing down of inventories as of Dec. 31, 1920, in which event the final net results would be the same as will result from absorbing in the operations of 1921 the amount of shrinkage resulting from these conditions."

#### Seasonal Conditions

In his circular to the stockholders Mr. Seger further explained the position of the company as follows:

"The business of this company, by reason of the major of the commodities handled, is subject to seasonal conditions and is necessarily conducted and must be considered on a yearly basis. Therefore, the results for any period of the year are not conclusive and might readily be misleading unless consideration is given to the condition under which the results were produced.

"The business recession that started during the last half of 1920 continued during the first half of 1921, with some improvement, however, in the latter part of that period. In order to meet this situation and conserve cash resources to the greatest possible extent, manufacturing operations were curtailed to the minimum consistent with actual requirements. This resulted in increasing the cost of production, due principally to absorbing those elements of overhead expenses which could not be eliminated.

"The cost of finished goods carried over as of the first of the year was conservative on the basis of the selling prices then prevailing, which prices it was believed would be maintained for the period of time necessary to effect the liquidation of stocks. Instead, however, it was found necessary to substantially reduce selling prices for some classes of merchandise, especially tires and mechanical

goods. The effect of these price reductions was necessarily reflected in the results of sales for the first six months of this year in addition to which there was reflected in the net results for the period the burden of the higher cost of goods sold, as shown above. "In addition to the effect of the reduction in sales prices and the higher manufacturing costs, consideration should be given to the matter of selling expenses. Owing to the seasonal nature of a large proportion of our business, the benefits of the sales efforts necessarily made during the first six months of the year will be favorably reflected, to a considerable extent, in the sales and profits for the last six months of the year, whereas the expenses are taken into account and charged against the income of the first six months, being the period during which they were incurred.

"As the result of this procedure selling expenses for the first six months of 1921, charged to the income account for that period, include a substantial sum representing the sales effort, the benefits of which will accrue in the last six months of the year and, in some cases, subsequently."

#### SEGER TO BE CHAIRMAN

NEW YORK, Sept. 2—C. B. Seger, president of the United States Rubber Co., will be elected chairman of the board when the directors meet next month, according to reports circulated in the financial district yesterday. Mr. Seger also is expected to retain the position of president. First reports had it that he would be made chairman of the board, to succeed the late Colonel Colt, and that a man not connected with the company would be elected president.

### Detroit May Be Scene of Big Gas Cut Fight

DETROIT, Aug. 30—Detroit may become the center of one of the biggest gas-cut wars. The local gasoline sellers, whether just filling stations, garages or other places which sell gasoline to automobilists, have been fighting for a 2-cent margin of profit a gallon. All the refineries except the Standard Oil Co. have given in to the dealers. Recently the latter formed the Retail Gas and Accessories Dealers Association, and President H. C. Maule has declared that every possible effort will be made to get the Standard to agree to the 2-cent margin, and if the request is not granted, it is said that the dealers will refuse to handle Standard oil and other Standard products.

The curious side of the matter is, according to an official of the dealers' association, that the Standard company is allowing gas dealers a margin of 2 cents a gallon in practically every State but Michigan. At present, Standard gas is retailing at 18.9 cents, leaving only 1 cent profit to the dealer. Independents are charging 19.9 cents and the retailers' margin is 2 cents a gallon. It is said by some dealers that they favor a price-cut war to a finish, as it is a case of Standard against everybody else.

#### COAST HIGHWAY OPENED

SAN FRANCISCO, Aug. 30—The new Santa Cruz highway, connecting that city with San Francisco, was officially opened Aug. 26 by a parade of more than 200 automobiles from San Francisco. The San Francisco Motor Car Dealers Association officially opened the road and was the guest of honor at the ceremonies.

## Low Prices Feature Toronto Motor Show

### Many Model Changes Also Noted at Opening of National Exhibition

TORONTO, Aug. 27—Downward revision of Canadian car prices and many model changes were the outstanding features of the motor car show in the Canadian National Exhibit, which was opened here to-night by General Sir Julian Byng, of British tank fame, and Canada's new Governor General.

The exhibition slogan is "Business Is Good," and almost without exception business representatives attending declare that business is better than anticipated and that they look for a gradual improvement in conditions, reaching a peak in 1922.

#### All Makes Represented

Forty-seven car manufacturers and about thirty truck makers, mostly American, are represented. Particularly strong popular attention is being attracted by the new Durant car which was introduced in person by W. C. Durant, who spent the day talking with the trade and the public at his booth. Durant showed a green touring model. While the Canadian price has not been fixed, Durant said it would be "less than \$1,300." Willys-Overland, Ltd., has a special Overland Four in the show with a composite body and a new series Reo also is shown. Austin, Vauxhall and Fiat are the only foreign cars shown. The London Six, made in London, Ont., is a new Canadian product on exhibition.

The automotive equipment show is the largest and most representative held in the Dominion. Sixty-seven exhibits of practically all leading Canadian automotive equipment manufacturers and jobbers are shown. A great collection of war photographs helps to attract many to the automotive equipment exhibit.

There are a score or more of tractors displayed and some motor boats and motor cycles.

### Myers, Colt's Counsel, Dies After Operation

NEW YORK, Aug. 30—Nathaniel Myers, for many years personal counsel to the late Colonel Samuel P. Colt, chairman of the board of the United States Rubber Co., died early yesterday morning in the Lenox Hill Hospital of this city following an operation a few days ago in his seventy-fifth year.

#### GREYHOUND INCORPORATES

OTTAWA, ONT., Aug. 30—The Greyhound Motor Corp., Ltd., has been incorporated with a capital of \$250,000. Head office, Montreal. L. C. Davis of Providence, R. I., and four Montreal directors are named in the Canada Gazette notice.

## Peru Holds Its First Automotive Exhibit

**Proves Most Extensive Feature of  
Independence Centenary—  
Trade There Heartened**

LIMA, PERU, July 31 (*By Mail*)—The display of automobiles and automotive equipment, including trucks and tractors, was the most extensive and most attractive of the exhibits at the Industrial Exhibition held in connection with the celebration of the Centenary of Peruvian Independence. This exhibition has just gotten under way and will continue for some weeks.

The display is the first attempt at an automotive exhibition or show ever held in Peru. Taking into consideration that Peru has been suffering from a severe industrial depression, both Peruvian representatives and foreign manufacturers should feel greatly heartened by the industrial exhibition.

### U. S. Far in the Lead

The exhibits showed the products of the United States, Great Britain, France, Italy and Germany, with the North American manufacturers far in the lead. The exhibit of El Vulcano—the Vulcan Iron Works of Lima and Callao—was conspicuous. This firm, which has large machine shops on the outskirts of Callao, is the agent for Marmon, Studebaker and Citroen cars; Mack trucks, Troy trailers, the Wallis, Yuba and Cletrac tractors, as well as Polack tires and other kindred lines. All of these cars, trucks and tractors were shown on the floor of the display room.

Delancy McKay & Co., a representative American house, made display of the Buick car, for which they are the sole agents for Peru. The National passenger cars, as well as Firestone tires, were also shown by this company. Fort Hnos, the Chandler representatives, naturally had their line on exhibition, and A. C. Shumway & Co., the Ford agents, who have recently greatly enlarged their dealer representation throughout all parts of Peru, showed the complete Ford line. This was accompanied by an announcement which stated the company had sold 600 Ford trucks, 700 Fordson tractors and 1400 Ford cars in Peru.

### All Models Displayed

Wessel, Duval & Co., who have the agency for Cadillac, Haynes, Franklin, Chevrolet, F.W.D. trucks, Avery tractors and Miller tires, displayed a Cadillac touring car, an Avery tractor and Miller tires. Bergstrand displayed Harley-Davidson motorcycles.

The exhibit of Ferrand Hnos marks the transition from American to European products. This company is divided, displaying United States trucks, Indian motorcycles on the one hand and English Dunlop tires and English Austin tractors on the other. Tassarò Bosso & Co. also carry water on both shoulders, displaying the Lancia from Italy, in both touring

and limousine styles; Rudge-Whitworth motorcycles from England and Federal tires from the United States.

The firm of G. M. & A. Petitjean had the French Berliet car which they are just introducing, and the well known Peruvian firm, W. & J. Lockett, showed the English Wolseley. Reiser Curioni & Co. made an extensive exhibit of Fiat cars, both limousine and touring, as well as trucks and tractors of the same make. They also showed Pirelli tires of Italian manufacture.

### German Tire There

It is noteworthy that the steel faced, leather-tread pneumatic tire was exhibited by the European representatives. At the present, the metal stud tire is a rarity in Lima.

Last, but not least, in future potentiality was the display of Gildemeister & Co., of the German Continental pneumatic tires. This is the first time since the war that this tire has appeared in Peru. It is in inch as well as in metric sizes and of a scalloped tread rather than the ante-bellum ribbed tread. Gildemeister also exhibited a Hansa Lloyd tractor, which appeared to even a superficial observer like a converted tank.

The European automobile representatives played up the low gasoline consumption of their vehicles.

Taken as a whole, the American product, from cars to lubricating oils, held its own well in the display room. American cars running about the streets of Lima outnumbered European about 50 to 1.

## New Adria, \$1,500, to Be Built at Batavia, N. Y.

NEW YORK, Aug. 30—The Adria, a new car to sell at \$1,500, will move to a new factory in Batavia, N. Y., early in September. It is planned to make a reasonable number of cars this fall and to start production on a larger scale during the winter to be ready for spring buying.

One of the features of the car is the rear axle, which has no axle housing. Its place is taken by a light axle formed of three pieces bolted together as a single unit, this carrying shackles for the springs and spindles for the wheels. This reduces the unsprung weight almost to a minimum, as the pieces are of seamless steel tubing. Specifications include Supreme engine, 3½ x 5, Delco ignition, Bijur starting and lighting, Borg & Beck clutch and Gemmer steering gear. Wheelbase is 120 in., tires 33 x 4.

## 800 on Durant Payroll at the Muncie Factory

INDIANAPOLIS, Aug. 30—Between 700 and 800 men will be on the payroll of the Durant Motor Co. at Muncie by Jan. 1, according to Dennis A. Burke, president and general manager of the concern, and the Muncie Durant plant will be in production before that date. The Durant company recently bought the Sheridan Motor Co.'s plant in Muncie.

## Cincinnati Plans Accessory Exhibit

**Manufacturers and Allied Inter-  
ests to Participate in Show  
This November**

CINCINNATI, OHIO, Aug. 30—John Behle, manager of the Cincinnati Automotive Trades Association, is planning a fall automotive accessory and equipment exposition, to be held at Music Hall, this city, one week in November, in which all local automotive merchants, manufacturers and allied interests are expected to participate.

In a letter sent out to the members of the association recently the idea of the exhibit was outlined, and returns from these letters indicate that the members are very favorable to the exhibit, which is a new idea for this city.

A similar exhibit was given last December in connection with the Ohio State automobile show held here. It far exceeded the expectations of those who had charge of it, and only about half as much space was provided as could have been used. The success of this venture is the foundation upon which the accessory show is being planned.

Last year the exhibit was made up of manufacturers who were showing their products chiefly to the dealers. This year the dealers and manufacturers will show their products for the benefit of the individual owners of cars and trucks. It will comprise everything in the line of accessories, equipment, supplies and repair parts.

"There is every reason why it should be a success," said Mr. Biehle in discussing the proposed show. "Owners of automobiles have only a slight first-hand knowledge of most of the accessories that are made for their cars. This show will be a good place for them to see and learn about these things. Also, it will give the dealers and manufacturers an opportunity to place their products before the ultimate consumers."

The show will be open to Cincinnati dealers and all manufacturers who distribute their products through jobbers and retailers. Both dealers and manufacturers will be solicited to create interest in the show.

In addition to the exhibits there will be daily educational lectures and demonstrations for the motorist, also attractive entertainments.

## Dedication of Coast Road Draws 1500 Crowd

SAN FRANCISCO, Aug. 30—Approximately 1500 persons attended the dedication of the new Franklin canyon highway, between Martinez and Pinole. The road, which is of crushed rock foundation with a five-inch concrete surface, 20 feet wide, cost \$800,000, and was constructed by Mrs. Ellen O'Brien, widow of a contractor of Martinez.



## Birmingham Motors Formed in New York

### Will Build New Type Automobile to Be Made Without Axles

DETROIT, Aug. 29—Birmingham Motors, a trust, has been organized at Jamestown, N. Y., to build a new type of automobile, which will be constructed without axles, the drive being by spindles, and the frame suspension being entirely upon cross-built springs. It is claimed for the car that the only unsprung weight is the wheels. Production is looked for about the opening of the 1922 show season.

The car is the idea of C. E. Weaver, who has been connected with the industry since its early days, serving first with Franklin and latterly being instructor in mechanical branches at the University of America, Washington. Engineering work and perfection of the design was handled by the Wright-Fisher Engineering Co., this city.

#### Basic Patents Purchased

The Birmingham is declared by Weaver to depart from all previous construction ideas, except for the design of the Cornelian car which was built by Blood Bros., several years ago, at their Allegan, Mich., plant. All patents held by Blood Bros. have been purchased by Birmingham Motors, and in addition patents have been applied for on improvements.

Aside from the special spring construction, the car will be made of standard units, including 6-cylinder Continental engine, Stromberg carbureter, Bijur starting and lighting, Gemmer steering gear, Borg & Beck clutch, Exide battery, Detroit gearset, Timken bearings, Michelin disk wheels; wheelbase will be 124 in.

### G. M. C. Truck Production Between 15 to 20 a Day

DETROIT, Aug. 30—General Motors Truck Co. at Pontiac is producing between 15 and 20 trucks a day and unfilled orders are larger than at any time since March. Increased business is attributed to recent price reductions.

W. L. Day, president, says in part: "We are building trucks from material bought at peak prices and while we are not making anything on the trucks at the new prices, we believe that we must accept our losses as do others. I am confident that September, October and part of November will be a good business period, and December and January probably will be dull."

### Olds Passenger Cars and Trucks Reduced

NEW YORK, Aug. 30—The Olds Motor Works announces that the following new prices for Oldsmobile passenger cars and trucks are effective Monday, Aug. 29:

43-A, 4 cylinder car:	Old	New
Touring .....	\$1,345	\$1,145
Roadster .....	1,325	1,145
Coupe .....	1,895	1,645
Sedan, 5 passenger .....	2,100	1,845
Small 8, No. 47:		
Touring .....	1,725	1,625
Coupe .....	2,225	2,185
Sedan, 5 passenger .....	2,425	2,425
Large 8, No. 46:		
Touring, 7 passenger .....	1,875	1,735
Pacemaker, 4 passenger .....	1,825	1,735
Sedan, 7 passenger .....	2,775	2,635
Truck:		
Chassis .....	1,250	1,095
Chassis with cab .....	1,325	1,175
Chassis with express body and top .....	1,395	1,245

### Mercer Motors Cuts Price on All Models

TRENTON, N. J., Aug. 30—Mercer Motors Co. announces price cuts on all models. The new prices follow—Sport-about, touring, runabout and raceabout, \$3,950; touring, limousine, \$5,650; coupe, \$5,150.

In explaining this price change, the new management, which recently took over Mercer affairs, state that it is made largely possible by the savings effected through the operation of the company's affairs entirely at the factory instead of through Hare's Motors, as formerly.

It will be recalled that Mercer prices were increased by Hare's Motors last March, and this reduction carries the list back to where it was prior to the increase.

### Stevens-Duryea Cuts Four of Its Models

NEW YORK, Aug. 30—Stevens-Duryea, Inc., has announced a price cut on the following models:

Name of Car	Old Price	New Price
Two passenger .....	\$8,500	\$7,250
Four passenger .....	8,000	6,900
Seven passenger .....	8,000	6,800
Sedan, four passenger .....	9,500	9,000

#### PEERLESS CARS CUT

DETROIT, Aug. 30—Peerless Motor Car Co. of Cleveland has reduced prices \$100 to \$180.

	Old Price	New Price
Touring .....	\$2,990	\$2,880
Roadster .....	2,990	2,880
Coupe .....	3,600	3,500
Sedan .....	3,950	3,790

#### ROAMER MAKES CUTS

NEW YORK, Aug. 31—The Roamer Motor Car Co. has announced a second reduction in all its models:

	Old	New
4 passenger sport .....	\$3,150	\$2,650
2 passenger roadster .....	3,150	2,750
7 passenger touring .....	3,250	2,750
4 passenger coupe .....	3,985	3,850
5 passenger sedan .....	4,100	3,950

#### ASK IMPORT STAMP

OTTAWA, ONT., Aug. 30—An order-in-council has been passed changing the date after which all goods imported into Canada must bear the name of the country of origin, as required under the new custom regulations, from Oct. 1 to Dec. 31, 1921. This alteration has been made to allow ample time for the importers.

## Coast Automotive Men in Convention

### Northern Division Hold Annual Meeting—Enthusiasm Among the Delegates

SAN FRANCISCO, CAL., Aug. 30—The northern division of the California Automobile Association held its semi-annual meeting at Al Tahoe, on the shores of Lake Tahoe, in the high Sierras, Aug. 20 and 21. More than 100 delegates from all sections of the state north of the Tehachepi mountains were in attendance, and there was more enthusiasm among the delegates than noted at previous meetings. George Habermeyer, state president, occupied the chair throughout the meeting. The report of Robert W. Martland, secretary manager, showed the association to be in good financial condition and to be growing steadily and rapidly.

#### Co-operative Buying

The principal discussion of the convention centered on the co-operative buying projects that are springing up continually in all parts of California. It was shown that some of the less well-known firms are offering large discounts to get business. This was disapproved, and the automobile tradesmen were shown clearly that giving discounts where they are unwarranted, or in larger amount than good business acumen would dictate, will soon wreck the retail business, either in automobiles or in equipment for them. It was demonstrated to the delegates that the margin of profit is so small now that those in the business will "go into the discard if they do not get full profits." Costs of doing business in these lines were shown by figures.

#### Craft Discussions

The first day of the convention was given over to craft discussions, the association being divided into various crafts, so that all the men in the same line of business meet together and thresh out their difficulties and air their problems. The second day was devoted to the general meeting, when reports of the crafts were read and general discussion given full time. Effects of price reductions on the dealers and on the trade in general were presented by various dealers. It was pointed out by L. H. Bennet, a commercial expert, that few garages in the state apply real selling methods to their businesses. Mr. Bennet demonstrated that a few dollars a day in extra sales would cover the overhead on every one of these garages for some time to come. Reports indicated that the failures among members of the association were some 60 per cent fewer in number than among those in the same lines outside the association.

The next semi-annual convention of the association will be held in February in San Jose, Cal., the exact date to be fixed later.

## Car's "Visible Value" Factor in Selling

### Briscoe Sales Chief Says Average Buyer Eliminates Cost in Purchase

SAN FRANCISCO, CAL., Aug. 30—The visible value of a car to-day is a greater factor in inducing the public to buy than are price reductions. This rather unusual view of the automobile selling situation is contained in a letter from Kelly R. Jacoby, vice-president in charge of sales of the Briscoe Motor Corp., just received by Frank O. Renstrom, Briscoe distributor here. Jacoby had just returned to the factory from a swing around the circle, in which he got first-hand information on the retail market for automotive vehicles in every State from the Canadian border to the Gulf of Mexico and from the factory westward to the Pacific Coast. His letter says, in part:

#### Car Buyer After Value

"The story is the same everywhere you go; the car buyer is after value. The tremendous confusion caused by many weeks of price reduction is now, happily, being dissipated. The automobile buyer is a pretty careful analyst; he no longer accepts everything told to him as gospel truth, that is to say, he accepts some, but he rejects much. He tries to strike an average of comparison and on that firm basis forms his opinion of the various makes of cars.

#### Reductions Trivial

"The average car buyer, at least those with experience, failed to enthuse over price reductions, for the simple reason that he felt that quality was being reduced with the price. In some cases, their suspicions may have been correct; in the majority it was not, but that does not alter the fact that the buyer and the prospective buyer to-day want value received for every dollar they put into an automobile."

## Chinese Airplane Gives Excellent Performance

WASHINGTON, Aug. 30—Several successful flights have been made with a hydro-airplane constructed by Chinese engineers at the Chinese Government Dock & Engineering Works at Foochow, according to a report made to the Bureau of Foreign and Domestic Commerce. All the material used in the construction of this plane, which was specially designed by a Chinese engineer, with the exception of the engine, which is of American design and manufacture, was produced in China. The works have several more of this type of airplane under construction for use by the Chinese navy. The success so far achieved is expected to give quite an impetus to aviation development in China.

## Southern "Town in Himself" Has Good Chance of Beating This Case—In Fact, He Can't Lose

ATLANTA, GA., Aug. 24—In a small town the automotive accessory dealer may just as well be the town preacher, postmaster, lawyer, etc.

In one of these towns just outside of Atlanta a few days ago a salesman with automotive specialties sold a fairly good sized order. When the goods arrived, however, the dealer found that they were of inferior quality and not nearly up to the standard as claimed by the salesman. Therefore he promptly returned them to the manufacturer. Shortly thereafter the house endeavored to force collection of the bill. First a sight draft was drawn on the dealer through the local bank, and was returned in a few days unhonored. The house then wrote the postmaster asking after the financial standing of the dealer, and was informed that he was o. k. By return mail the manufacturer wrote the postmaster asking him to secure an attorney for him and force collection of the bill. The manufacturer received the following reply:

"The undersigned is the dealer on whom you attempted to palm off your worthless specialties. The undersigned is also the president of the bank to which you sent your sight draft. Furthermore, the undersigned is the postmaster to whom you wrote, and the undersigned is also the attorney whose services you seek to force collection of this bill. Your methods are nefarious considering the inferior quality of the goods sent me and the extravagant claims made by your salesman. The undersigned is so angry that if he were not also the preacher of the church in this place he would be sorely tempted to tell you to go to h—."

## Detroit Preparing for Convention of M. A. M. A.

DETROIT, Aug. 29—C. W. Dickerson, vice-president of Timken-Detroit Axle Co., who is chairman in charge of Detroit arrangements for the "Back to Normal" credit convention of the Motor & Accessory Manufacturers' Association, has about completed plans for the reception and entertainment of delegates and guests. The two opening days of the convention, Sept. 14 and 15, will be given to business sessions with the dinner on the 14th evening.

The 16th will be a day of recreation at the Detroit Golf Club. Wives of delegates will be entertained during the sessions with sight-seeing trips about the city and lakes, and social events at the Detroit Boat Club and the Detroit Athletic Club. Edgar A. Guest will be the sole entertainer at the convention dinner.

Acting on the Detroit committee with Dickerson are E. T. Ailes, treasurer Detroit Steel Products Co.; M. A. Moynihan, secretary Gemmer Mfg. Co., William Hendrie, secretary Detroit Gear & Machine Co.; Thomas M. Simpson, credit manager Continental Motors Corp.

## Stockholders Against Automotive Receiver

TOLEDO, Aug. 30—Officers and directors of the Automotive Corp., tractor manufacturers, decided at a meeting of stockholders to fight to a finish the petition filed by E. E. Hallet, Archbold, Ohio, stockholder, asking for the appointment of a receiver for the company.

It was stated that stock sold to a brokerage house for \$14 had been sold at \$25 a share. The par value of the stock is \$15. Attorney Denman also declared that the company had valid contracts for \$2,250,000 worth of tractors but that production had been held at a low ebb by business depression's effect on demand.

## Pre-Selex Gear Shift Launched in Illinois

CHICAGO, Aug. 29—Pre-Selex Gear Shift Corp. has been organized in Illinois for the manufacture and sale of the Pre-Selex mechanical gear shift, which is designed to eliminate entirely the hand-shift lever and permit gear shifting through the clutch pedal. This shifting is accomplished without springs or electricity.

Ten leading automobile factories are preparing to test the Pre-Selex gear shift. Manufacturing plans are now under way.

The company's affairs are in the hands of Franklin A. Miller, vice-president, who has been associated with the industry for a number of years. He was at one time advertising and assistant sales manager of Stromberg Motor Devices Co. Executive offices of the company are at 750 Railway Exchange Building, Chicago.

## Remodeled Airplanes for Mail Service Route

WASHINGTON, Aug. 30—Six remodeled army airplanes, which will carry double the amount of mail carried in the D. H. type machines now in use, will soon be placed in operation on the transcontinental air mail route between New York and San Francisco, the air mail service announces.

The planes will carry 800 pounds of mail or 32,000 letters, with no additional cost in fuel or pilots, the statement said, and were remodeled at a cost of \$3,000, whereas the cost of the new machines would have been \$15,000 each.

#### BRITISH TRACTOR CUTS

LONDON, Aug. 10 (By Mail)—Tractor prices have dropped until it now is possible to get a good, fair powered utility tractor for \$1,500 (normal exchange).

## Mexican Sales Grow; Revival Has Started

### Business Shows Improvement in Some Phases—Transportation Still Big Problem

CITY OF MEXICO, MEXICO, Aug. 24—According to the statement of dealers, there has been a marked improvement in some phases of the business during the last few months. Even during the protracted revolutionary period a considerable number of automobiles, motor trucks and delivery vehicles were purchased in the United States and brought to Mexico, despite the fact that all shipments had to be paid for in cash at the border, and that there were delays in making transfers from one railroad to another and in transporting the cars to destination.

#### Transportation Problem

The transportation problem is still unsolved as to automobiles, as well as all other kinds of shipments. It is met in a measure, however, by shipping practically all automobiles by express from Rio Grande crossing points. Even express shipments are slow. It usually takes twelve days for an express car of automobiles to move from Laredo to the City of Mexico, a distance of about 800 miles. The practice of giving credit to reliable dealers is rapidly taking the place of paying cash for cars at the border.

It is estimated that there are approximately 20,000 motor vehicles in Mexico, including automobiles, delivery vehicles and motor trucks. This is a very small number when it is considered that the country has a population of more than 15,000,000 people. Just what per cent of inhabitants might be considered as prospective buyers of cars there is no means of determining. It has been said that the laboring class numbers fully 12,000,000 people. There is little prospect that many of this element will reach the automobile buying stage for many years to come unless there should be a phenomenal rise of wages.

#### Revival Has Started

During the last few months there has been a great revival of automobile sales and the establishment of agencies, accessory houses and garages. This is especially true as to the City of Mexico, which is the center of automobile distribution for the greater part of the country.

Practically all of the American and French automobile manufacturers who are reaching out for foreign trade are represented in Mexico. This is especially true as to the larger and higher priced cars. Although there are a number of American dealers here the business is not confined to men of any one nationality. This is the case not only as to the sale of automobiles and other motor vehicles, but also applies to accessories and garages.

One of the oldest and largest agencies in the City of Mexico is B. Estades y Cia., whose place of business is Av. Bucareli. The company is composed of B. Estades and R. Romano. The sales manager is J. F. Canales, who has had long experience in the various branches of the automobile business not only in the United States but in Europe and South America. He has brought American methods of salesmanship to the agency with which he is now connected. The company handles the Packard, Renault, Paige, Briscoe and Pierce-Arrow automobiles and the Packard motor trucks. In discussing the automobile situation in Mexico, Canales said:

#### Buying Power Good

"Although business conditions are not as good as they might be, the buying power of the people seems to be remarkably good when it comes to the purchase of automobiles and motor trucks. This agency sells about 25 cars and trucks a month. The banks here do not give credit to dealers as a rule. We have a credit of not over ninety days. We sell cars on one-half cash and the balance ninety days. During the last few years there has been a tremendous influx of second-hand cars to Mexico from the United States. There are now so many of these used cars in the country that they may be bought cheaper here than across the border. There must be a general discarding of worn-out cars in the not far distant future and this will improve the demand for new cars.

"We have a well equipped repair shop in which native workmen are employed with the exception of a German electrician. We have found that Mexican mechanics learn the trade quickly. They are adepts when it comes to picking up the fine points of automobile repairing. We sent our German electrician and chief mechanic, Gustavus Schmidt, to the Packard factory for a year's practical training and we found that the investment brought us good returns. We have three salesmen on the street and they use the same sales methods that are practised by the more progressive agencies in the United States.

"We carry a stock of about 100,000 pesos worth of tires. There are two automobile tire manufacturing plants in Mexico, both being located here. They make tires of all sizes. One is called the Azteca Tire Company and the other is the Pelzer Tire Company. Their products sell for about 25 per cent less than American tires."

### Paige Enclosed Car Output Quickly Sold

DETROIT, Aug. 29—Paige Motor Car Co. sold out its entire August production of enclosed cars in the first five days of the month. The demand is reported at the factory to be far in excess of former seasonal demand for enclosed types, and production will be increased to meet sales requirements.

## Used Car Situation Better in Spokane

### New Cars Going Well Also as Credit Allowances Speed Up

SPOKANE, WASH., Aug. 30—With improved business conditions and credit allowances gradually speeding up sales of new cars, Spokane automobile dealers are finding that the used car situation is assuming a less drab aspect.

Sales of used cars are dependent upon new car sales, according to E. Stock, managing-secretary of the Spokane Automobile Chamber of Commerce. Seventy-five per cent of new car sales entail used car transactions, says Stock.

"The used car situation is always a step or two behind the new car market, for at least 75 per cent of dealing in new cars is done with persons already owning cars," said Stock. "During the recent period when the automobile industry openly marked time the used car situation assumed rather discouraging proportions.

"At present the used car situation is more favorable to both purchaser and dealer. The situation is no doubt much more favorable to the purchaser than it will be during the winter months, when the car sales season is expected to slow up somewhat. When this winter period of less numerous new car sales comes, dealers will be careful about taking used cars in trade. The exchange valuation allowed will necessarily be lower and no trades will be made unless the dealer is reasonably certain of a quick turnover."

### Durant Announces Oakland Home Site

OAKLAND, CAL., Aug. 30—R. C. Durant, president and general manager of the Durant Motor Co. of California, has definitely announced the site of the Durant assembly plant in Oakland to be at East 14th Street and 106th Avenue. The site consists of 18 acres, on which will be built exclusively class A buildings, construction to be of concrete throughout, with buff pressed-brick facings and gray granite trimmings. The main building will have a frontage of 600 feet, from which will run three wings, each extending 400 feet, thus forming courts which will allow all windows the greatest possible amount of air and light. All buildings are to be of two stories.

The powerhouse will be situated between the wings, and the water tank enclosed in concrete to conform to the general plan of the plant. The second floor of the factory will be devoted to body building, paint shops, upholstery and trimming shops. The finished bodies will be sent through chutes in the floor to the waiting chasses on the main floor, where they will be carried on endless chain conveyors through the various processes of assembling.

## Reorganization of Locomobile Decided

### Company Divorced from Hares Motors Following Meeting of Stockholders

BRIDGEPORT, CONN., Aug. 27—Reorganization of the Locomobile Co. through which Col. Elmer H. Havens, junior member of the firm of Hunter & Havens of this city, president of Bridgeport Board of Education and prominent in financial, industrial, civic and fraternal circles, becomes head of the corporation and has already assumed charge of the big Main Street plant, was consummated at New York yesterday, according to announcement here to-day. Frank R. Hickman is associated with Colonel Havens, as vice-president and treasurer of the corporation.

These revolutionary changes and reorganization of the corporation were perfected at a meeting of the stockholders in New York. Through them the Locomobile Co. is wholly divorced from Hares Motors, Inc., which had charge of manufacturing and selling the automobiles built at the Locomobile plant here. Mr. Hickman was a former president of the Locomobile Co. of America, which was organized April 1, 1920, as the Locomobile Co. He was also treasurer of the Hares Motors, Inc.

#### Confirms Reports

President Havens confirmed reports of his election and the reorganization of the corporation, when interviewed at his Southbury, Conn., summer home. However, he was not ready to make a statement as to the plans for the new organization, but said that operations will be resumed at the local plant as soon as business conditions warrant. Colonel Havens and Mr. Hickman represent the creditors of the Locomobile Co. in the latest reorganization.

Rumors of a dissolution of Hares Motors, Inc., which were in circulation here a number of weeks ago, are not borne out by the change. It is pointed out that the connection of Hares Motors, Inc., with the Locomobile Co., to which the name of the local corporation was changed last year, were in the form of a contract for operation of the plant and the selling of its products. At that time the officers of Hares Motors were made officers of the Locomobile Co. Those officers have now resigned and have been succeeded by the local men, Messrs. Havens and Hickman.

#### Contract Is Dissolved

The contract between the Locomobile Co. and Hares Motors, dissolved yesterday by the reorganization of the former corporation, took effect April 1, 1920, and, at the same time, the Mercer Motors entered into a similar agreement. The Mercer Co. withdrew from the agreement April 1 last. Hares Motors is a separate corporation, according to

### CONVICTS TO MANUFACTURE 1922 LICENSE TAGS AT OHIO JAIL

COLUMBUS, O., Aug. 30—License tags for 1922 will be manufactured by the convicts in the Ohio Penitentiary, as has been the case in the past few years. The 1922 tags will be on battleship gray background with blue letters and numerals. The number the coming year will be divided by a hyphen as in many States. This is a new feature to the Ohio tags. There will be the letter D to designate dealers and manufacturers; E for electrics and T for trucks. Gasoline passenger cars will not be designated with any letter. In all there will be approximately 800,000 tags manufactured for 1922.

E. L. Larson, works manager of the local plant, and the reorganization and withdrawal of the Locomobile Co. does not affect it.

#### Won't Discuss Capital

At the time the contract with Hares Motors was made, the Locomobile Co. of America was reorganized into the Locomobile Co. and recapitalized. None of those interested would state to-day as to whether any new capital has been put into the corporation under the latest reorganization.

E. L. Larson, who has been works manager under Hares Motors, has tendered his resignation, to take effect Sept. 1, but may remain for some time in an advisory capacity, although his active duties have been practically completed. He stated to-day that he is not acquainted with any of the details connected with the reorganization of the corporation. His successor has not yet been appointed.

#### 20 Years in Bridgeport

The Locomobile Co. of America located in this city about 20 years ago, during the early days of automobile manufacture, at first making a steam propelled car. The manufacture of gasoline-propelled vehicles was soon taken up and the Locomobile, in a short time, became one of the most popular of the higher priced cars in the country. Several times the Locomobile was a competitor for the Vanderbilt cup, highest honor in automobile racing, and was successful, after several trials, in winning that classic.

Originally, starting in a small way in East Bridgeport, the business of the company has been enlarged and the present big plant at the foot of Main Street was built a decade or more ago. During the recent war a large amount of important war work, including the manufacture of trucks, tanks and other similar equipment, was turned out there.

It is expected the work at the plant will go on with added vim from now on.

## Sherman Puts Pep in Montreal Meeting

### A. E. A. Merchandising Director Is Principal Speaker at Session at Montreal

MONTREAL, CANADA, Aug. 30—The first meeting of the Montreal auxiliary of the Automotive Equipment Association was held at the Windsor Hotel with Ray W. Sherman, merchandising director of the Automotive Equipment Assn., as the chief speaker. Other speakers who addressed the meeting included A. J. Hays, president of the Champion Spark Plug Co. of Canada, Ltd., and chairman of the Automotive Equipment Association; E. J. L'Esperance of the Imperial Life Insurance Co., Montreal, and N. H. Oliver, general sales manager of the Metal Specialties Mfg. Co. of Chicago. The gist of the addresses of the evening was "Sales Promotion," and the formulating of new selling ideas which would bring into closer contact manufacturer, wholesaler, retailer and consumer.

For five minutes Sherman kept his audience in laughter describing his first two attempts at public speaking.

"To come down to business," he interposed, "this is the biggest thing that has happened in the motor industry and I venture to say that no other industry has started such a movement. We are out to do something for public weal and to put it over we must stick to the job. It can be done and will be done, nothing can convince me otherwise. As testimony of the faith I have in the proposition, I offer the fact that I willingly threw up one of the best positions to give my time to this work. I am not going to burden you with figures and statistics of the motor trade—you have probably been given these before and have perhaps read them time and again—but by trying to make my 'speech' more in the nature of a chat and giving you a few examples of how selling can be done and at the time of selling the dealer is shown that there is more in it than waiting for someone to ask for a certain article.

"Our first object is to get the goods off the dealer's shelf, by showing him how to get them off, and how to instill the idea of 'asking people to buy.' And all this is dependent on the salesman, we must have men who are enthusiastic, like their work and the people they are working for; and if every salesman will give his support just think how the business will grow. We have got to do away with the dirty shop and dusty shelf idea, we must set up inviting displays in the dealer's premises conveying the 'idea' of the goods and what their advantages are.

"The salesman must understand that the retailer is a personal friend, and he should see that that state comes about, and that he has a greater influence over the retailer than is realized. We must make the manufacturer, wholesaler, and dealer believe in this thing. When that happens mutual benefit and increase of business all round will come about. When you take into consideration the usefulness of nearly all motor accessories and the comparatively small price it is easily seen that a 'dead stock' proposition is—or should be—unknown in the automobile accessories business. Every season is a selling season, so where does the kick come in about slack business? That is usually the cry of the man who has not the stamina to 'stick it' and who 'thinks he's beaten.' Give us your earnest support in this 'closer contact' proposition and you will not only be helping us, but yourselves."

## Business Prospects— Loom in South Africa

### Business Steadily Improving, Survey Shows—Exports on the Increase Again

NEW YORK, Aug. 31—Business conditions affecting the sales of automotive equipment in South Africa are steadily improving and exports of such equipment from this country are again on the increase, with the probability that August shipments will be materially higher than those of July and June. This opinion was voiced at the local office of the National Bank of South Africa, Ltd., coincident with the issuance of the results of an automotive survey of that country. The survey was the result of a questionnaire sent out by the New York office and which was answered by the managers of the bank offices at Capetown, Johannesburg, Bloemfontein, East London, Port Elizabeth and Durban.

#### Favor Lighter Cars

The survey took up the question of road building, the competition of European manufacturers in motor car and tire lines, the development of motor truck use and the subject of spare parts. The most interesting part of the survey was, perhaps, that devoted to the European light car, the question being asked as to whether the high price of automotive fuels in South Africa would cause car owners there to drift away from the American product in favor of the lighter and smaller models built in the Old Country.

"These, in the form of the Calcott, Morris-Oxford, Swift and 'Baby' Standard, are now to be seen in increasing numbers on the streets, the last-named preponderating," read the Capetown report. "They appear to be popular for city use, but are heavily handicapped by virtue of their high initial cost. It is pointed out that in this country it is not weight reduction but efficiency of the engine that will count in the future—i.e., the small but efficient engine giving 25 m.p.g. (imperial gallon 20 per cent larger than American gallon). One authority states that the small foreign engine is not economical for country running owing to heavy gradients and road conditions generally. Also, owing to frequent gear changing the small engine brings about transmission troubles which counterbalance its apparent advantages."

#### Truck Usage Grows

This report was similar in tone to those from the other localities, the point being made that such cars were not adapted to the agricultural regions and that their first cost was in excess of the well known American makes.

Truck utilization is growing slowly in South Africa, the report from Capetown again reflecting the opinion from all districts.

"The truck is slowly but surely replacing horse traffic, at any rate in the

larger cities, but not for long distance," the report states. "It is largely used by commercial houses for town and suburban use, but to a limited extent, if at all, for agricultural purposes. There are more motor trucks in the Cape Peninsula than in any other center of South Africa, owing partly to the inefficient railway goods service and partly to better roads. In Johannesburg there would be a large field for expansion but for the fact that prospective users are diffident about employing colored drivers."

Bloemfontein answered that the one-ton truck is proving a commercial asset and that, with normal prices, a large number will be employed, especially by farmers. The Johannesburg office added that educational work would be desirable to further truck operation.

The parts situation in some localities was reported as being good, with owners having little difficulty in Capetown and Johannesburg in obtaining parts. The Capetown report declared, however, that prices for such parts are often excessive and that car owners thought this serious. East London dealers were not so fortunate, and it was said that garages were having difficulty in obtaining other parts than for Fords.

#### American Cars Lead

The known predominance of American makes of cars in operation in South Africa was shown by statements that our makes were from 70 to 95 per cent of the total, the smaller figure being reported from Port Elizabeth and the larger from Johannesburg. American and British motorcycles were reported from Durban to be in about even proportion and the statement was added that British firms are backward in service and merchandising effort.

The tire situation was not so promising, as the European Dunlop, Michelin and Pirelli are obtaining a good place in the market. Capetown estimated that American makes of tires held about 50 per cent of the sales, this likewise being true of Johannesburg. The American makes reached 75 per cent in Bloemfontein and Durban added that British and American makes were about even in price.

#### To Improve Highways

No railroad extension work took place last year and none is expected this year, but highway improvement and maintenance is being continued. The Provincial Council of the Cape Province increased the 1919-20 appropriation of £54,500 to £57,300 for 1920-21, although this may be modified somewhat. The main roads in this province total 3956 miles, with an additional 24,727 miles of divisional roads, with some 2589 miles more in Transkei, Herschel and Glen Grey.

The present road expenditures are triple over what they were eight years ago, and a scenic highway, about 100 miles in length, is nearing completion. This provides an all-round route to cover the Peninsula and opens up some picturesque and hitherto inaccessible districts.

The sale of South African products is increasing, it was added, and this has cleared the financial situation materially.

## Tractor Trials in England Sept. 20-24

### Manufacturers and Traders Society Announces 62 Entries for Event

LONDON, Aug. 19 (By Mail)—The Society of Motor Manufacturers and Traders is clearly justified up to the hilt in its determination to proceed this year with its tractor trials. The entries are now complete and the total should be more than gratifying to the promoters. They testify to the belief of the makers of both tractors and implements in the value of these annual trials and in the future of the industry. Manufacturers evidently realize that it is largely upon the results of this year's tractor trials that next year's trade will depend.

It is interesting to compare the entries with those for 1919, the society's first trial. On that occasion entrants were permitted to enter three machines of any one make and type, and as a result 56 tractors were entered for the trials. This year the society only permits the entry of two machines of any one make or type, yet, notwithstanding this restriction, no fewer than 37 tractors are entered.

Additionally, 25 special implements have been entered for test and report; these being quite apart from the implements necessarily entered with the tractors for the purpose of demonstration and test of the tractors themselves.

In addition to the trials there is to be an extensive exhibition of power farming machinery. The entries for this exhibition are not yet complete. If present indications may be taken as a guide, however, this section of the event bids fair to rival the interests of the trial itself.

### Make Tests of New Ray Battery; Study Others

NEW YORK, Aug. 30—A test of the Ray storage battery and of several other makes was made at the New York Electrical Laboratories recently to demonstrate the ability of the Ray construction to stand up under conditions of heavy charge and discharge. The test lasted two days. On the first day each battery was in turn discharged at 200 amperes for 1 minute and then at 100 amperes until the voltage was down to zero. The Ray held up 31 minutes in this test we are informed. After this test all the batteries were connected in series and charged at the rate of 100 amperes for the first hour and at 25 amperes for the next sixteen hours. When this charge was completed the batteries were again put through the discharge test. The Ray battery started at a discharge of 200 amperes which continued for one minute, and then gave 100 amperes for four minutes. The batteries were of the 6-volt, 11 plate type.



## Federal Report Says Trade Is Improving

Industry Feeling Way Out of Depression—Reductions and Good Crops Responsible

WASHINGTON, Aug. 31—Analysis of reports received from agents of the Federal Reserve Board on business conditions throughout the country show that the automobile trade is feeling its way out of the economic depression. The price reductions have stimulated sales and the early marketing of crops puts the farmer on the prospect list because of his improved financial status. The movement of crops away from farms is expected to have a salutary effect in the liquidation of outstanding indebtedness and provide a favorable credit situation.

### See Foreign Gain

The board has found evidence of improvement in some branches of foreign trade and with a fairly good agricultural yield and enlargement of manufacturing demand, it is believed the autumn season will be encouraging to trade. The Federal agents state, however, that the situation is not such as to forecast any extensive or immediate revival of business in a large sense.

Because of the fact that manufacturers and dealers alike are interested in the question of price stabilization, it is significant to note the opinion of the Federal Reserve Board: "Price movements have been on the whole limited, but with a slight upward tendency in the case of some groups. The Federal Reserve Board index prepared for international comparisons shows an increase of two points to 141. The index number of the Bureau of Labor Statistics for July was 148, the same as during June. The current price reports for the early part of August indicate if anything, a strengthening of prices in some lines."

### Forecasts Difficult

"On the whole it is impossible to forecast the general trend of prices during the month. Manufactured goods have probably held relatively firm, but as has been indicated above, many important raw materials have declined. Prices in general during the past three or four months have become somewhat more stabilized than they were in the early spring, but whether this period of relative stability will continue, whether prices will rise appreciably, or fall is a matter for speculation. A continuation of relative stability in the price level as a whole might be marked by more or less extreme variations in the prices of individual commodities if the variations cancelled one another. For instance, increases which might occur in the prices of commodities which have been "liquidated" or reduced to approximately pre-war levels might be accompanied by reductions in the prices of commodities which are still far above the pre-war level."

### FORM AUTOMOTIVE DIVISION UNDER THE DEPARTMENT OF COMMERCE

NEW YORK, Sept. 1—Formal announcement of the formation of the automotive division under the Department of Commerce and in the Bureau of Foreign and Domestic Affairs, as a part of the plan of Secretary Hoover to aid industry, was made here to-day by the National Automobile Chamber of Commerce. Gordan Lee will head the automotive division and William J. Irvine will be the automotive trade commissioner working with Lee.

Lee has had lengthy experience in the automotive industries. He was formerly in the sales department of the Ford Motor Co., working in the Fordson tractor division, in New York State. Later, he joined the firm of Gaston Williams & Wigmore and made a tour of the world with their automotive lines. Irvine was formerly with the White Co., being in the foreign sales promotion department.

Both these men are now at Washington and have begun their duties, their first work being to survey the field and determine the assistance that may be rendered the industry. Irvine probably will go abroad within a few months.

The formation of the division has been under consideration for some months and is similar to the trade divisions recently named by Secretary Hoover in other industries. It will concern itself with tractors, trucks, cars, motorcycles and equipment, in the promotion of both foreign and domestic business.

## Rubber Exports on Gradual Increase

Great Britain Purchasing Larger Quantities—Mexico Also Shows Improvement

AKRON, Aug. 31—There has been a gradual improvement in exports of rubber goods although the improvement is spotty in character and while no figures are available as yet, the improvement has been noticeable.

Great Britain is purchasing larger quantities of rubber goods according to reports of the export departments of the larger factories. The Scandinavian countries have purchased larger amounts of rubber goods during the past two months than during the previous three. Business from the east coast of South America with the exception of some states in Brazil, is gradually improving.

Business through Mexico has shown some improvement recently. In Canada the rubber business, especially tires, has shown practically the same improvement which has been registered in the United States. The depression in the rubber industry came a few months later in the foreign fields than it did in the United States, but the slight business revival which has been noted abroad came about the same time business picked up generally in the rubber field in this country.

## Columbus Has Annual Motor Show This Week

COLUMBUS, O., Aug. 30—The annual fall show, given under the auspices of the Columbus Automobile Show Co., opened at the Ohio State Fair Aug. 29 to continue for the week. The show opened under the best of conditions as some very good advertising had been done by the fair management and crowds were larger than usual. The automobile show occupied Automobile Building, which was 100 by 400 feet. Anson B. Coates was manager of the show.

Among the cars displayed were the Overland and Willys-Knight, Franklin, Hudson and Essex, Lincoln, Davis, Harry C. Stutz, Chevrolet, Sterns, Moon, Hupmobile, Cleveland, Chandler, Allen, Nash, Peerless, Maxwell, Chalmers, Buick, Studebaker, Columbia, Dodge, Oldsmobile, Pierce-Arrow, Reo, Stutz, Haynes, Cadillac, Packard, Oakland, Wescott, Auburn, Grant, Scripps-Booth, Ford, Jordan, Stephens, Lexington, Milburn electric and Roamer. A few trucks were also included in the exhibit.

### BUS PLEA IS MADE

INDIANAPOLIS, Aug. 30—Investigation of efforts of city officials and street railway officials to prohibit jitney bus operations has been begun by the Citizen's Protective Association which demands that jitney buses be allowed to operate freely in order to insure the public with adequate transportation.

## Durant to Organize Company in Canada

TORONTO, Aug. 31—Durant Motors of Canada, Ltd., is soon to be organized. The company will begin shortly to assemble the Durant four for Canadian distribution and eventually, according to W. C. Durant, will build here the entire car, even the electric system and tires.

Durant has purchased a former munition plant at Leaside near Toronto. There 2500 men will be employed and an assembly building will be erected for use right away and manufacturing on a considerable scale will be under way, Durant states, about March 1. Production of 100 cars a day is planned.

A Toronto man whose identity is not known will be associated with the American manufacturer.

### ATLAS IS REDUCED

YORK, PA., Aug. 31—Effective Sept. 3, 1921, the list price of the Atlas "Merchant's Dispatch" is reduced to \$1,550, f.o.b. York, Pa. This is the second cut in the price within a year and makes a total reduction of \$215.

## METAL MARKETS

**ALTHOUGH** stabilizing influences are multiplying, the steel market continues to present a surface appearance of price variations and fluctuations. Concessions are largely a matter of how advantageous to operating schedules the tonnage and specifications involved in individual orders may be. Some of the sheet mills have recovered to a point of operations where they can well afford to make some sacrifices in order to increase their output to a percentage of capacity that will bring the overhead down to a more normal level per ton of rolled product. To this rational motive rather than to any ambition to wage war upon competitors for the sake of weakening them must be ascribed such price inducements as buyers are able to obtain these days. It will be well for steel consumers not to delude themselves on this score. Daily newspaper reports in the last few weeks have made it appear as though the steel industry was more or less in the midst of a price war waged, as price wars usually are, by one side for the sole purpose of enfeebling the other. Nothing is further from the truth. Every producer's goal is to get enough orders on his books to bring more and more of his equipment and labor to a state of useful productivity and, succeeding in this, he doesn't waste any thought on his more or less fortunate competitors. When Judge Gary stated the other day that in the case of most mills selling prices represented very close to actual production costs, he did not intend to convey the impression that these producers were standing on the brink of becoming unfair competitors of the Corporation. He merely laid bare the plight in which the entire industry finds itself. If there is a steady increase in mill operations from now on, it will be a stabilizing factor of prime importance. In connection with agitation to bring about early downward revision in freight rates on steel and steel products, it is noted that many of the transportation interests support this movement. Apparently the Interstate Commerce Commission's attitude is the chief stumbling block which, executive traffic officials of the steel companies opine, it will be possible to overcome in good time. Such revision of freight rates would, of course, exert paramount stabilizing influence on steel prices and, now that labor rates have been adjusted all around, would tend to bring out considerable buying for future delivery, which is a *sine qua non* of genuine stabilization.

**Pig Iron.**—The market is turning more and more into a sellers' affair. Automotive foundries, however, are not figuring very prominently in the market at this time.

**Steel.**—A broadening demand for automobile sheets is noted, with the smaller rolling mills quoting 4.45c. for the base gage, a reduction of \$5 a ton from the recent asking price. In some instances 4.35c. is said to have been the price named for No. 22 gage. In pre-war days 1.35c. was the customary spread between black and full finished sheets, but it is recognized that higher labor costs, etc., have made obsolete this spread, which, on the 2.75c. basis for black sheets, would make the price for full finished sheets 4.10c. No change is noted in the strip steel market.

**Aluminum.**—With some of the Continental ingots, 98 to 99 per cent pure, offered at as low as 19c., there are those who wonder whether the anti-dumping law may not be invoked if European producers continue to flood the American market with aluminum at prices jeopardizing continuity of Ameri-

can production. Consumers, however, contend that the salvation of the American aluminum industry lies in meeting these prices, at which automotive consumption would increase considerably.

**Copper.**—The market is decidedly easy, producers offering no opposition to the lower prices that have resulted, apparently because of a desire to stimulate further buying and reduction of accumulations.

**Tin.**—The market is quiet and prices continue low.

**Lead.**—Moderate steadiness characterizes the lead market.

**Zinc.**—Dulness continues to prevail. Consumers not buying.

## INDUSTRIAL NOTES

**Duplex Motor Truck Co.,** Lansing, is sending its experimental passenger bus on a tour of Ohio and Indiana, to demonstrate the possibilities of meeting transportation problems by bus operation. The Duplex bus has been in operation for two months in Lansing, demonstrating its adaptability for public transportation.

**Mission Motor Co.,** Los Angeles, has been appointed Dort distributor for southern California. George Goodrum, president of the company, is a veteran Coast distributor and associated with him is F. A. Petrie, who was formerly assistant general sales manager for Dort at the factory.

**Rubber Products Mfg. Corp.,** Kansas City, has been formed and chartered to operate the Kansas City Tire & Rubber Co., which for two years had been operated under lease by the A. J. Stephens Rubber Co., which will continue to distribute output.

**Spicer Mfg. Co.,** Plainfield, N. J., reports August the best month in some time. John Lee, a company official, says business has been showing great strides.

**Studebaker Corp. of America** has moved its Detroit sales branch into the new headquarters at 3646 Woodward Avenue.

## WISCONSIN FAIR OPENS

**MILWAUKEE, WIS., Aug. 30.**—What is planned by the Milwaukee Automotive Dealers Association to be the most intensive selling effort it has ever undertaken is the annual State Fair motor show, which opened to-day with the seventy-fifth annual agricultural exposition at West Allis, suburb of Milwaukee. Not only is this year's show to be a merchandising campaign of a high order, but the occasion will be employed to give the public a new conception of the utility of the passenger as well as commercial car to the end that "pleasure" and "luxury" be abolished in popular descriptions of passenger cars. The ways and means for accomplishing this end will be unfolded as the show progresses. It will close with the fair on Saturday afternoon, Sept. 3.

## LINCOLN LIGHT STARTS

**MILWAUKEE, WIS., Aug. 18.**—The Lincoln Light Corp. of Milwaukee, which was organized several months ago, has commenced manufacturing operations in a new plant at Grafton, Ozaukee County, north of Milwaukee.

## FINANCIAL NOTES

**Fisher Body Co.** for the three months ended July 31 reported a surplus after all charges, including Federal taxes, of \$1,212,236. Allowing for dividends on the preferred stock, this was equal to \$2.30 a share on the 500,000 shares of common stock of no par value outstanding. In the corresponding period of last year the company reported a surplus of \$2,221,553, equivalent to \$4.29 a share on the same amount of stock. Net earnings for the period ended July 31 amounted to \$1,720,643. Interest payments called for \$227,587 and reserves for Federal taxes amounted to \$280,820, leaving the surplus of \$1,212,236. In the same period of 1920 net earnings were \$3,673,642, after deducting \$283,299 for interest and setting aside \$1,168,700 for tax reserves, leaving the surplus of \$2,221,553. Net earnings were calculated after deducting all charges for repairs, maintenance and depreciation.

**Motors Products Corp.** directors have arranged to purchase for retirement 32,000 shares, or approximately 40 per cent of the company's capital stock outstanding, at a price not to exceed \$50 a share, according to information obtained yesterday. Under the plan the stockholders are given the privilege of disposing of their pro-rata holdings as of the close of business Aug. 23, 1921, and the right to exercise the option to sell any or all of their pro-rata shares expires Sept. 6, 1921. The directors are authorized to buy from any available source the number of shares needed to retire the full amount mentioned under the plan, provided the stockholders do not consent to dispose of their pro-rata holdings. All stockholders who desire to dispose of more than their pro-rata share are authorized to notify the directors.

**Raybestos Co. of Bridgeport, Conn.,** manufacturers of automobile brake linings, Ford accessories and automotive supplies, increased the capital stock from \$3,000,000 to \$8,000,000, it was disclosed by papers filed in the town clerk's office here. There is an increase of common stock shares from 15,000 to 30,000; of preferred stock shares from 15,000 to 50,000. None of the stock is on the market, it is announced. The increase of capital stock was to finance the purchase of the General Raybestos & Rubber Co. of Charleston, S. C. This is an older concern than the local one and operates spinning mills of Raybestos fabrics. The combination, it is stated, means a strengthening of both organizations. The Charleston concern will supply the local concern with most of its material.

**Keystone Tire & Rubber Co.** reports for the six months ended June 30, last, deficit from operations \$247,018, and a deficit after interest, losses, taxes, etc., of \$279,729. The balance sheet as of June 30, last, shows cash on hand and in banks, \$48,935; accounts receivable, \$2,193,339; bills receivable, \$73,504; merchandise inventory, \$565,287; accounts payable, \$384,678; deficit, \$591,936; total assets and liabilities, \$3,876,423.

**Martin-Parry Corp.** board of directors has this day declared a quarterly dividend of 50c. a share on the capital stock of the corporation, payable Sept. 1, 1921, to stockholders of record at the close of business Aug. 15, 1921. The transfer books will not be closed.

**Packard Motor Car Co.** has declared the regular quarterly dividend of 1½ per cent on the preferred stock, payable Sept. 15 to stock of record Sept. 1.

**BANK CREDITS**

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Aug. 30—In spite of business depression and widespread unemployment, the savings banks of New York State have gained nearly \$250,000,000 in deposits in the year ending July 1, 1921, of which \$93,000,000 came from interest credited on deposits, while \$156,000,000 represented new deposits. The number of depositors increased by 83,000 in the same period. Total resources of New York State savings banks on July 1, 1921, were \$2,856,110,000, a gain of over 10 per cent in the year.

The Federal Reserve system continues its improvement by remarkable strides from week to week. The ratio of total reserves to deposit and Federal Reserve note liabilities combined increased from 65.8 per cent on Aug. 17 to 66.5 per cent on Aug. 24, while the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, advanced from 86.3 per cent to 87.7 per cent. This improvement was accomplished by an increase of \$19,000,000 in gold and \$2,000,000 in other reserves, making the total reserves on Aug. 24 \$2,766,000,000, and by a decline of \$18,000,000 in note circulation, which was \$2,486,000,000 on Aug. 24. Total deposits increased by \$2,000,000 to \$1,674,000,000, due to an increase of \$12,000,000 in Government deposits, and a decrease of \$10,000,000 equally divided between the member bank reserve account and all other deposit items. Note circulation since it reached its highest point of \$3,405,000,000 last December has declined \$920,000,000, or 27 per cent. Total bills on hand declined during the week by \$23,000,000 to \$1,530,000,000 on Aug. 24. Bills bought in the open market declined \$6,000,000 and bills discounted secured on Government obligations declined \$18,000,000, while commercial bills discounted increased \$1,000,000.

Although the crop moving demands upon the money market are still increasing, money rates have fallen off slightly. Call money ranged from 5 per cent to 5½ per cent last week, compared with a range of 5½ to 6 per cent the previous week. On Friday last 5 per cent was the only rate quoted throughout the day, while loans were made outside the Stock Exchange at 4½ per cent. Time money also declined from a range of 6 per cent to 6¼ per cent to 5¾ per cent to 6 per cent for all maturities, but trading was comparatively dull. Prime commercial paper, on the other hand, for all maturities up to six months, was fairly active with the rate at 6 per cent. Demand came chiefly from country banks. Whatever the cause of the ease in money rates, statistics which show a total of \$2,340,000,000 of new securities offered in seven months ending July 31, 1921, compared with \$2,567,000,000 offered in the same period of 1920 and \$2,184,000,-

000 in the first seven months of 1919 indicate that our investment market is absorbing new capital issues to the same extent as usual. However, few new issues were brought out in August.

## Demand for Motor Cars Better in Charlotte

CHARLOTTE, N. C., Aug. 30—The motor car demand in this section is improving. Coddington's special train has just made another trip from the Buick factory, bringing this time 201 automobiles of different types, and other distributors are also bringing them in about as fast as they can get them. The Anderson Motor Co. of Rock Hill reports an improvement in business, their dealers now placing good sized orders for their product. Charles R. Shanks, vice-president of the company, is of the opinion that recent favorable action by the Federal Reserve Board toward relieving the cotton situation in the South is one of the principal factors in bringing about this improved condition. Another factor, says Mr. Shanks, is the realization on the part of car buyers that the limit of low price levels has been reached and that in all probability the next change in price will be upward.

The Anderson plant at Rock Hill, which had been operating on half time during recent weeks, is now going ahead on full time. The company has recently made improvements in its cars and added two new models and these are contributing factors to the plant's activity.

## Indian Refining Wars on Standard Oil Prices

INDIANAPOLIS, Aug. 30—A fight is being waged between the Indian Refining Co. and the Standard Oil Co. here. The Indian Refining Co. equipped with a battery of twelve new Packard trucks has announced through their officers that two cents a gallon is a sufficient margin of profit for filling stations and garage-men who sell gasoline. The price has been cut and further declines are promised since officials of the company have arrived from New York. Officials of the Standard Oil Co. declare that they do not wish to enter into any controversy with the Indian Refining Co. or any other company, but at the same time every cut in price on the part of the Indian Refining Co. will be met by the Standard Oil.

## Kelsey Wheel Official Dies After Long Illness

DETROIT, Aug. 31—James S. Stevenson, vice-president of the Kelsey Wheel Co., died here Tuesday after a two years illness. He had been a resident of Detroit since 1887, joining Berry Bros, Inc., and later becoming general manager of that company.

Stevenson was probably as well known here as the biggest men in the automotive industry.

**MEN OF THE INDUSTRY**

George Sprowls, of the factory manager's staff of the Goodyear Tire & Rubber Co. of Akron, has sailed for an extensive survey of economic and export trade conditions in Europe. He will spend a year investigating foreign trade conditions with reference to the tire and the automotive industries. Sprowls will be in Berlin on Sept. 23, for the first German automobile show held since the war. He will also attend the Paris automobile show in October, and the English automobile exhibit at London in November. His business survey will include France, Spain, Germany, Holland, Belgium, Switzerland, Norway, Sweden and Denmark.

H. R. Hoskin, manager of the accounting department of the Goodyear Tire & Rubber Co., has been named assistant comptroller of the company. The comptroller's office was established when E. G. Wilmer succeeded F. A. Seiberling as president under the new Goodyear financial control, and takes the place of the old Goodyear board of control. A. J. Blanchet also has been named assistant comptroller. P. E. H. Leroy, manager of the foreign finance department, has been named assistant treasurer.

Ralph L. Ross, for two years general superintendent of the Moreland Truck Co. of Los Angeles and formerly connected with the Continental Motor Corp. at Detroit and Muskegon and superintendent of the Beaver State Motor Co. of Portland, Ore., now has become connected with the Leach-Biltwell Motor Car Co. of Los Angeles. Ross has assumed charge of the motor department, production end, of the Leach factory.

Chas. A. Nevins, consulting engineer of New York, has joined the organization of the Cameron Motors Co., New York, and will be general manager and chief engineer of their recently acquired plant at Greenville, Mich. Nevins has been associated with the automotive industry for a number of years, both in the United States and Canada.

Morris H. Anderson has assumed charge of the Detroit branch of Mack International Motor Truck Corp., succeeding W. W. Helte, transferred to the head office in New York. Anderson was formerly assistant manager of the central territorial division for Mack, with headquarters in Chicago. Before that he was with Packard.

H. B. Phipps, export manager for the Hudson-Essex Motor Car Co. for the past eight years, has been appointed sales manager by O. H. McCormack, general sales manager. Irving Segwalt has been appointed assistant sales manager in charge of car distribution, and C. V. Williams, export manager.

Charles M. Steele, who was reported in last week's Automotive Industries to be the new advertising manager for Studebaker is and has been for some time manager of the bond department of the banking firm of Dominick and Dominick, New York.

H. S. Durant, of the American Steel & Wire Co., Chicago, has been appointed sales agent and M. W. Floto, assistant sales agent at the Detroit office, to succeed M. Whaling and T. J. Usher, Jr., resigned.

Roy F. Irvin has been made sales manager of the Steel Wheel division newly organized by the Motor Wheel Corp. He will also continue his duties as advertising director.

J. Paul Winchell has been added to the research staff of the Duplex Truck Co., Lansing, Mich.

## Calendar

## SHOWS

- Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.
- Sept. 28-Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.
- Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.
- Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.
- January—Chicago, Automobile Salon, Hotel Drake.
- Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.
- Jan. 28-Feb. 2—Chicago, National Automobile Show,

- Coliseum, Auspices of N.A.C.C.
- Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.
- Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.
- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

- September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.
- September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park; Sociedad Rural Argentina.
- September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

- Sept. 5, 1921—Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.
- Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.
- Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.
- Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.
- November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.
- March, 1922—Santiago, Chili, Annual Automobile Show.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador, Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobillista Brasileira.

## CONVENTIONS

- Sept. 14-15-16—Detroit, Credit Convention Motor and Accessory Manufacturers Association.
- Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.
- Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## RACES

- Labor Day—Unlontown, Pa., Autumn Classic.

Indianapolis to Have  
Two Fall Motor Shows

INDIANAPOLIS, IND., Sept. 5—Indianapolis is to be treated to two automobile shows this fall. The first, plans for which have been under way for weeks, will be that staged by the Indianapolis Automobile Trade Assn. this week. The second will be held in conjunction with the Industrial Exposition, which is to be held the week of Oct. 10. The two shows are similar in that automobiles and accessories will be shown, but they differ in that the latter exposition will be open only to Indianapolis-made products. Requisitions for space already have been received from the automobile manufacturers here and from the tire and accessory manufacturers.

The automobile manufacturers will show in a group, space having been taken out sufficiently large to permit them all to make displays. The same thing is true of the tire and accessory manufacturers. Walter C. Marmon, head of the Nurdyke-Marmon Co., and Harry C. Stutz of the H. C. S. Motor Car Co., both are on special committees making preparations for the event. The exposition is being staged under the auspices of the manufacturers' committee of the Indianapolis Chamber of Commerce, and the automotive industry is well represented on this committee. On this committee are George M. Dickson of the National Motor Car Co., D. McCall White of the Lafayette Motors Co., Paul P. Parker of the Parker Tire & Rubber Co., Harry C. Stutz of the H. C. S. Motor Car Co., L. M. Rankin of the Duesenberg Motors Co., Warren D. Oakes of the Oakes Co., John C. Orman, manager of the Indianapolis Automobile Trade Assn., and J. A. Daugherty of the Robins Body Corp.

## RUSH WORK ON PLANT

MUNCIE, Aug. 30—Preparations for resuming operations at the Sheridan Motor Co., former General Motors Corp. plant, now owned by the Durant Motor

Co., are being rapidly pushed forward. It is the intention to make a new six cylinder car of practically the same specifications as the Sheridan, which name may be retained.

## TO OPEN NEW METAL FOUNDRY

MILWAUKEE, WIS., Aug. 30—The American Metal Products Co., manufacturer of Ampco bronze and brass castings, bearing metals, etc., expects to start the operation of its new \$100,000 foundry and machine shop within a week to ten days' time. The building is of brick and steel, 60 x 120 ft., with a separate office and transformer house, pattern shop, storage buildings, etc. A Detroit electric melting furnace of 1000 lbs. capacity has been purchased from the Detroit Electric Furnace Co. With the new plant and equipment the company expects to enter the general brass and bronze casting field on a tonnage basis, continuing to make special bearing metals and similar specialties for the gas engine, machinery and automotive industries generally. Carl J. Zaiser is secretary-treasurer and general manager of the company.

## TO MAKE NEW BEARING METAL

BLOOMINGTON, ILL., Aug. 30—The John M. Ryan Foundry Co. of Rock Island, Ill., has secured the exclusive motor vehicle rights for the manufacture of a new lead and copper bearing alloy invented by A. H. Ackerman of Chicago. A closer amalgamation than has been obtainable heretofore and greater uniformity are claimed for the new alloy. The physical properties are given as follows: Tensile strength, 19,600 lbs.; elastic limit, 14,700 lbs. A new company is to be formed and new buildings are to be erected for the production of the alloy, and it is also planned to license other bearing companies to use the metal. One of the advantages claimed for the new bearing metal is that as compared with brass backed babbit bearings, bearings made of it cost only half as much to produce.

Demand Increases  
Around Cleveland

CLEVELAND, Aug. 30—Cleveland automobile manufacturers have experienced an increased demand for their products since Aug. 15. This, coupled with business already on hand for the month, assures a healthy condition of production for September. October is looked forward to with optimism by the average auto maker here.

The average manufacturer experienced a slight let-up in the demand during the latter half of July. This slowdown continued through the first two weeks of August. But things have picked up considerably. The condition is considered especially good in view of the fact August is a vacation month when the family stocks up for the outing, and car buying ordinarily slows down greatly.

At the plant of the Jordan Motor Co., for instance, dealers reported sales of 150 new cars per week the first two weeks of July. That is at the rate of 600 cars a month. In the last two weeks of July sales dropped to 125 cars a week. In the third week of August sales were 135 cars. During this period the dealers were selling approximately 75 to 100 used cars a week. This is a barometer that correctly records what is taking place in this city.

At the plant of the Stearns Co., G. W. Booker, the sales manager, said his concern had experienced a trade increase since Aug. 15. The factory is running at 90 per cent of normal. The company has booked many orders for the new five-passenger, two-door brougham coupé that is to be put on the market Sept. 1.

Another barometer of conditions is the report of the McGraw Tire & Rubber Co. for July. Net earnings for the month totaled \$35,000, compared to \$20,000 in June. The company is making 2000 tires a day and 300 tubes. It was said sales are running 4000 tires daily. On this schedule the inventory is being reduced rapidly.

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE



**MAKE NEW WORLD RECORD  
AND WIN EVERY PLACE  
at  
BUFFALO BOAT RACES  
Aug. 11, 12, 13, 14**



**C**HAMPION "Dependability," which was so well demonstrated at the Indianapolis Races, was further emphasized by their wonderful performance at Buffalo, when used in marine engines.

In the Displacement Race for the Fisher-Allison Trophy, four out of the five boats that started were equipped with "Champions" and were

the only ones to finish.

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# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

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No. 10

## Statistics Don't Tell the Whole Story

Accurate statistical data are of great value to the industry, but figures alone cannot present a true picture. Economic and human factors must be considered if fair conclusions are to be drawn.

By Norman G. Shidle

**O**NLY to those with a thorough knowledge of a subject appear the many difficulties and complexities involved in solving its problems. A voluminous book is being prepared, for instance, which will contain the history of every word in the Latin language. The problems which will arise in the preparation of this book can scarcely be conceived in detail except by scholars interested and active in similar research.

While this fact is pretty well understood in general, there are still many persons to be found who will attempt to settle precisely and accurately problems containing many variables which have puzzled students for years. This is witnessed by the five people that are found by Inquiring Reporters every day in various cities, who are willing to have their name and address attached to a one-sentence-answer to such queries as "What is the solution of the Irish question?" "What should Congress do about taxes?" etc.

Sometimes even a careful observation of an industry fails to reveal satisfactory data upon which to base final conclusions. Much has been said and written concerning the past and future of the automotive industry. Considerable statistical data have been marshalled to prove this or that conclusion. In a general way, it may be said that such attempts at analysis are encouraging as denoting a desire for more accurate knowledge

of the commercial phases of the industry. But the danger of drawing conclusions on the basis of insufficient data must be guarded against very strongly.

It is interesting to note that no attempt to analyze in detail the future of the automobile industry on the basis of the statistical data now available has come from any particularly authoritative source within the industry. There is some significance to be attached to that fact. Those directly interested in the general phases of the industry have made extensive efforts in collecting and interpreting statistics of various kinds. As a result of these interpretations, conclusions of a limited nature have been drawn from time to time. But no attempt has been made to predict exact future figures, because such agencies recognize the futility of such efforts in view of the variable factors involved.

There is, of course, every reason for wishing to peer into the future; to predict with some degree of accuracy just what is the future market for cars and trucks; to determine how best to sell to that market. AUTOMOTIVE INDUSTRIES has emphasized very strongly the need for research and investigation along this line, but has pointed out coincidentally the danger of drawing final conclusions on the basis of incomplete data.

It is practically impossible to discuss intelligently the

automobile industry and its future purely on the basis of statistical data, since such a discussion necessarily involves economic and psychological factors not reflected from statistical information. Moreover, the gross inaccuracy of the figures available renders such an attempt even more difficult.

Even when every effort is made to get the statistics as nearly correct as possible, and even when an attempt is made to allow for errors and inaccuracies, the variables involved in the present data are so great and the general economic factors affecting the discussion are so strong as to render misleading practically any survey based entirely upon statistical information.

Only very general indications and trends can be observed. From this standpoint present statistics are of value; but an attempt to make anything like mathematically accurate deductions is almost certain to be misleading.

The real need of the automotive industry is more accurate statistical data compiled upon sound economic basis. Every effort should be exerted to encourage the more extensive gathering of such data and to outline the proper fundamentals upon which it should be assembled. It is worth while to discuss more in detail the specific inaccuracies and difficulties which present themselves.

The confused state of the registration figures even at the present time precludes the possibilities of a very high degree of accuracy. The farther back the calculations are carried the more inaccurate these figures become. It is possible to build up a theoretical registration on the basis of past production figures and the life of a car, but such data are of little value since it has thus far been impossible to determine with any degree of accuracy the life of a car. The only way this life can be calculated is on the basis of registration figures. Thus the circle of inaccuracies is completed.

The necessity for considering separately the passenger car and the truck when discussing future makes and trends, moreover, has not been sufficiently recognized.

The future of the car and the truck rests upon fundamentally different bases. Their development will proceed along different lines and will be caused by different economic forces. To consider gross registration or production figures of motor vehicles as a basis for predicting future trends is to insert a fundamental error which will render inaccurate the reasoning and conclusions drawn from them.

For the same reasons segregated registration figures are necessary. General conclusions and prophecies cannot be made from registration figures alone unless the details of gathering and compiling those figures are understood. And when these factors are studied it becomes evident that sufficient data for an intelligent analysis on the basis of statistical data are simply not there.

Many states do not yet segregate car and truck registrations at all. This fact alone makes even approximate accuracy nearly impossible. But further analysis of registration methods shows the following vagaries in connection with this matter of segregating car and truck registrations:

Some states register tractors with trucks and do not

register trailers; others register trailers with trucks and do not register tractors; others register both tractors and trailers with trucks; still others register neither tractors nor trailers in any way. All these factors enter into a consideration of the registration figures even in those states where segregation between cars and trucks is apparently made.

All these difficulties render dangerous any attempt at general predictions on the basis of statistical data alone. Even an intelligent effort to get results from such material is likely to go astray far enough to render the conclusions drawn unsound as a basis for commercial plans.

Take the matter of estimating the replacement market which has been attempted by numerous persons. Some general idea as to this market can and should be determined by every manufacturer and parts maker. But to base detailed plans on such an estimate may lead to very bad results.

A banker, for instance, who has studied the statistics of the industry very carefully and who has honestly attempted to interpret accurately the many variables, estimates the replacement market in the near future at 1,500,000 cars. Another executive closely connected with the industry who has made a similar close study of the situation estimates it at 1,800,000. This is a variation of 300,000 cars. Estimating the average car value at \$1,000 this means that there is a difference of \$300,000,000 in the possible sums to be derived from replacement sales according to which of the estimates is accepted.

This illustrates vividly the danger of attempting to make detailed plans or to derive specific conclusions purely on the basis of available statistics. The variation shown in these two estimates, both carefully made, is not at all surprising to anyone who has studied the sources and the methods of compilation of the

various sets of figures involved in the calculations.

The government export figures furnish another basic set of statistics for compilations of this kind. The deficiencies of these figures during recent years are common knowledge throughout the industry. So here again enters inaccuracy and variables. In this connection, however, it should be noted that a marked improvement in this particular statistical field can probably be expected at once, since definite efforts to render these export figures more accurate and more valuable are already under way by the Department of Commerce.

The automotive industry has become so much a part of industry and society as a whole in this country, its development is so closely bound up with a number of economic and psychological factors that no sound discussion of its future can neglect consideration of these factors. The very fact that they are intangible and difficult to evaluate simply emphasizes the futility of trying to get a mathematically correct answer to such a question.

Even those who have studied the situation carefully do not always recognize this vital point. A recent writer on this subject, who according to his own statement, recognizes the inaccuracy of much of the available data, discusses these difficulties, and then says: "The questions involved in all these possibilities suggest sources of error. These are at present unavoidable and they modify but do not at all destroy the value of the figures used."

It is possible for inaccuracies to so far modify the

value of statistics as to entirely destroy their usefulness for detailed calculations. That is the case in regard to the figures under discussion in this article. When the inaccuracies are great enough to allow two careful studies of the same figures to arrive at conclusions differing by \$300,000,000 as regards the gross selling price of the product, it becomes apparent that the value of the figures for the purpose of such calculations is more than "modified."

The necessity for more accurate statistics has been emphasized. Until better conditions in this regard can be brought about, however, the present figures must be used to the best advantage possible. Despite their inaccuracies there is a function for which present figures can be used. They are extremely useful as indicating general trends, in forming a basis of comparison in a general way, and of pointing the way to the broader and less detailed phases of the future.

It is natural that business men, connected in various ways with the automotive industry, should try to determine with some degree of accuracy what the future holds during the next few years. It is absolutely necessary that the human and economic factors be considered along with the available statistical data in any attempt

along these lines. The results, obviously, will be less concrete, but will present a picture of the situation much nearer to truth than any discussion which excused consideration of these vital factors.

The accumulation of accurate data, upon which production and merchandising plans can safely be based is one of the chief problems with which the industry should be concerned at the present time. Individual firms can do much along this line by intensive cultivation and analysis of specific sales territories. The whole industry can actively attempt to get a uniform method of automobile and truck registration throughout the country, and the industry can co-operate with government officials—as it is doing now—in making export and import figures more accurate than they have been in the past.

The individual merchandising research of the various companies, while a matter of immediate dollars and cents sales value, will constitute a step in the direction of accumulating better statistics upon which the plans and progress of the industry as a whole can be made. It is upon the side of getting better statistical data that the industry must concentrate its efforts. Definite conclusions drawn on the basis of the extremely inaccurate statistics now available are just as likely to be definitely wrong as definitely right.

## Progress in S. A. E. and Government Standards Work

THE importance of standardizing body nomenclature has been recognized by the Passenger-Car Body Division of the Society of Automotive Engineers and as a result a subdivision was appointed which recently submitted a report to the division. The report covers 12 fundamental types of bodies, but permits a certain amount of freedom in the selection of additional names based on the fundamental types.

The fundamental body types recommended are: roadster, touring, sedan, berline, coupe, coupelet, limousine, brougham, limousine-landaulet, brougham-landaulet, cabriolet and town-car. The latter term is really a more general term for certain of the chauffeur-driven types. Complete definitions are given for each type. Various other types are also covered in the report, but only as variations which have existed for some time. The term touring phaeton is used in place of five-passenger touring based on present custom.

The Passenger-Car Body Division has also tentatively recommended the following door-fit clearances:

Location	Clearance, In.
Hinge Side .....	1/8
Lock Side .....	3/16
Bottom .....	7/32
Top .....	1/8
Jamb .....	3/16
Bead .....	3/32

These clearances are for all types of bodies and are measured from wood-to-wood or metal-to-metal before painting. Top clearance does not apply to open bodies.

These standard clearances, if adopted, will be of great assistance to passenger-car body engineers.

The Division has tentatively recommended that door handle squares shall be made from 5/16-in. cold-drawn key stock with tolerances of plus or minus 0.001 in. There has, however, been some criticism as to these tolerances, it being stated by some manufacturers that they are too close and that steel cannot be obtained on the market within these limits.

It is considered, however, that for good workmanship these tolerances should be adhered to and it is known that certain well-known automobile companies have obtained key stock to this specification for several years.

At a meeting of the National Screw Thread Commission, recently held at the Bureau of Standards, a program for the continuance of the commission's work was discussed. The following program was agreed upon and will be carried out under the direction of the subcommittees:

(1) Specifications and tolerances for taps, dies and tap drills; (2) standardization of bar stock for producing cut and rolled threads; (3) standardization of bolt heads, screw heads, and nuts; (4) standardization of instrument thread and threads cut on brass tubing; (5) standardization of Acme, square, buttress, and other special threads, and (6) tolerances and allowances for Class IV, wrench fit.

The Progress Report, recently issued, is also to be further studied with a view to incorporating in it more information as to the specific class of fit and series of thread pitches to be used under different conditions.

At a recent meeting at the Bureau of Standards attended by representatives of government departments and of the manufacturers ways and means for devising government tire specifications with a view to adopting better standards were discussed. Specifications for tires which the Bureau had prepared were submitted to the committee for discussion and the various members suggested such changes as seemed desirable. The committee decided to send a copy of the specifications, together with these recommended changes, to the Rubber Association of America for their consideration and possible further revision. The specifications and the resulting changes are then to be returned to the Bureau of Standards when a second meeting will be called for further consideration of the problem. When completed, these specifications for tires will be available for use by the various branches of the Government, municipalities, and private corporations who buy tires in quantity.

# Smaller Tractor Added to Cleveland Line

Extensive use of pressed steel parts, greater accessibility, and single point lubrication among the features of new product which weighs 1820 lbs., is 80 in. long, 50 in. high and 32 in. wide. Frameless type power-plant includes  $3\frac{1}{4} \times 4\frac{1}{2}$  in. four-cylinder engine designed to burn kerosene.

By J. Edward Schipper

A NEW and smaller Cletrac has been added to the line of the Cleveland Tractor Co., the new model being featured by a wide range of adaptability and low weight. It weighs only 1820 lb. and the over-all dimensions are 80 in. in length, 50 in. in height and 32 in. in width. It is claimed to be capable of plowing from 6 to 8 acres a day with a standard, two-bottom, 12 in. plow and of performing any other of the usual farm tasks. To make it universally applicable, a two row cultivator specially designed for use with this machine has been put on the market.

From an engineering standpoint, the new tractor incorporates a great many new features. It is particularly noteworthy for its accessibility and simplicity. Pressed steel parts are used to an unusual degree and this practice is responsible for the lightness of the finished product. Simplicity has been secured by discarding the main frame. The engine, transmission and differential assemblies are bolted together as in

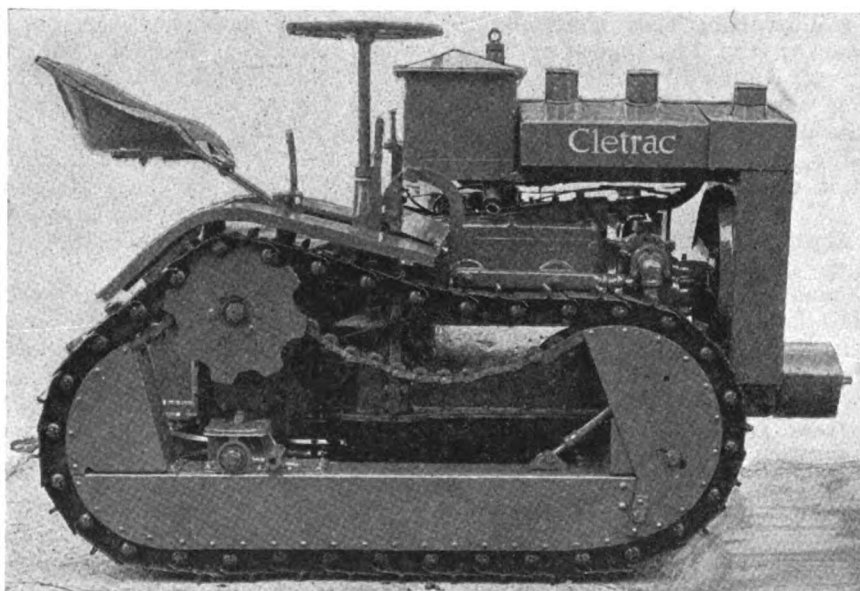
the frameless type of wheeled tractor, this construction ensuring both compactness and accessibility. There is little similarity to the older Cletrac model except that both are of the creeper type. Instead of the track running over wheels, it operates on a floating roller chain, and the drive is by sprocket. Parts which are subjected to intense stress are of chrome steel, and practically the entire assembly is made up of pressings. These include such important parts as track shoes, track frame, roller chains, sprockets, radiator cover, fuel tank support and fenders. Altogether, there are 900 lb. of pressed steel on the machine, which is about 50 per cent of the total weight. It is estimated that the use of pressed steel saves from 25 to 30 per cent in weight over the usual iron construction.

To give an idea of some of the accessibility features it may be stated that the entire radiator core may be

removed by taking out two screws and undoing two hose connections. The core can then be pulled vertically out of the pressed steel core case, which, being a flanged member, takes all of the stresses and eliminates strains on the core. The core case is supported by a bridge to the transmission case. This bridge, consisting of two longitudinal pressed steel members, carries the fuel and oil tanks and the air washer. The entire bridge with the tanks and air washer can be removed by taking out

four screws and disconnecting the gasoline line. This leaves the engine head free for removal and enables the operator to reach anything on the upper part of the engine assembly. Incidentally, the mounting of these tanks on the bridge puts the carburetor and air intake in a high, and therefore relatively dust-free, location.

Another advantage of the location of the fuel tank on the bridge is that it provides a straight gravity feed to the carburetor, although the latter is mounted



The new model F Cletrac, showing floating chain drive

on top of the intake manifold, giving a down draft arrangement. This causes the heavy ends of the fuel to drop on the hot-spot, which is thus rendered particularly effective, besides which the passage from the carburetor inlet to the valve is shortened. This, of course, has the advantage of reducing condensation to a minimum. The temperature of the hot-spot is held at about 450 deg. Fahr. Kerosene is the standard fuel, though gasoline may be employed if desired. The fuel tank is provided with a small auxiliary sub-tank for gasoline used for starting.

Returning to the subject of accessibility, the ease with which the various units can be removed may be illustrated by a few more examples. The gear driven fan, the helical timing gears and the cross-shaft for the magneto and water pump are all part of an assembly mounted on the front end of the engine. The water pump may be pulled



out from the side by removing four bolts from the water pump flange. The water pump drive gear comes with it. Alternately, the entire front motor gearcase casting may be removed, carrying with it the timing gears, water pump, magneto and fan, as well as the power drive pulley. This leaves the entire front end of the engine open for inspection.

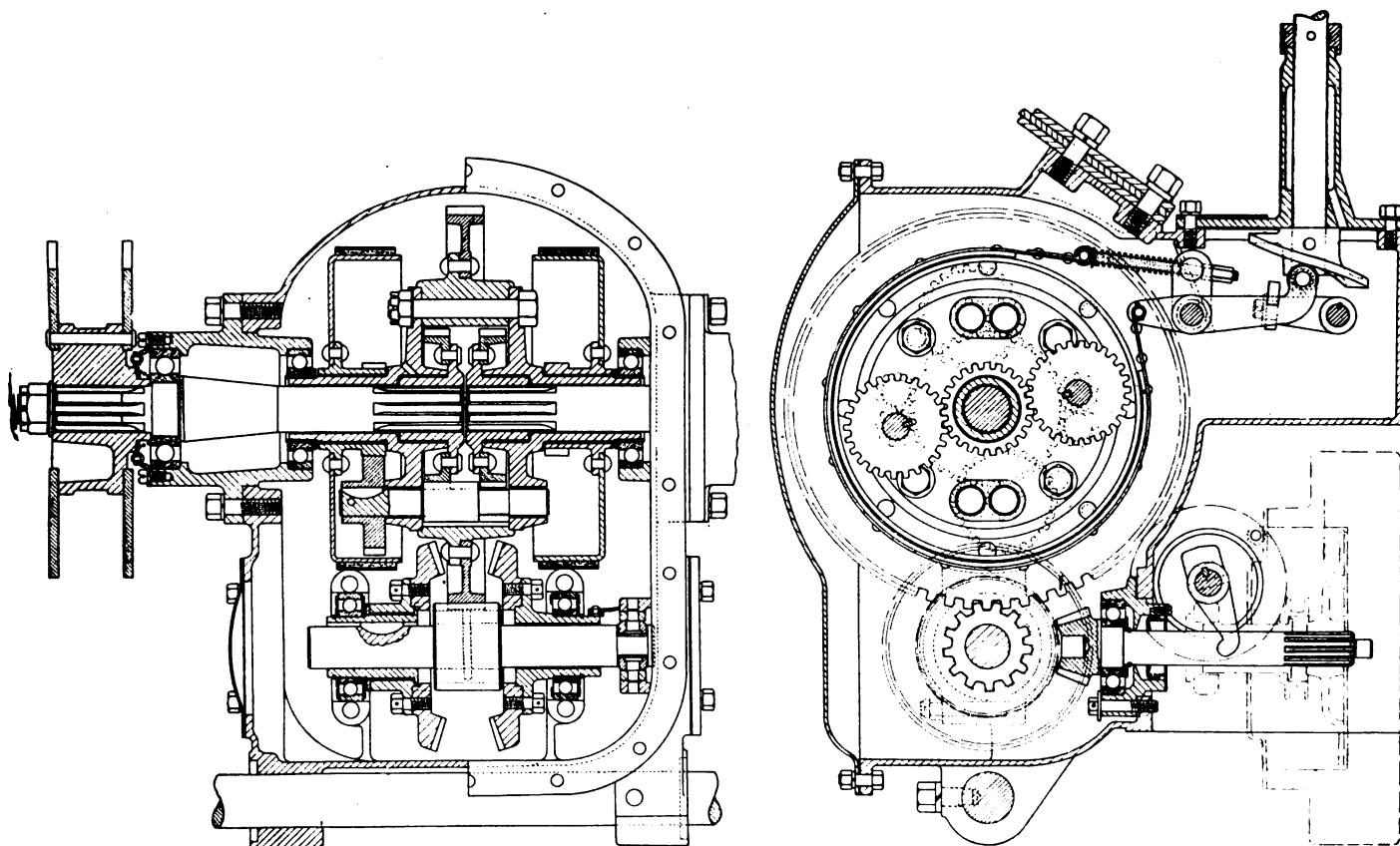
To reach the lower part of the engine, the oil pan, which runs the entire length of the engine and transmission case, can be dropped, and then by taking out one nut from each of the front spring points, the entire tractor can be lifted up around the dead axle which acts as the suspension pivot point. This permits the operator to work on the engine in a vertical position. By taking off the main bearings, he can pull out the crankshaft, connecting rods, pistons, clutch shaft, flywheel, and then by taking off the back or transmission cover, all other inner parts of the engine are removable. An example of the practice of using individual parts for two or more purposes is the use of the starting crank as the gear shifter lever. This dual use of the crank entails some incidental advantages. The starting crank cannot be removed from its gear shifting position unless the gears are in neutral. Therefore it is impossible to crank the engine with the gears engaged, and it would be impossible to leave the starting crank in the field, because the gears cannot be engaged unless the starting crank is in shift lever position.

By the use of the unit crank and transmission case a single oiling point suffices for the lubrication of all working parts of the tractor. On the earlier product there is only one grease cup, and this is located on the water pump shaft, but it will be shortly replaced by a packing gland which will do away with the only point requiring attention from the operator. The oil filler is so located that the oil first enters the transmission case and then flows to the crankcase, so there is no possibility of dry bearings in the transmission when starting the tractor after a new supply of oil has been admitted.

The powerplant is a four-cylinder,  $3\frac{1}{4}$  by  $4\frac{1}{2}$  in. unit, specially designed to burn kerosene. On this fuel, 16 hp. is developed at the normal speed of 1330 r.p.m. The maximum brake horsepower is 21. The horsepower at the draw-bar is 9 and the gear ratio to the sprocket is 17 to 1. At 1600 r.p.m., the tractor travels 3 m.p.h., allowing 3 per cent for slippage. The engine is a four-bearing type, there being a large bearing on either side of the double central throw of the shaft. The pistons are three-ring, with a slot below the bottom piston ring land on each side of the piston to provide a drain back to the crankcase. The usual train of transmission gears has been entirely eliminated, as there is only one speed forward and one reverse. Shifting is accomplished by meshing a heavy, straight tooth pinion inside of one or the other of two bevel gears which are so set that they turn in opposite directions from the bevel drive pinion on the clutch shaft.

The steering action on this Cletrac is similar to that on the other model, steering being effected by varying the relative speeds of the two tracks, but instead of gears and screws to tighten the steering bands, a positive cam and roller action is used, making a much simpler mechanism. This new type of brake control utilizes both steering bands and makes unnecessary the addition of a third band and drum for braking. Adjustments for wear are made by turning conveniently located screws which can be reached through hand holes without removing the rear housing cover.

The driving sprocket for the track is located well up from the ground, for protection from mud, grit and sand. The track runs upon a pressed steel frame which is so formed as to provide an inner race for the floating roller chain, which acts as a bearing. The track forms the outer race. Owing to the solid support for the roller chain along the entire length of the tractor at the bottom, there is no sagging of the track in encountering rough going. The frame acts as a solid support and differs from



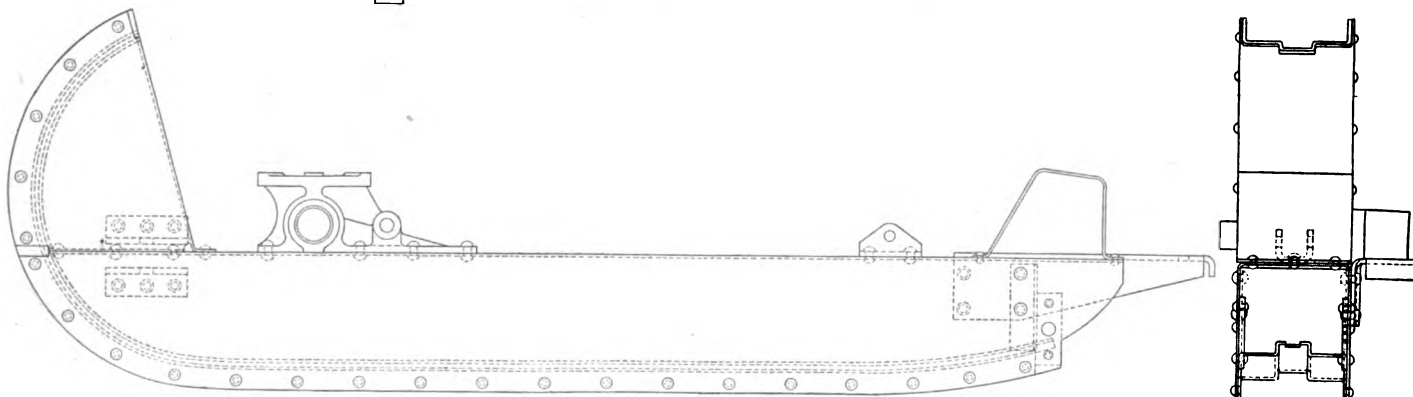
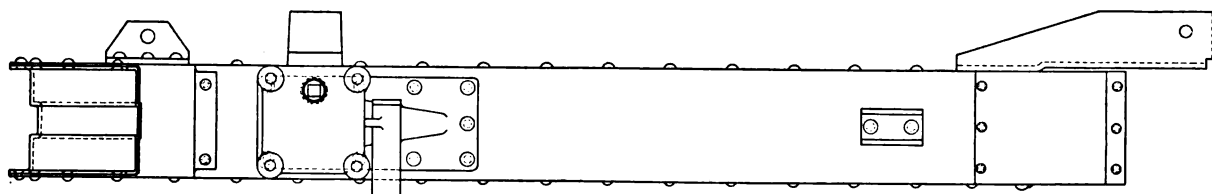
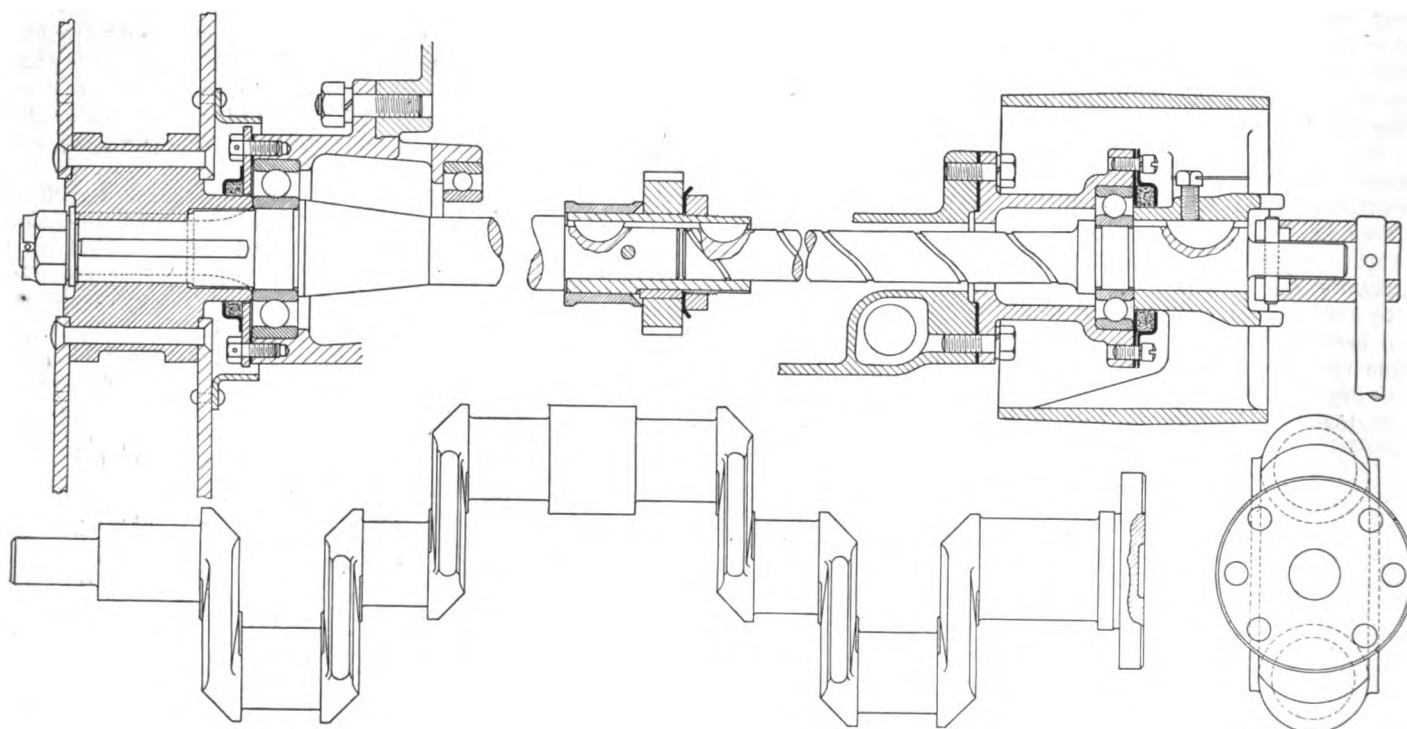
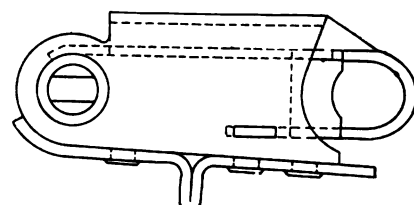
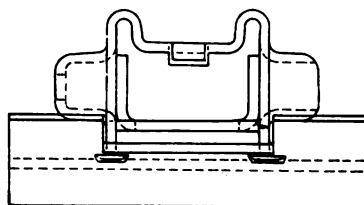
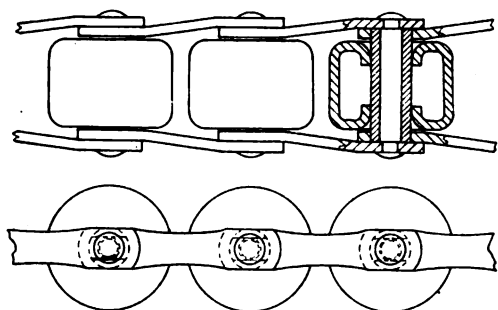
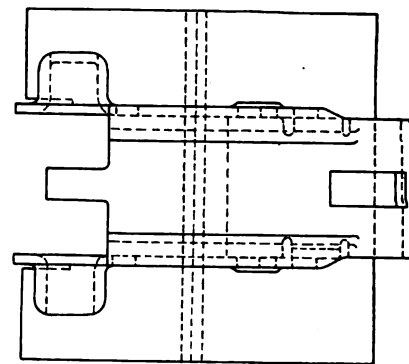
Sectional views of the gearset showing the differential band type of clutch used to control independently the motion of the two tracks

## PARTS OF THE NEW CLEVELAND TRACTOR

At top—Details of track shoe and floating roller chain.

Center—The crankshaft, above which (at the right) is a sectional view of the starting crankshaft and belt pulley, and (at the left) a detail section of the driving sprocket.

At bottom—Plan and side views of the present steel track frame.



the wheel track support, which permits of some degree of sagging of the track between the wheels over ground inequalities. The use of the floating roller chain, upon which the track moves, eliminates the necessity for lubricating the track. The track shoes are formed cold from hardened chrome steel and are designed to present a continuous solid tractor surface, which is self-cleaning. The tractor is suspended between the two track frames on coil springs at the front end and pivoted on a dead axle at the rear end. The operator is seated so he can conveniently watch the work of his implements, especially in the case of the cultivator. Power is applied to this cultivator from behind, and the operator, sitting on the

tractor, looks ahead at the work rather than straight down to it. By this method, the lateral movement of the cultivating tool, ordinarily limited to a few inches each way, can be made anything desired. A turn of the tractor steering wheel guides the cultivator, and the lifting levers permit adjustment while within easy arms length on either side.

It is claimed that this two-row cultivator can be attached to the Model F Cletrac by one man in 2 min. It has a 30 in. clearance and therefore can be used on corn up to 48 to 60 in. in height. The Cletrac Model F tractor is priced at \$845 and the Cletrac cultivator, which is adapted to it, at \$135, both prices f.o.b. Cleveland.

## Comparative Aircraft Engine Data

CONSIDERABLE data on the fundamentals of aircraft engine design are given in an article by Commander Martinot-Lagarde of the French Army, abstracted in *La Technique Moderne*.

The power of the engines varies between 160 and 600 hp. The outputs even attain 800 and 1000 hp.; the average is 300 hp. The speeds of revolution are comprised between 1400 and 2100 r.p.m., the speeds of the propellers between 1000 and 1800 r.p.m. The mean piston speed lies between 1375 and 2750 ft. p. m. The weight per horsepower varies between 1.75 and 3.2 lb. The use of Vee type and radial engines and of high speeds without gear reduction permit of the lightest construction.

The compression ratio is at least 5 and attains even 6; when it is above 4.7 we have what is known as a super-compression engine which can be used near the ground only when partly throttled. A comparison of two engines, in order to be complete, should be made for the altitude of flying, by taking account of the over-all efficiency of the powerplant. The specific consumption of fuel per horsepower-hour amounts to 0.46 to 0.57 lb.; that of oil to 0.024 to 0.088 lb. The latter factor increases with the number of connecting rods on the same crankpin.

The output per liter of cylinder displacement varies from 11.5 hp. for low speed engines to 19 hp. for high speed engines (5.3 to 3.2 cu. in. per horsepower). The mean effective pressure lies between 113.5 and 135 lb. p. sq. in., depending on the compression ratio and the volumetric efficiency. The flexibility and efficiency of the engine increase if the stroke-bore ratio is increased from 1.2 to 2.

The bores range between 4.75 and 6.70 in. Vee type and radial engines of from 200 to 400 hp. have bores of 4.75 to 5.50 in. In engines of the all in line type of the same output these figures become 5.50 to 6.70 in. With bores of over 6.3 in. the carburetion becomes more difficult. With bores of more than 5.12 in. it is common practice to use four valves per cylinder; in some cases 5 and even 6 valves per cylinder have been used.

The variations of the weight per horsepower of the principal components of the engine are given below for engines whose specific weight ranges between 1.75 and 3.2 lb. p. hp.

Crankcase .....	0.62 to 0.99 lb.
Cylinders .....	0.47 to 0.815 lb.
Crankshaft .....	0.22 to 0.55 lb.
Connecting rods .....	0.084 to 0.176 lb.
Pistons .....	0.100 to 0.264 lb.
Timing gears .....	0.073 to 0.132 lb.
Carbureters .....	0.044 to 0.110 lb.
Magnetos .....	0.088 to 0.176 lb.
Water pump .....	0.009 to 0.033 lb.
Oil pump .....	0.009 to 0.066 lb.

The use of the radial type of construction makes for

the lightest crankcase, connecting rod assembly and distribution gearing. Cylinders of pressed steel in a single piece, or with aluminum water jacket are the lightest. Vee engines of short stroke, having a main bearing between each pair of adjacent throws, have the lightest crankshafts and crankcases. The connecting rods of Vee engines and vertical engines are substantially equal as regards weight.

Helicoidal water pumps are heavier than centrifugal pumps. For the lubrication system the gear pump is lightest and the one most commonly used.

The maximum pressures on the crankpins are of the order of 1420 lb. p. sq. in. On the piston pins one may go to 2550 lb. In Vee type engines the pressure on the crankpins or the pins of the auxiliary connecting rods may attain 2000 to 2500 lb. p. sq. in.

From the standpoint of inertia forces and uniformity of torque, a twelve-cylinder Vee engine has the advantage over a six-cylinder vertical engine of the same output, substantially in the proportion of 4.5 to 7, and it lends itself better to the installation of a speed reducing gear. With eight cylinders and less, if a speed reducing gear is to be used, it is desirable to use a flywheel. The six-cylinder engine is better balanced than the eight-cylinder Vee engine. The ratio between stroke and connecting rod length varies between 1.7 and 2; the largest values are found in Vee engines.

The best type of valve seat from the point of view of easy passage of the gases is that having an angle of 30 deg.; the diameter of the valves is of the order of 0.45 of the bore and does not exceed  $2\frac{3}{8}$  in.; the lift is of the order of 0.394 in., the maximum being 0.55 in.

The working stress in the crankshaft is of the order of 15,500 to 31,000 lb. p. sq. in., with a tensile strength of 115,000 lb., an elastic limit of 100,000 lb., an elongation greater than 12 per cent and a resilience greater than 10. The bearing diameters for a 300-hp. engine are of the order of  $2\frac{3}{8}$  in.

Oiling pressures are generally about 15 lb. p. sq. in. They attain 75 lb. in high speed engines with narrow bearings like the Hispano-Suiza.

Aluminum pistons are superior to cast iron pistons; the masses and the clearances must be well distributed; the copper content should be about 5 per cent and that of zinc nil. For each altitude and each type of engine there is an optimum compression which depends upon the temperature of self-ignition, the resistance of the spark plug insulator and of the spark plug joints, as well as upon the metal of the exhaust valves. In order to insure good carburetion with the present induction system it is necessary to have gas speeds corresponding to 12 in. of water column. The durability of the engine is the greater the lower the speed of rotation (below 1800 r.p.m.) and the lower the bearing pressure.

# British Daimler to Produce New Four-Cylinder Chassis

Has  $3\frac{1}{2} \times 5\frac{1}{8}$  in. Knight engine with pair-cast cylinders, Lanchester vibration damper, single plate clutch, worm-drive axle, and 132 in. wheelbase. Four-point body mounting minimizes effect of frame distortion.

By M. W. Bourdon

**F**OR some years past the Daimler Company has specialized in six-cylinder cars of 30 and 45 h.p. respectively, but to meet the current demand for less expensive chassis a new model has just been introduced to supplement the existing types for 1922. It has an engine termed 20 h.p., with four cylinders  $90 \times 130$  m.m. ( $3\frac{1}{2} \times 5\frac{1}{8}$  in.).

As with all Daimler engines produced during the past fifteen years, Knight sleeve valves are used. The cylinders are cast in pairs with the silent chain distribution located between rear end of crankcase and flywheel. Separate detachable heads are used. At the front end of the three bearing crankshaft the Lanchester vibration damper appears as on the six-cylinder engines. In front of the casing is a grooved pulley driving the combined fan and generator shaft with a hinged mounting of the generator for belt adjustment. A separate engine starting motor operates through a Bendix drive. Water circulation is by pump, driven by a transverse shaft which drives the magneto at the opposite end. Cast iron pistons are used. The wrist pins are clipped in the small end of the connecting rods and float in the piston bosses.

Engine lubrication is on the trough system, with five independent plunger pumps, one for each trough and the fifth for supplying the main bearings and the worm driving gear of the front transverse shaft.

The carbureter is of the Daimler type, the 7 jets coming successively into operation automatically by the negative pressure lifting a series of steel balls. Vaporization is assisted by water jacketing the induction manifold. Fuel is fed by a vacuum tank; this represents a departure for Daimler.

Another departure is the use of a single plate clutch instead of the cone type. Three external multiplying levers are used for clutch operation, the springs being internal and operating directly upon the clutch plates. Fabric disk joints are used at each end of the tubular shaft between engine and the four-speed gear-set. The latter has a three-point suspension, while the engine is secured at four points directly to the main frame. Engine and gear-box are considerably inclined.

The rear axle has a Lanchester worm drive below with

a ratio of 4.125 to 1. The axle casing is built up from a three-part aluminum center and extension tubes, with adjustable truss rod. Detachable wire wheels,  $32 \times 4$  in., are fitted; straight side cord tires will be standard on cars for export and also, later on, on all chassis of this model.

Previous Daimler practice is also departed from in the rear wheel brakes. These, although still operated by pedal, are of the internal instead of external. The transmission brake is of the band type, lined with metal segments, and operated by the push-on side lever. The suspension is by three-quarter-elliptic springs at the rear and semi-elliptics at the front. Rear springs are underslung, a feature which, it is asserted, has almost eliminated the tendency toward rolling which occurred when the springs were mounted above the rear axle casing.

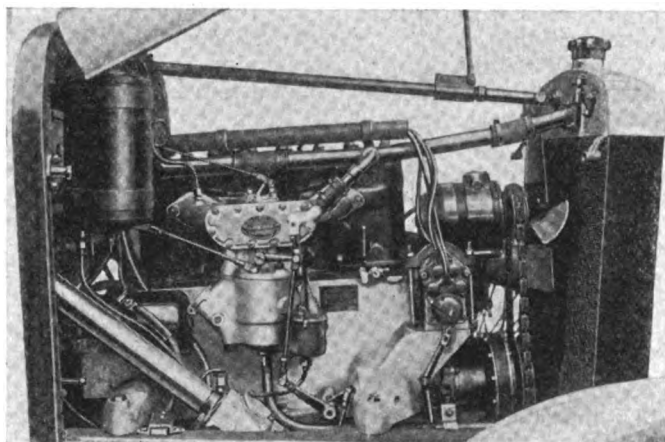
The new chassis is designed to take the same length body as the larger models, and therefore has a wheelbase considerably greater than usual in cars of this power, namely 132 in.

The standard bodywork at present consists of an open touring model and a landaulet. Both types are comparatively narrow, allowing a rear seat wide enough for two persons only; but purchasers of the touring car will have the option of either two additional folding seats or no folding seats and a rear windscreen. The latter is being specially made by the Daimler Company, and will, when out of use, fold neatly so as to appear as the rear panel of the front seat.

The bodies are mounted on the chassis so as to take bearing at four points only and thus prevent frame flexion from distorting the superstructure. At the front the bodies are secured by two hinge bolts, while the rear supports consist of two large circular rubber buffers with a central locating pin to each.

The chassis price is £750 (say \$3,700) and the open touring car £1,050 (\$5,200).

**T**HE American Wood Preservers' Association has established a Service Bureau which will answer inquiries and furnish information regarding the treatment of wood and the use of treated lumber. The Service Bureau is located at 1146 Otis Building, Chicago.



Right side of new Daimler "Twenty" engine, showing water jacketed seven jet carburetor

# Show Time Finds Canadians Widely Interested in Automobiles

Sales stimulation noted at National Exhibition, but return of aggressive buying power will be slow. American tariff action increases advantage of Canadian-made cars and is affecting improvement of Dominion business conditions, which have much of encouragement in them.

TORONTO, Sept. 5.

**T**HE motor show of the Canadian National Exhibition, which has always been regarded by Dominion automotive men as an indicator of the next season's market, is being studied this year with more than usual care. Not that its students expect it to yield a complete forecast of what may be expected during the next six months—there are too many uncertainties in Canadian political and business conditions for that. But the men in the automobile, truck and equipment businesses count on the show to provide at least a fairly good telescopic view of the buying sentiment of the Canadian public and the number of high executives—manufacturers, branch managers, distributors and dealers—who are watching the drift of people in and out of the Transportation Building and listening to their conversation is greater than in former years.

In attendance, the exhibition, which began its second and final week to-day is going to surpass all others unless unfavorable weather develops in the closing days. The previous attendance record is a million and a quarter. Approximately 600,000 persons had passed through the gates when the first week was concluded Saturday night and with to-day—Labor Day in Canada as well as across the line—offering ideal weather and a crowd of more than half a million, the most conservative estimators fix the 1921 aggregate attendance at a million and a half. Of these people, half will pass through the Transportation Building, which houses passenger cars—an interest in automobiles which promises well for the future of motor transportation in the Dominion.

Throughout the first week the automotive men found some buying at the exhibits of cars and a better than casual interest in trucks, shown in tents, and automotive equipment, displayed in one of the old barracks of the war-time period. But trucks and accessories were hardly in the show, practically speaking, because the crowds are used to milling through the great permanent buildings that make this exhibition one of the world's wonders.

The automotive men found some buying of passenger cars, but the general attitude of the public through the first half of the show was to shop around. This gave the Toronto dealers' salesmen manning the booths opportunity to fatten their prospect lists, which promises healthy activity and some sales results during the fall months. But the undercurrent of sentiment, as careful observers noted it at the show, is one of strict economy. There are too many problems of readjustment still confronting the Canadians to warrant anything more than a slow, gradual return of freer investing in such commodities as automobiles.

Show time finds several of the Canadian manufacturers doing some commendably energetic things to stimu-

late the latent desire of every normal man or woman to own a new motor car. These things the Canadians are doing are likely to be more than interesting to American manufacturers. They may contain some practical suggestions for stirring up a sluggish automobile market.

General Motors of Canada has in the show the new McLaughlin (equivalent of Buick) four. Chevrolet has specials both in the FB and 490, the latter job, in particular, being an aggressive bidder for business with an imposing list of special attractions at only \$95 more than the stock job list price. On this 490 special are a front bumper, nicked radiator, lowered steering wheel and seats (one inch), seat side arms flush with side of body, gas tank at rear, green paint with gilt striping and quite a few other features that are causing talk at the show.

Willys-Overland of Canada also has a special Overland four, with a composite body and some other merchandising features that have made it a center of attraction.

The Canadian cars cost more here than American cars of the same name sold across the border, considerably more in some cases than can be accounted for in the duty on raw materials and parts, the difference in exchange and the higher cost of production per unit due to smaller production totals, but in quite a few even conventional particulars the Canadian cars are better made, especially as to body and top finish. Yet the Canadian manufacturers have not had to wait for lessons from the makers in the States to see the possibilities of sales stimulation in special jobs and fittings.

When the Canadian manufacturer or the American manufacturer who is sending cars into Canada goes into a study of his market for the rest of 1921 and 1922 he finds a good many factors that make definite forecasts difficult. Yet some things are quite apparent. They might be enumerated:

1. Canadians are leaning even more strongly than they were a year or a few years ago toward the Canadian-made car. You would hardly say they are resentful, but plainly they are disappointed over the American attitude as expressed in the American emergency tariff, which has raised a little higher the wall of import duties over which leading Canadian products, such as grains, livestock and lumber derivatives, must climb to reach the American markets.

2. The farmers, generally, won't have much money to spend until after the harvest of 1922. They owe most of what the current crops will yield and they must borrow again, in some cases this fall, in others next spring, to carry on their work.

3. There will be sporadic bursts of buying, in which motor cars particularly will profit, but the re-



turn of healthy buying power will be slow—some of the bankers predict it will become weaker before it gets stronger.

4. The failure of the hay crop in Quebec and eastern Ontario and the collapse of the livestock market are offset by the normally good yield of wheat in the great prairie provinces of Manitoba, Saskatchewan and Alberta.

5. The blow to manufacturing by the crippling of export demand is softened by the fact that the bulk of Canadian manufactures are for home consumption and Canadian business, following the curve of that in the United States, is steadily improving.

6. Canada's recovery from the difficulties imposed by the readjustment will follow the recovery of the United States unless the American Congress, on which all eyes are turned in the Dominion, erects a still higher tariff wall in the way of the natural flow of the great mass of Canadian agricultural, livestock, fisheries, fur and manufactured products.

7. Money is comparatively "easy." Credit is readily available for legitimate enterprises, and just now some dealers who were using acceptance corporations to finance stocking of cars are having them shipped on sight draft, indicating that the banks are financing them direct.

The effect of American tariff legislation is one of the chief topics of conversation among well-informed Canadian business men. They are frank to say that Canada's return to prosperity will not be able to follow the return across the border if Canada is forced to search elsewhere for markets, which naturally would take time and seriously injure Canadian business while the searching process was going on.

Just now Canada is upset, and she will be more or less upset the remainder of the year, over the impending general election, called by Premier Meighen on the protective tariff issue. Meighen stands for protection and has decided to stake his government on the question.

As in the past, makers of cars sold in Canada, whether Canadian, American or European, will find high prices and poor roads restricting factors. The Dodge, for instance, whose touring car price is \$985 f.o.b. in the States, is listed at \$1,615 here. And the Maxwell, \$845 in the States, is \$1,250 here. Dodge has to come into the Dominion as a completed vehicle, paying the full 35 per cent import duty; Maxwell is manufactured at Windsor. Yet the difference in Canadian over American price is only the difference between 58 and 61 per cent. Chevrolet in Canada has kept its price within less than 40 per cent over the American figure, but some cars made either in the States or the Dominion, particularly in the high-priced classes, run upward of 70 per cent higher. Motor wise Canadians know these things and some of them have foregone automobiles on the out and out objection to the price differential, regardless of its justice. To the greater number, however, under present conditions it is just a question of buying power, which obviously is not going to be quite so active in the face of the Canadian differential.

Quebec leads in good roads and Ontario, with an appropriation of \$10,000,000 this year and the aggressive better highways man, F. C. Biggs, in charge, is coming right along with roads encouraging for automobile traffic, as are some of the other provinces. Biggs talked to the automotive men and directors of the Exhibition at one of the noonday luncheons in the Administration Building and told them that Ontario would have completed this year 75 to 100 miles of permanently improved highway and 600 to 700 miles of good gravel roads. Biggs proved

to be an enthusiast for motor truck transportation and said he was working "from the bottom up" to build roads fit for trucks. F. W. Fenn of the truck section of the National Automobile Chamber of Commerce, told the Canadians of the development of motor freight transportation in the United States and of its possibilities on the North American Continent.

As to the competition which American and Canadian manufacturers may look forward to from Europe, the indications are plain that the British manufacturers, in particular, will make a strenuous effort to regain some of the ground lost when military restrictions stopped their shipments to the Dominion in the three years before the United States entered the war. The Canadian disappointment over American tariff legislation, previously mentioned, is augmenting the interest shown in the British cars at the exhibition—Vauxhall and Austin. They are costly, of course, Vauxhall being listed at something around \$6,000, while Austin sells for \$4,800, yet they compare quite favorably with the prices of American cars in their classes when the differential imposed by the tariff and loss in exchange are considered.

This attitude of the Canadian toward American products, in fact, deserves attention by American business men who are consulting and being consulted by members of Congress in connection with the framing of the new tariff. The attitude has been repeatedly put into words by well-informed Canadian business men canvassed by dealers as prospects for cars, particularly in the medium and high-priced classes. The Canadian business man shows his interest in the American car—and, of course, if his interest is strong enough he buys it, which is often the case, tariff or no tariff—but sometimes he counters with his feeling, and that of many of his neighbors, that perhaps he is not quite justified in passing his money on to an American manufacturer. He tells the dealer that the United States has been selling goods to Canada at the rate of almost \$800,000,000 a year and buying from Canada in only half that amount, yet the United States adds to its restrictions upon the flow of Canadian goods to America. He reads the advertisements of the big Canadian stores of goods "Made in Canada," a sort of campaign which has been highly popular of late, and he thinks a little more than he might otherwise about cars manufactured in Canada or England, which, of course, is favorable to the Canadian manufacturer, who in virtually all cases is an auxiliary or associate of an American corporation with the same or a similar name. One exception to this rule at the show is London Motors, Ltd., of London, Ont., which shows one of the first cars made under the London name.

A canvass of the truck situation coincident with the show reveals a not unexpected condition, in view of general conditions and the comparative infancy of the truck business in the Dominion. An aggressive distributor of several lines who sold 3000 cars in the fiscal year ending Sept. 1, disposed of only 30 trucks, an extreme condition perhaps, yet one which gives some indication of the stagnation of truck business. In so many sections roads are unfit for any but light trucks and in so many others the truck idea has hardly a foothold that the truck men of the Dominion must go through a long pull of educational and sales work before they get into real momentum. That they are not discouraged is shown by the appearance of 22 truck firms at the Exhibition, despite the unfavorable condition of housing in tents.

The United States, England and Italy are represented in the truck section, in addition to those exclusively Canadian products: H. & K., Harmer & Knowles, Toronto; Mapleleaf, Mapleleaf Mfg. Co., Montreal; National, National Steel Car Corp., Hamilton, Ont.

# Producer Gas as a Fuel for Automotive Vehicles

## Part I

The possibility of operating truck or similar internal combustion engines on gas derived directly from coal is here considered from theoretical as well as from practical angles, while the basic principles of operation of the producer and its auxiliaries are briefly outlined.

By P. M. Heldt

**I**N a report issued about a year ago by a Committee on Motor Fuels of the British Fuel Research Board the view was expressed that that country must depend mainly upon its coal deposits for fuel for its motor cars and other automotive apparatus in the future. There are no oil wells in Great Britain. The shale deposits of Scotland do not seem to be very promising and the only other obvious liquid motor fuel would be alcohol produced from starchy vegetable material, which probably would have to be specially grown for the purpose and would therefore prove quite expensive. Coal, on the other hand, is available in abundance.

The heat energy of coal can be used as the propelling agent of internal combustion motor vehicles in any one of three different ways. In the distillation of coal certain liquid products are obtained, one of which is sold under the name of commercial benzol and forms an excellent motor fuel. With benzol used in an automobile engine the fuel consumption is usually somewhat less than with gasoline, and as the benzol does not cause knocking of the engine at much higher compression than is practical with gasoline, the compression ratio of the engine can be raised and thus the power output increased.

The second method consists in using coal gas as the fuel, the gas being carried along on the vehicle in either a collapsible bag or in a steel bottle under high pressure. This method, with collapsible bags, was employed in England to quite an extent during the war. Its disadvantages are obvious. The third method consists in fitting the vehicle with a gas producer operating on the same principle as producers for stationary power plants, and producing fuel gas as needed as the vehicle proceeds.

### The Weight Problem

Upon an inspection of a stationary producer plant it may appear doubtful whether such a device can be built sufficiently light to permit of its installation on a vehicle, but a review of the history of weight reduction of internal combustion engines gives rise to the highest hopes in this respect. For instance, a single cylinder 60 hp. Otto gas engine running at 210 r.p.m. weighed 25,000 lbs., or more than 400 lbs. per hp. A modern automobile engine weighs little more than 10 lbs. per hp. and an aircraft engine of the lightest type, operating on exactly the same basic principle as the above mentioned Otto engine, weighs less than 2 lbs. per hp. It is quite reasonable to expect that gas producers when specially designed for purposes where lightness is essential, can be reduced to a small fraction

of their normal weight in the stationary form.

The idea of using producer gas as a fuel for motor vehicles, and particularly for motor trucks and tractors, is by no means new. The greatest amount of development work along this line has been done in England, largely, no doubt, by reason of the gasoline shortage in that country during the war and the comparatively high prices of motor fuel there after the war. It is hardly to be expected that in this country, so long as liquid petroleum fuels sell at anywhere near present prices, there will be a demand for a substitute fuel that is materially less convenient and whose use results in a reduction of the engine power. But in countries where the price of gasoline ranges very high and coal is available, producer gas would seem to have a good chance.

### The Producer Process

Producer gas is made from coal in a simple manner. A vertical furnace lined with fire-brick, with openings at both top and bottom, is filled with coal to a considerable depth, the coal resting on a grate. The bed of coal is kindled at the bottom and air is drawn or blown through the furnace, causing a hot fire in the lower part. The combustion of the coal in the lower part of the furnace produces carbon dioxide, but as the latter rises and comes in contact with a layer of coal which cannot burn because of the lack of oxygen, it combines with additional carbon and forms carbon monoxide. It is this carbon monoxide which forms the chief combustible element in producer gas. When made from hard coal in the manner outlined the gas contains about 32.3 per cent of carbon monoxide, 1.6 per cent of carbon dioxide, 4 per cent of hydrogen, 61 per cent of nitrogen and 2 per cent of marsh gas.

That a gas of this character has only low calorific value may be readily seen, as the bulk of it is nitrogen, an inert gas. The heat value of producer gas is given as 72 B.t.u. per cubic foot. The gas can be made from coke, but is then slightly leaner, the average composition being 29 per cent carbon monoxide, 4 per cent carbon dioxide, 2.5 per cent hydrogen and 64.5 per cent nitrogen.

### Water Gas

In the development of gas producers various methods of creating a draft of air through the fuel bed were tried. One way was to use a blower and force the air through, and another to draw it through by suction, as, for instance, by directly connecting an engine to the producer. Later on a steam jet was introduced for creating the draft, and

this had a marked effect on the quality of the gas produced, as the steam, when raised to the high temperature of the incandescent fuel, would dissociate into hydrogen and oxygen. The oxygen thus set free combines with carbon to produce carbon monoxide, while the hydrogen remains in the uncombined state and adds materially to the heat value of the fuel. It might be thought that there would be no gain in the heat value in the gas obtained from a given quantity of coal or coke, because the heat absorbed in the dissociation of the steam is equal to the heat later given out by the combustion of the hydrogen in the gas. However, when steam is injected, it seems that more of the heat of the incandescent fuel is absorbed within the producer and less is radiated, and in consequence the efficiency of the whole producer increases from about 70 per cent without to between 80 and 90 per cent with steam injection. Besides, when no steam is injected, every pound of oxygen required for the combustion of coal to carbon monoxide and carbon dioxide carries with it  $3\frac{1}{2}$  lbs. of nitrogen, which has no heat value and acts merely as a diluent. The oxygen derived from steam does not carry this diluent and the gas therefore is relatively richer. At the present time the injection of steam or vapor is a common practice in producer work.

#### Coolers and Dust Extractors

Gas produced from hard coal or coke carries with it a good deal of fine dust, which must be separated out if the gas is to be used in an engine; gas from coal in addition carries much tarry matter and this must likewise be separated out before the gas can be used in an engine. The former operation is performed in a dust extractor which usually operates on very much the same principle as dry air cleaners on farm tractors. That is, the gas is drawn through a chamber in which it is subjected to a spiral or other curvilinear motion, so that the heavier dust particles separate out at the bends and collect at the bottom of the separator, from which they can be removed at intervals, while the cleaned gas leaves the apparatus on top.

Before the tarry matter can be extracted from the gas the latter must be cooled, for upon leaving the producer the gas is very hot and some of the tarry materials are in a gaseous state. Cooling is effected by bringing the gas in contact with tubes through which cold water runs, or else directly into contact with a cold water spray. Sometimes the dust separator is combined with the cooler.

#### Scrubbers

The apparatus used for removing the tarry material from the gas is known as a scrubber. It takes quite a variety of forms. Sometimes there are counter currents of gas and water spray, and in other devices the gas is allowed to bubble up through water and then pass through a bed of pebbles, coke, sawdust, asbestos wool, etc., these materials being preferably kept moist so the tarry materials will adhere to them. One great difficulty that must be overcome in the design of a producer outfit for motor truck use is to keep the size of the scrubber within practical limits, as in stationary work the scrubber is usually larger in dimensions than the producer itself.

#### Advantages and Disadvantages

As already noted, the use of producer gas on motor trucks would be considered chiefly in countries where petroleum products sell at high prices, and the chief advantage would be the saving in fuel cost. There are, however, a number of other minor advantages. For instance, the fire hazard connected with the vehicle is much less if the fuel supply is in the form of coal or coke, and lower insurance rates could no doubt be obtained on both the vehicle and the garage. Distribution troubles would be

entirely eliminated and there would be no crankcase dilution. As regards fuel costs, it has been calculated that producer gas at \$8.00 per ton of coal is equivalent to gasoline at 9 cents per gallon.

To offset these advantages there are a number of disadvantages. With a gas producer the truck is not instantly ready for a trip at any time. To heat up the producer and get it into working condition takes about 20 minutes. The scrubber requires a cleaning every day, but this can be done while the fire is being lighted and therefore need not involve any loss of time. Not only does the fuel (and water) required to cover a given distance weigh approximately twice as much as with gasoline, but the weight of the producer and scrubber, which varies from 250 to 400 lbs. for a 3-ton truck power installation, is almost completely additional weight, as the only thing replaced on the gasoline truck is the carburetor, which represents only a very small fraction of the above weights.

#### Difficulties of the Producer Problem

If we start with a gas producer as used in stationary work many difficulties are encountered in automobile practice, and these are well summarized by D. J. Smith in a paper presented to the Institution of Automobile Engineers. Mr. Smith says:

"A producer of this type depends entirely for its satisfactory working on the care and attention given by the man in charge. It has no moving or mechanically operated parts. The fire having been lighted, fuel is fed into the producer by the attendant until the hopper is full. Only a thin layer of the fuel is burning at the bottom, the remainder of the fuel above this being exposed to the full heat of the fire, and all the hot gases are drawn up through it. If there are any volatile constituents in the fuel—and even in good anthracite there is a certain proportion—this is the best possible method of distilling them off, but the worst possible method for direct use, as any portion of these volatile constituents would gum up the engine; a very large scrubber has therefore to be fitted, in order to eliminate them, and this requires a large quantity of water, usually about  $1\frac{1}{2}$  gallons per b.-hp. per hour. It will thus be clear that if a producer which is liable to give off tar or volatile matter is used on a motor vehicle, it would not be practicable to fit a scrubber large enough to deal with the gas efficiently, nor would it be possible to carry the quantity of water required for anything but a very short run.

#### Ash Removal and Compacting of Fuel Bed

"As the fuel is consumed, a layer of ashes is deposited on the bars which, unless periodically removed, deadens the fire and the production of gas falls off. To remove these ashes, a firedoor has to be opened so that they may be raked out by the attendant, and this has to be carried out quickly, or air will enter which may stop gas production or cause an explosion in the producer.

"The deep bed of fuel also burns hollow, which tends to stop the full gas production. If this is knocked in by the attendant, the resulting disturbance generally destroys the production of gas so that the engine stops, and the producer has to be fanned up to get it to work again. The poking of the fire, to destroy or prevent these hollows, has to be carried out by the attendant through small holes normally closed by plugs, and as it is impossible to see what is happening, it is not a very efficient operation.

"The feeding of the fuel is performed by hand, and the fuel passes through an air lock, as it is essential that no air be allowed to leak into the generator during the operation. If, as occasionally happens, the attendant leaves both doors of the air lock open, either the engine stops or an explosion occurs. With fuel fed in this manner, it is

quite obvious that there is at one time too much fuel in the producer, and at another too little. In any case, there is no connection between the quantity of fuel fed and the work that is being done, and, therefore, the quality of the gas must be very variable.

#### Water Feed

"The supply of water to the producer is a most important point, in view of the part played by the water vapor in the composition of the gas. The control of this is generally left to the attendant, who regulates it without anything to guide him as to the quantity required, though in one or two cases the suction of the engine is made to control the feed of water, but even here there is no definite regulation.

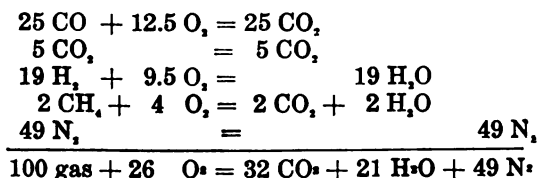
"The inflexibility of the ordinary producer is bound up with the lack of control of the water supply and the form of fire bed used. If it is assumed that a producer is working on a steady load, air is being drawn over the surface of the water in the vaporizer and takes up a certain quantity of steam. If the load is suddenly increased, more air would pass over the water, but no increase of steam would be available; in fact the tendency would be to cool the water down and decrease steam production. The gas would therefore be of lower quality, and the engine, instead of responding to the increased load, would stagger and possibly stop. Even if the steam were available, the fire, possibly with a layer of ashes between it and the bars and a bed of dead fuel above it, cannot respond rapidly, and would be cooled out by the sudden increase of steam drawn through it, and the quality and quantity of the gas would be still further reduced."

#### Air Required for Combustion of Producer Gas

It has long been known that a stationary engine running on coal gas generates less power than the same engine operated on gasoline, and the same is generally true of all engines operating on gaseous fuel. The chief reason is that these fuels occupy a considerable space in comparison with the air required for their combustion, whereas the space occupied by gasoline vapor in a perfectly proportioned mixture is less than 2 per cent. Moreover, the reactions are entirely different in the gas engine than in the gasoline engine. In an engine operating on producer gas the bulk of the heat generated is due to the combustion of carbon monoxide into carbon dioxide. From the composition of the producer gas it is possible to calculate the volume of air required to completely burn a certain volume of the gas, and thus the ratio of volumes can be found. Let us take a producer gas having the following composition:

Carbon monoxide .....	25 per cent
Carbon dioxide .....	5 per cent
Hydrogen .....	19 per cent
Marsh gas .....	2 per cent
Nitrogen .....	49 per cent

By Avogadro's law equal volumes of gas at equal pressure contain the same number of molecules. In the combustion of the gas one molecule of carbon monoxide combines with one atom (or one-half molecule) of oxygen; one molecule of hydrogen combines with one-half molecule of oxygen and one molecule of marsh gas combines with two molecules of oxygen. The volume relations of the combustion therefore are as follows:



or 102 parts of burned gas. In the table all figures represent parts by volume.

The above would be the reaction if the gas were burned in pure oxygen. However, the gas is burned in air, and the oxygen forms only 21 per cent by volume of atmospheric air. The other 79 per cent are inert gases, mostly nitrogen.

Hence, instead of 26 parts of oxygen combining with the fuel,

$$26 \times \frac{100}{21} = 119 \text{ volumes of air}$$

combine with it, and the products of the combustion of 100 parts of gas in 119 parts of air form 195 parts by volume. Thus the gases occupy less volume after combustion than before, when reduced to the same temperature and pressure. This is the reverse of what takes place when gasoline vapor is burned.

Calling the capacity of the cylinder (the piston displacement) 100 per cent, the fuel of a properly proportioned charge occupies

$$\frac{100 \times 100}{100 + 119} = 45.7 \text{ per cent}$$

and the air,

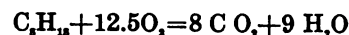
$$\frac{100 \times 119}{100 + 119} = 54.3 \text{ per cent,}$$

while the products of combustion occupy

$$\frac{195}{100 (100 + 119)} = 89 \text{ per cent.}$$

#### Air Required for Combustion of Gasoline

A little calculation will show how different the relations are in the case of gasoline fuel. Octane may be considered as typical of present-day gasoline. Its combustion reaction is



One volume of gasoline gas + 12.5 volumes of oxygen = 17 volumes of burnt gas.

For the combustion in air we require

$$12.5 \times \frac{100}{21} = 59.6 \text{ volumes of air,}$$

containing the 12.5 volumes of oxygen required together with 47.1 volumes of nitrogen and other inert gases, and the equation of the combustion reads

1 vol. of gasoline gas + 59.6 vol. of air = 64.1 vol. of burnt gas. Or, calling the cylinder volume 100 per cent,  
1.65 vol. of gasoline gas + 98.35 vol. of air = 105.7 vol. of dead gas.

#### Heat Energy of Combustible Mixtures

Now, the power which an engine can develop does not depend solely upon the amount of air which the cylinder can draw in during each cycle, but also upon what this air is used for. A different amount of heat is liberated per unit volume of oxygen used for each of the different chemical reactions. The amounts of heat generated per pound of oxygen consumed in the different reactions are as follows:

Carbon to carbon dioxide, 5,300 B.t.u.

Carbon monoxide to carbon dioxide, 7,670 B.t.u.

Marsh gas to carbon dioxide and water vapor, 6,030 B.t.u.

Hydrogen to water vapor, 6,560 B.t.u.

The total amounts of oxygen available in the cases of the producer gas engine and the gasoline engine are 54.3 and 98.35 volumes respectively. In the case of the producer gas engine 12.5/26 of the entire amount of oxygen is used for converting carbon monoxide into carbon dioxide; 9.5/26 for converting hydrogen into water vapor; and

4/26 for converting marsh gas into carbon dioxide and water vapor. The heats of the various components of the fuel therefore figure out as follows:

Carbon monoxide	$54.3 \times (12.5/26) \times 7,670 = 200,000$
Hydrogen	$54.3 \times (9.5/26) \times 6,560 = 130,000$
Marsh gas	$54.3 \times (4/26) \times 6,030 = 50,400$

Total	380,000
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In the case of the gasoline engine we have 98.35 volumes of oxygen available. Two-thirds of this oxygen are used to convert carbon into carbon dioxide and one-third is used to convert hydrogen into water vapor. The heats of reaction are therefore as follows:

Carbon	$98.35 \times \frac{2}{3} \times 5,300 = 347,000$
Hydrogen	$98.35 \times \frac{1}{3} \times 6,560 = 215,000$

Total	562,000
-------	---------

From this must be deducted about 2 per cent for the heat of formation of the gasoline; that is to say, before the gasoline can be transformed into carbon dioxide and water vapor it must be broken up into carbon and hydrogen, and this requires a certain amount of heat energy.

562,000 — 2 per cent = 550,000 B.t.u.

Therefore, the heat energy in a cylinder full of gasoline vapor-air mixture bears to the heat energy in a cylinder full of producer gas-air mixture the proportion

550,000 : 380,400

or 100 : 69.4

#### Increased Compression Possible

This latter figure represents the relative amount of power which can be expected if the producer gas is used in a gasoline engine without any change in the compression. However, as there is no knocking with producer gas at ordinary compressions, it is quite possible to increase the compression, and compressions of 125 lb. per sq. in. are considered practicable. In other words, instead of a compression ratio of 4, commonly used in gasoline engines, we could use a compression ratio of 6. The theoretical efficiency varies according to the equation

$$e = 1 - \left(\frac{1}{r}\right)^{0.3}$$

and as the amount of fuel charge drawn in would be independent of the compression ratio it is reasonable to assume that the output would increase in the same proportion as the efficiency.

$$1 - \left(\frac{1}{4}\right)^{0.3} = 0.341$$

$$1 - \left(\frac{1}{6}\right)^{0.3} = 0.341$$

With such an increase in compression in the producer gas engine the powers of the gasoline and gas engine therefore would be to each other as

$$100 \times 0.341 : 69.4 \times 0.416$$

or as 100 : 84.7

Consequently, even with very high compression, only about 85 per cent as much power can be expected from the producer gas engine as from the gasoline engine, and at the same compression, only about 70 per cent. It should be pointed out, however, that the gas made the basis of this analysis is so-called water gas, containing a considerable proportion of hydrogen. With producer gas made without steam injection the engine output drops to about 50 per cent.

#### Comparisons Made By Fuel Committee

During the war a committee of the British Fuel Petroleum Executive was formed to look into the practicability of using various gases as substitutes for gasoline in motor vehicles. In the report of this committee it was stated that 250 cu. ft. of free coal gas was equal to one Imp. gal. of gasoline (200 cu. ft. = 1 U. S. gallon), the gas containing from 490 to 500 B.t.u. per cu. ft. This evidently allows for a slightly higher thermal efficiency with the gas, because one gallon of gasoline (6 lbs.) contains 115,000 B.t.u., whereas 200 cu. ft. of gas of 490 to 500 B.t.u. per cu. ft. would have only 98,000 to 100,000 B.t.u. With portable suction gas plant, the report states, a performance of 1.8 ton-miles can be obtained per pound of coke and 2.2 ton-miles per pound of hard coal. The report also stated that an ordinary motor vehicle engine, unaltered structurally, when operating at between half and full load, would do 91 per cent the work on coal gas of 450 B.t.u. per cu. ft., 87 per cent the work when operating on producer gas of 210 B.t.u. per cu. ft., and 82 per cent the work when operating on producer gas having 140 B.t.u. per cu. ft., as with gasoline. It was figured that with hard coal at 55s. per ton and gasoline at 3s. 8½d. per Imp. gal. the fuel cost per ton-mile was only one-twelfth as much with producer gas as with gasoline. This comparison probably does not take account of the fact that when a truck is standing the engine operating on producer gas must be kept running in order to keep the gas producer going, and when operating at very slow rates the efficiency of the producer is undoubtedly quite low. All fuel consumption of the machine, therefore, does not stop with the shutting down of the truck, as it normally does in the case of a truck operating on gasoline.

(To be continued)

## Standardizing Radiator and Bumper Fittings

THE present Society of Automotive Engineers standard for radiators specifies inlet and outlet flanges identical in dimensions to the S. A. E. standard two-bolt carbureter flanges. It also specifies that the fittings themselves shall be cast separate from the radiator tanks. If the radiators are shipped with the fittings cast on there is danger of their breaking off during transportation and the automobile and truck manufacturers can purchase them to better advantage than the radiator manufacturers because they are purchasing a larger amount of castings.

As it seems desirable to have a standard for these fittings so that they can be sold as a standard part, a tentative specification for water-pipe fittings has been laid out, using the dimensions specified by the S. A. E. Radiator Division for the pad dimensions and the dimensions for the length of fittings and the outside diameters specified in the present S. A. E. standard for rubber hose

clamps and fittings. Blue-prints of this tentative proposal have been mailed recently to radiator manufacturers and users for their criticism.

#### Automobile Bumper Mounting

The passenger-car manufacturers have been circularized by the S. A. E. requesting their opinions as to whether or not the standardization of a plain bolted-on bumper connection would, if adopted by the Society, be generally adopted in future passenger-car practice.

The replies to this general letter indicate that twenty-one out of twenty-four companies, or 90 per cent, believe that such standardization is most advisable.

It is expected that the Subdivision on Automobile Bumper Mountings will be able to submit a preliminary recommendation at the September meeting of the Parts and Fittings Division.



# The Influence of Various Fuels on Engine Performance

## Part VI

In this instalment the author outlines tests intended to determine the conditions which govern ease of starting with various fuels, and the effect of the fuel upon the volumetric efficiency, as well as upon distribution in multi-cylinder engines. Gasometer is used for air measurements.

By H. R. Ricardo\*

IT is proposed in this article briefly to examine the conditions governing ease of starting, distribution and volumetric efficiency, and to consider in what ways these conditions react favorably or otherwise toward one another.

### Starting

Ease of starting must be considered from two different aspects, namely, (1) the ease with which an engine can be induced to start running under its own power, and (2) the time taken to warm up sufficiently to give full power.

It is common experience that while a motor-car engine can be started up with ease it may take as much as five or six miles running before the engine will "pull" well, more particularly when the carbureter setting is such as to deliver a rather weak and therefore an economical mixture.

The conditions governing the ease or otherwise of gaining the initial start will be considered first. They have proved extraordinarily difficult to determine because so many factors enter into the case, such as the condition of the sparking plugs and the strength of the spark, which has usually to be provided from a magneto running at a very low speed, and also the speed at which the engine is rotated.

To start an engine from cold it is necessary to have present in the cylinder at the time of ignition a sufficient proportion of vapor to form an explosive mixture. The formation of this vapor must be effected notwithstanding the fact that not only the whole of the induction system but the cylinder walls, pistons, and valves are all quite cold, and also that the velocity in the induction system is at a minimum.

If, at starting, the carbureter were supplied only with a mixture of strength just sufficient to give good economy under normal running conditions, the engine would certainly never start from cold with even the most volatile gasoline. On the other hand, if an excessive quantity of liquid fuel be admitted to the cylinder, or it is spread over the internal walls of the induction system, the large surface of liquid thus exposed will allow a sufficient quantity of the more volatile fractions, even of the least volatile of the present day gasolines, to evaporate and so produce a combustible mixture. Even in cold weather, therefore, it is possible to start an engine from cold with any reasonable fuel.

From these considerations the following conclusions may be drawn:

(a) On no gasoline will an engine start from cold with an economical mixture strength.

(b) On commercial gasoline an engine will start from cold provided sufficient fuel of reasonable quality is admitted.

In all fuels belonging to the group known as gasoline, some of the light fractions, which occur in the majority of crude petroleums, exist. These light fractions consist either of hexane, cyclohexane or benzene and often of all three of these substances. Even in the least volatile gasolines these light fractions are present to some extent, and their presence renders starting from cold possible.

In all modern carbureters some means, such as a pilot jet, is provided in order to deliver a very rich mixture for starting and slow running, and this is generally supplemented by flooding when starting from cold. How much flooding is required depends primarily upon the arrangement of the induction system. When the induction pipe is of large diameter so that when turning by hand the velocity through it is very low, and when the carbureter is fitted at the lowest point with efficient drain holes, it is sometimes found that no amount of flooding will suffice for the less volatile gasolines, and that fuel must be injected either into the cylinders or into the upper portion of the induction system. On the other hand, when the induction system is of small cross section so that even when turning by hand the velocity is high enough to raise and spread the liquid fuel over the whole surface of the combustion chamber, an engine will usually start readily enough after flooding the carbureter even with a gasoline of low volatility. If the mixture from the pilot jet is sufficiently rich it will often start without any flooding at all. In some cases the induction system is so arranged that when the carbureter is flooded freely the quantity of liquid fuel taken into the induction system and cylinders is so large that the proportion of vapor to air becomes too great and the engine will fail to start from over richness. The ease, therefore, with which an engine can be started from cold can be said to depend upon the following:

(a) The arrangement and proportions of the induction system and carbureter combined with the degree of flooding which is possible.

(b) The adequacy of the pilot jet to supply a comparatively large quantity of very rich mixture, and

(c) The proportion of hexane, cyclohexane or benzene

\*From a preliminary report (slightly condensed) on research work conducted by the author for the Asiatic Petroleum Co. and published in *The Automobile Engineer*.

or other very volatile fraction in the fuel which determines the amount of flooding required.

With the least volatile of the gasolines tested it was always found possible to provide an over rich mixture on the coldest days either by doping the cylinders or, in some cases, merely by excessive flooding of the carbureter, depending on the induction system design.

Fuel	A S.G. at 15 Deg. C.	B (Boiling Point (Engler- Distillation) at				C Inlet Temp. with Std Heat g. Deg. C.	D Inlet Temp. with Std. Heat g. Deg. F. Vapor Pressure at 0 Deg. C. (32 Deg. F.) Mm. of Mercury
		140 Deg. F., 60 Deg. C., %	170 Deg. F., 80 Deg. C., %	212 Deg. F., 100 Deg. C., %	248 Deg. F., 120 Deg. C., %		
Gasoline "F"	0.704	1	27	65	86.5	20.3	68.8
Heptane ....	0.691	Bolls at 98 deg C.			(208 deg. F.)	20.5	11.5

The conclusions so far recorded apply to the composite fuels known as gasolines. The statements are not applicable to pure substances having constant boiling points. For instance, it was found almost impossible to start from cold on pure heptane even with the most careful priming of the cylinder and any degree of flooding. This test is interesting since the boiling point of heptane is practically the same as the average of that of gasoline "F," which is a very light aircraft spirit. Table XII shows a comparison of these two fuels. The inlet temperature as shown in column C of this table, gives (as will be described later) an approximate measure of the mean volatility. Column D shows the vapor pressures at 0 deg. C. of these fuels. It will be seen that while the mean boiling point and mean volatility (as indicated by induction pipe temperature) is practically the same for these two fuels, the vapor pressure under the same low temperature is very different. The fuel with the high vapor pressure started from cold with extreme readiness, while the heptane, with a vapor pressure of only 11.5 mm. of mercury column, would not start at all.

It is evident that in so far as the influence of the fuel is concerned the vapor pressure is indicative of the readiness of a fuel to start from cold. As will be shown later the mean volatility, on the other hand, largely controls the time taken to get fully under way.

There are other considerations bearing on the problem of starting from cold when fuels other than petrol and benzol are used. Two of these new factors are:

- The ratio of fuel to air required to provide an inflammable mixture, and
- The heat required to supply the latent heat of evaporation.

For any gasoline and even for a commercial benzol, both the fuel to air ratio (by weight) and also the latent heat of evaporation are approximately the same. Up till now, therefore, these variables have been neglected in regard to their effect upon ease of starting. So soon, however, as the alcohols and allied substances come under consideration as fuels these new factors must be taken into account. Table XIII shows a comparison of some typical pure substances. The first three, namely, hexane, cyclohexane, and benzene, represent the volatile portions of most gasolines.

From this table (column E, which gives the ratio between the weights of air and fuel required to provide a mixture giving just complete combustion) it is seen that for the volatile constituents of gasoline approximately 1/14 of the weight of air is required. For ether 1/11 of the weight of the air gives a correspondingly inflammable mixture, and for ethyl alcohol as much as 1/9 of the weight of the air present must consist of fuel vapor. From Column D it is seen that there is comparatively

little variation between the latent heats of the fuels named except for alcohol. The latent heat absorbed in vaporizing a pound of alcohol is no less than two and a half times as much as that required to vaporize the same weight of gasoline. Approximately 1.6 times the weight of alcohol is required to give an inflammable mixture with a given cylinder full of air, so that almost exactly four times the quantity of heat is required to furnish a combustible mixture with alcohol as compared with gasoline.

As a practical means of using alcohol the addition of comparatively small proportions of ether, with its high vapor pressure, renders starting quite easy.

So far, the problem of effecting the initial start only has been considered. As to how long a period must elapse before the engine will develop its full power depends on quite other factors than those already mentioned. The most important probably are:

- The mean volatility of the fuel.
- The arrangements provided for warming the carbureter or induction system.
- The design of the carbureter and
- The equality of distribution of the fuel to the different cylinders.

The term "volatility" here may be taken in its broadest sense, meaning the readiness with which a liquid vaporizes under any given temperature conditions. Many tests were carried out on the road with different gasolines for the purpose of investigating roughly the effect of volatility upon the time taken in getting under way with a motorcar. In each case the engine was started up from all cold and immediately driven along a level road with the carbureter set to give rather a weak mixture. The distance traveled before top gear could be taken was carefully noted, and the results were found to agree generally with the volatility tests which will be described later.

Much clearly depends upon the arrangements for heating the induction system. When the passages are water jacketed the heating up is naturally very slow because of the large heat capacity of the system; on the other hand, when the system is exhaust heated, the heat capacity is relatively small and it rapidly attains its normal working temperature.

	A S.G. at 15 Deg. C. (59 Deg. F.)	B		C Vapor Pressure at 0 Deg. C. (32 Deg. F.) Mm. Mercury	D Latent Heat B.t.u. per Lb.	E Air: Fuel Ratio by Weight
		Boiling Point, Deg. Cent.	Boiling Point, Deg. Fahr.			
Hexane .....	0.670	69	156	45.0	156	15.2
Cyclohexane .....	0.780	81	178	27.5	155	14.7
Benzol .....	0.884	80	176	26.0	172	13.2
Ethyl alcohol....	0.794	78	172	12.7	397	8.95
Ether .....	0.719	35	95	185.0	158	11.14
Heptane (pure) .	0.688	98	208	11.5	133	15.1

Carbureter designs naturally influences greatly the readiness with which power and flexibility of running are gained after starting a cold engine. If the means of compensation are effective, thereby eliminating "blind spots," i.e., conditions of throttle opening or engine speeds where the mixture becomes unduly weak, then sooner will it become possible to get the engine under full power, even when it is not yet thoroughly warmed up.

Equality of distribution is hardly less important than adequate compensation in the carbureter in its effect upon the time taken to get under way. If we assume that the carbureter delivers to the induction system a mixture of normal strength, then so long as the distribution is uniform there is still some range available on the weak side. Consequently, regular running will be ob-

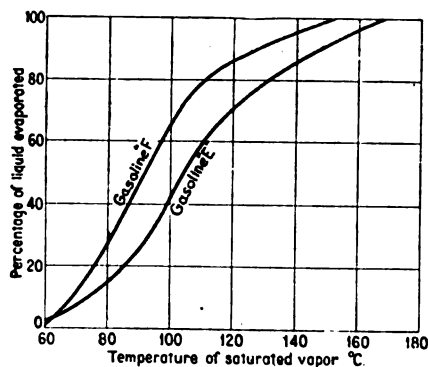


Fig. 21.

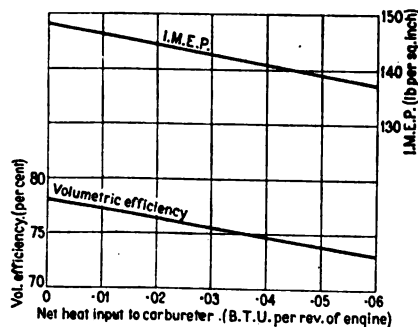


Fig. 25.

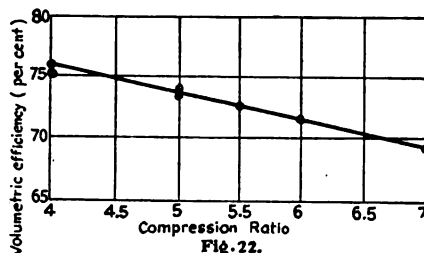


Fig. 22.

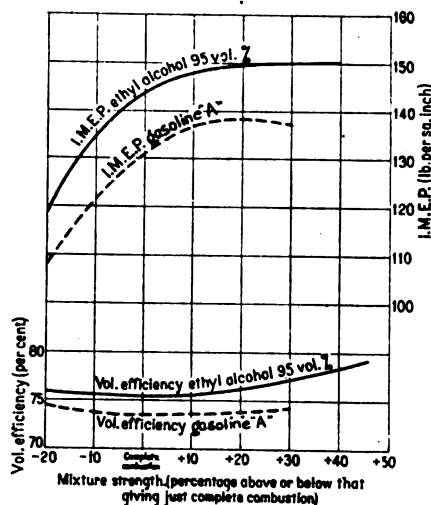


Fig. 24.

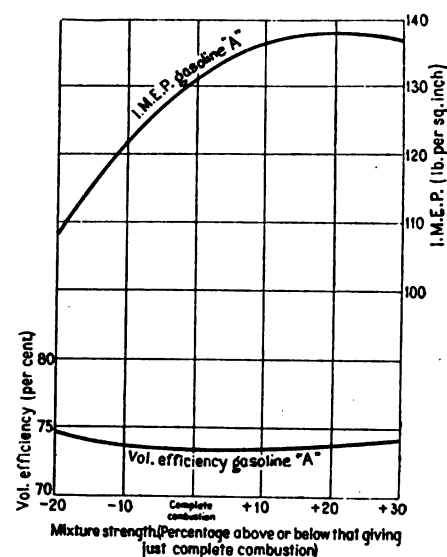


Fig. 23.

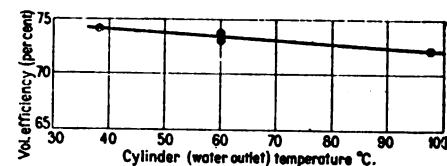


Fig. 26.

Fig. 21—Curves showing relation between temperature of the saturated vapor and the percentage of the total fuel boiled off when each temperature is reached, obtained by distillation in an Engler flask. Fig. 22—Variation in volumetric efficiency with different compression ratios. (Constant mixture strength giving just complete combustion. Speed constant 1500 r.p.m. Jacket temp. constant 60 deg. C. (140 deg. Fahr.). Heating to air intake constant 0.056 B.t.u. per rev. Fuel, gasoline "A." Fig. 23—Variations of volumetric efficiency and I.M.E.P. with varying mixture strength. (Compression ratio constant at 5:1 and all other conditions constant.) Fig. 24—Variations of volumetric efficiency and I.M.E.P. with varying mixture strength. (Compression ratio constant at 5:1 and all other conditions constant.) Fig. 25—Curves showing variations of volumetric efficiency and I.M.E.P. with varying heat input to carburetor. (Compression ratio constant at 60 deg. C. [140 deg. Fahr.].) Mixture strength 20 per cent richer than that giving just complete combustion. Fuel, gasoline "A." Fig. 26—Curve showing variation of volumetric efficiency with change of cylinder temperature. (Compression 5:1. Other conditions constant as for Fig. 22.)

tained before the engine and induction system have reached their normal temperature. With poor distribution, whereby one or more cylinders receive a mixture weaker than the rest, the available range of mixture strength is much reduced, and consequently until everything is well warmed any attempt to open the throttle is frustrated by "popping back" due to the after-burning caused by excessive weakness of mixture in one or two cylinders.

### Mean Volatility of the Fuel

In the preceding notes on starting use has been made of the term "mean volatility." Before dealing with the subject of distribution it will be well to define exactly what is meant by mean volatility, which so far as the nature of the fuel is concerned is the most important factor controlling the time taken to obtain full engine power.

As described in a previous article on power output, a standard test was made with each fuel. The method adopted was to provide the air, as it was drawn to the carburetor, with a constant supply of heat, the heat being given by means of an electrical resistance and being measured accurately by an ammeter and voltmeter in the circuit. By driving the engine at definite speeds, by means of the electrical dynamometer, it was found possible to determine with accuracy the temperature which would, under running conditions, be recorded in the induction passage for any given supply of heat to the air if no fuel were supplied to the carburetor. When the fuel was turned on and its flow was adjusted to give a suitable standard mixture strength, the fall in temperature, caused by the latent heat of evaporation, was

noted for different fuels. Having ascertained the constants for a number of the standard fuels by means of tests made by driving the engine, it was found that the behavior as regards vaporization of the various fuels could be studied with equal accuracy when the engine was actually running under its own power.

By means of motoring tests while only air was admitted to the carburetor it was possible to determine the proportion of the heat which was lost, presumably, mainly owing to the slight blow back which occurs at inlet valve closing. This test, which was made at various engine speeds, consisted in rotating the engine while cold (and without fuel) at a constant speed, and supplying the air intake heater with a known quantity of heat, the difference between the temperature of the air in the induction pipe and that of the outside air being noted.

Since both the specific heat and the weight of air passing was known within fairly close limits, the actual quantity of heat taken into the engine could be calculated. In this determination the only assumption made was in regard to rate of flow of air. Subsequent tests, some of which are described below, made with a displacement air meter, showed that the estimated flow, taken from calculated volumetric efficiency, agreed with the measured flow within such close limits as to affect the results of the heater tests to only a negligible degree.

Having determined the corrections required for measuring the actual heat supply under any conditions of engine speed, tests to measure the effective volatility of the fuel under running conditions could be made.

The standard test made on each of the fuels referred to in these articles included the following readings:

TABLE XIV

Fuel	S.G. at 15 Deg. C., 69 Deg. F.	Temp. Rise, Deg. C., Measured in Induction Pipe with Std. Heating	Boiling Point (Engler Distillation) at										Latent Heat B.t.u. per lb.	Air-Fuel Ratio by Weight	Vapor Pressure at 0 Deg. C. (32 Deg. F.) Mm. Hg.
			140 Deg. F., 60 Deg. C., %	176 Deg. F., 80 Deg. C., %	212 Deg. F., 100 Deg. C., %	248 Deg. F., 120 Deg. C., %	284 Deg. F., 140 Deg. C., %	320 Deg. F., 160 Deg. C., %	356 Deg. F., 180 Deg. C., %	Final, Deg. F.	Final, Deg. C.				
<i>Gasolines</i>															
Aromatic free	0.718	+10.0	1.0	16.0	49.0	72.0	85.0	93.0	..	..	..	133	15.05	..	..
"A" gasoline	0.782	+11.0	..	5.0	15.0	54.0	83.0	96.0	..	227	164	142	14.3	28.0	..
"B" gasoline	0.723	+3.0	4.0	27.0	79.0	99.0	..	..	..	259	126	140	14.7	86.0	..
"C" gasoline	0.727	+7.0	..	11.5	47.0	79.0	92.0	98.5	..	320	160	135	14.8	54.0	..
"D" gasoline	0.760	+11.0	..	..	13.0	66.0	89.0	97.5	..	331	166	132	14.6	18.0	..
"E" gasoline	0.719	+10.5	2.0	14.5	43.0	71.0	86.0	96.0	..	338	170	133	14.9	70.0	..
"F" gasoline	0.704	+5.3	1.0	27.0	65.0	86.5	94.5	..	..	307	153	134	15.0	68.0	..
"G" gasoline	0.750	+18.0	..	7.0	24.0	47.0	67.0	81.5	91.0	410	210	..	..	44.0	..
"H" gasoline	0.767	+12.0	..	1.0	7.0	55.0	83.0	94.0	..	349	176	145	14.7	17.0	..
<i>Heavy Fuels</i>															
Heavy aromatics	0.885	+28.0	8.0	30.0	50.0	65.0	77.0	90.0	..	527	275	136	13.8	..	..
Kerosene	0.813	+31.0	..	22.0	36.0	50.0	63.0	76.0	86	572	300	108	15.0	..	..
<i>Paraffin Series</i>					Range of Boiling										
Hexane (80%)	0.685	0.0	..	..	Deg. Cent		Deg. Fahr.					156	15.2	45.0	..
Heptane (97%)	0.691	+5.5	..	..	40.0 to 88.0		104.0 to 190.0					133	15.1	11.5	..
<i>Aromatic Series</i>															
Benzol (pure)	0.884	+7.3	..	..	80.0 to 80.0		176.0 to 176.0					172	13.2	26.0	..
Toluene (99%)	0.870	+8.0	..	..	110.0 to 110.0*		230.0 to 230.0*					151	13.4	9.0	..
Xylene (91%)	0.862	+18.0	..	..	84.0 to 143.0		138.0 to 289.0					145	13.6	..	..
<i>Naphthene Series</i>															
Cyclohexane (93%)	0.786	+3.0	..	..	80.8 to 81.0		177.5 to 177.8					156	14.7	27.5	..
Hexahydrotoluene (80%)	0.780	+3.0	..	..	95.5 to 101.2		204.0 to 214.0					138	14.7	..	..
Hexahydroxylene (60%)	0.744	+13.5	..	..	103.0 to 123.0		217.0 to 253.0					133	14.8	..	..
<i>Alcohol Group</i>															
Ethyl alcohol (98%)	0.798	+1.5	..	..	78		173					406	8.9	12.5	..
Methyl alcohol (purified)	..	..	..	..	..		..					500	6.5	28.0	..
wood naphtha	0.829	+8.5	..	..	..		..					450	8.0	..	..
Methylated spirits	0.821	+1.0	..	..	..		..					180	11.0	185.0	..
Ether (dilute)	0.730	..	..	..	35		95					..	..	..	..

\*Approximate

(a) Temperature recorded by thermometer in the induction pipe close to the inlet valve housing.

(b) Temperature of the outside air before entering the heater.

(c) The net heat input to the carbureter.

(d) Fuel consumption.

For the standard test the net heat input was maintained constant at 0.0433 B.t.u. per revolution of the engine. The fuel consumption was adjusted as nearly as possible to that giving a mixture strength 20 per cent greater than that required for complete combustion, this being the mixture strength at which maximum power is obtained with fuels such as gasoline and benzol. The temperature rise or fall, i.e., the difference between reading (a) and reading (b), is given in Table XIV for most of the fuels tested. (See Column B.)

In this table is shown (Column C) the boiling point or boiling range of each of the fuels named. In Column D the latent heat per lb. is given, and in Column E the air-fuel ratio for just complete combustion is shown. Finally, in Column F the vapor pressure at 0 deg. C. (32 deg. Fahr.) is indicated.

An examination of the table shows that the temperature rise above atmospheric temperature (or the fall below that temperature in the case of the very low boiling point fuels) varies consistently with the boiling point or with the average boiling point as given by the Engler distillation curve. It may be seen, also, that the temperature rise bears no relation whatever to the vapor pressure. For example, in Fig. 21 the distillation curves of gasoline "E" and "F" have been drawn from the values shown in Table XIV. While, as will be seen from the table, these two fuels have almost exactly the same vapor pressure, the average boiling points as shown by

the curves are approximately 104 deg. C. and 92 deg. C. (219 deg. Fahr. and 197 deg. Fahr.) respectively. The temperature as measured in the induction pipe clearly indicates the difference in the mean volatility. For gasoline "E" the temperature rise was 10.5 deg. C. (18.9 deg. Fahr.), while for gasoline "F" it was only 5.5 deg. C. (9.9 deg. Fahr.).

Since the lower temperature must be caused by more rapid evaporation within the induction system these temperatures may fairly be taken as a good indication, relatively, of the effective or mean volatility of the fuel.

Temperature readings are given in Table XIV for alcohol and other substances having high latent heats. In these cases, it must not be assumed that the measured temperature is always a true indication of the rate of evaporation taking place within the induction pipe, since where there exist considerable differences in latent heat an exact comparison becomes altogether too complicated.

### Distribution

To obtain equality of mixture strength or good distribution to a number of cylinders fed by one carbureter is one of the most difficult and complex problems which confront the designer of an internal combustion engine. No attempt will be made to deal with all the mechanical considerations which have to be taken into account, since anything approaching a complete treatise on this subject would be far too lengthy to include here; moreover a complete knowledge is by no means available. In passing, however, it may be remarked that for three, four, six and eight cylinder engines complete mechanical symmetry is impossible if only one carbureter is used.

At a time when so much still remains to be learned as to conditions governing distribution in a multi-cylinder engine it would be unwise to attempt to draw too many conclusions as to the influence of the nature of the fuel upon distribution. This much, however, seems to be fairly clear, namely, that the uniformity of distribution, that is, the uniformity of mixture strength supplied to each individual cylinder of any group drawing from one source of supply, depends primarily upon the design of the induction system generally and to a surprisingly small extent upon the nature of the fuel. A really well designed and efficient distribution system appears to maintain nearly the same uniformity of mixture strength on all fuels, while a badly designed system will give poor results on all fuels, though its defects are more accentuated the lower the volatility of the fuel.

It is concluded from observations on various multi-cylinder engines that the question of distribution and its relation to the fuel must be considered from two independent standpoints:

(1) The uniformity of the mixture strength supplied to each individual cylinder from any one source of supply.

(2) The uniformity of the mixture strength delivered to the induction system as a whole.

With regard to the first of these points, it may safely be accepted from the outset that the mixture entering the cylinder under almost all conditions of running consists of a non-homogeneous mixture of air, fuel vapor and liquid fuel. Only when running throttled, and then probably only after the induction system has been warmed by previous running, can it be assumed that the charge reaches the inlet valves as a mixture of vapors only.

It is clear that since both the liquid fuel and the air are traveling at approximately the same velocity the inertia of the former is greater, and that to avoid inequality of supply as between different cylinders it is most important that the induction system shall be as symmetrical as possible. Provided that not more than three cylinders are drawing from any one source of supply it is not difficult to design a reasonably symmetrical and uniform induction system, but so soon as the number drawing from one carbureter exceeds three the difficulty is greatly increased; for not only is the sequence of the induction strokes disturbed, but the effective induction periods themselves overlap.

From the above considerations it will be apparent that the uniformity of distribution as between individual cylinders is mainly a problem of induction pipe design, and only in a secondary degree is it affected by the nature of the fuel. The extent to which the nature of the fuel influences equality of distribution is most difficult to investigate accurately. No suitable apparatus as yet exists on which the behavior of fuels in this respect can be fully explored.

The next point to be considered is the influence of the nature of the fuel upon the uniformity of the mixture delivered to the induction system as a whole. To appreciate this problem we must try to visualize the changes that occur in the induction system when the load is varied. What occurs in any manifold appears to be substantially as follows:

When the engine is throttled and is running light the absolute pressure in the induction system may be as low as 5 lb. per sq. in., or about 10 lb. per sq. in. below atmospheric pressure. The effect upon the liquid fuel is exactly as if its mean volatility had been suddenly increased. Its latent heat is practically unaltered, but it will tend to evaporate at a much lower temperature.

The latent heat required to produce evaporation is obtained partly by lowering the temperature of the small quantity of air that is drawn in under throttled conditions, but also, and probably chiefly, by conduction through the carbureter and induction pipe. If now the throttle is opened, the pressure within the induction system rises immediately, and a large proportion of the entering fuel is precipitated on the previously dry walls. Such precipitation then continues until the walls are thoroughly wetted, the thickness of the layer of liquid depending upon the design of the system generally, also upon the temperature of the walls and the velocity of the gases. For any given design of system the lower the velocity, and therefore, also, the lower the engine speed, the greater the thickness of the layer so formed. Now unless the carbureter supplies a very rich mixture at this stage the cylinders will receive only a weak mixture until the requisite layer has been formed, with the result that the engine will either stop altogether, or will fire back into the carbureter due to the slow burning. If now the carbureter be so adjusted as to supply under these conditions a mixture sufficiently rich in fuel, not only to meet the condition of supplying liquid to line the walls, but, at the same time, to supply over and above this demand sufficient fuel to form a combustible mixture in the cylinders, it follows that so soon as the layer has been formed the mixture supplied thereafter will be excessively rich. In order to obviate the difficulty, many designers endeavor to raise the temperature of the induction system so as to evaporate at once any fuel which may precipitate thereon.

In order to accomplish this result with most fuels of low mean volatility, it will be necessary to maintain the temperature of the walls unnecessarily high for ordinary running. This clearly will have the effect of decreasing the available power and of increasing the tendency to detonation at a moment when detonation is most liable to occur.

It would appear to be far more preferable to accept the necessity for the formation and existence of a layer of liquid in the induction system and to cater for its immediate formation by so designing the carbureter that it will, immediately the throttle is opened, supply a good gulp of liquid fuel, and thereafter continue to supply mixture of normal strength. In such carbureters as the Zenith or the Claudel, means are provided for supplying a sudden gulp of liquid, which has collected in the diffuser or compensating jet chamber, but although these carbureters are designed to do this, the quantity stored up and delivered suddenly is generally quite insufficient to meet the needs of a cool induction system and a fuel of low volatility. If the capacity of the storage well or diffuser tube could be made adjustable it would probably be found possible to obtain instant acceleration with almost any gasoline and without the necessity for adding more heat than is needed to prevent freezing in cold weather. This conclusion is made on the assumption that the system is such that equal distribution of mixture between the cylinders is derived without the addition of heat. At present, it is seldom that a design is met with in which it is not necessary to add considerable heat to the system in order to mitigate the consequences of what are in fact defects in design. It would appear that the efficiency of an induction system may be gaged by the amount of heat required.

The actual experiments carried out with different fuels all tended to confirm the conclusions arrived at. Tests were made on a number of different multiple cylinder engines with good, bad and indifferent induction systems. It was confirmed that those engines with bad



distribution systems gave poor results on all fuels, though their performance was improved by the use of the more volatile fuels. On the other hand, engines having efficient induction systems were affected by changes of fuel volatility to a very small degree.

As explained in the first article, most of the multi-cylinder engines employed for this research proved so inefficient and so sensitive to large variations in friction, etc., that truly comparative results were seldom obtainable, while the more efficient research engines having each only one cylinder naturally could not be utilized on the problems of distribution.

While many experiments have been made and a great deal of data collected as to the variations in power, output and efficiency with various fuels when used in multiple cylinder engines, the writer feels that none of it is sufficiently reliable to justify publication. To obtain reliable information on this subject it would appear to be necessary to design and build a special engine equipped with several different types of induction system and all the features necessary to insure consistency of running, which is the first essential condition of any reliable scientific test. Whether, in reference to motor fuels, the information obtained would be of sufficient value to warrant the heavy expense of such an undertaking, is, in the writer's opinion, open to question. Such information, however, would be of very great value to the designer and manufacturer of engines, for it seems clear that the problems relating to distribution are problems of design in the first place, and that the nature of the fuel plays but a secondary part. As a piece of engine research it is, in the writer's opinion, by far the most urgent and important of any which could be undertaken at the present day. It is the one factor about which least at present is known, while it exerts a more powerful influence upon the performance of an engine than almost any other.

### Volumetric Efficiency

Volumetric efficiency is defined as the ratio of the weight of air drawn into the cylinder per cycle to the weight of air at 0 deg. C. (32 deg. Fahr.), and 29.92 in. of mercury pressure which would just fill the volume swept by the piston in one stroke.

During the latter period of the fuel research means have been available for measuring accurately the weight of air taken into the engine. Attempts to work with calibrated orifices proved very disappointing. They yielded somewhat erratic and wholly unconvincing results, also the very serious difficulty of calibrating the orifices, and their "sensitiveness" to the sharpness of the edge rendered this method of measurement unreliable. In order to obtain a correct value for the mixture strength used, and a correct determination of the efficiency with which the fuel was burned, it was essential to provide means for measuring the weight of air taken into the engine not only in relative but also in absolute terms.

After much consideration it was decided to construct a gas holder having sufficient capacity to supply all the air required to consume the measured quantity of fuel at the weakest possible mixture strength. The details of this arrangement will be dealt with later.

For the present it is sufficient to state that means are now provided whereby both the number of cubic feet of air and the number of revolutions of the engine during the consumption of a measured quantity of fuel, are recorded automatically and simultaneously, the former to within  $\pm$  one-fifth of a cu. ft. and the latter to within  $\pm$  4 revolutions. The air from the gas-holder passes on its way to the carbureter through an expansion chamber

of 8 cu. ft. capacity, which is interposed in order to damp out oscillations in the pipe. The temperature as it passes through this capacity is measured by means of a thermometer. In all cases, the measurements recorded here of air consumption and of volumetric efficiency are reduced to terms of standard temperature and pressure, 0 deg. C. (32 deg. Fahr.) and 29.92 in. of mercury.

So far the apparatus has been in operation for a short time only, but the following tests have been carried out. The tests on volumetric efficiency referred to below were carried out with a different combustion head from that used throughout all the preceding tests. With this combustion head both the mean effective pressure and the thermal efficiency of the engine are substantially higher than with the head used previously. It will be observed, for instance, that in Figs. 23, 24 and 25 the mean effective pressure under any given set of conditions is much higher than that recorded hitherto; this difference, however, does not affect in any way the deductions to be drawn from the volumetric efficiency tests, and the writer mentions it only to explain what might otherwise appear to be a glaring discrepancy. The tests which have been made are as follows:

(1) Tests of volumetric efficiency at constant mixture strength with constant heating and at varying compression ratios on gasoline "A" and on benzol.

(2) Tests of volumetric efficiency over the whole available range of mixture strength with compression ratios of 4:1 and 6:1.

(3) Tests of volumetric efficiency with gasoline "A" and with 95 vol. per cent alcohol at a constant compression ratio and constant heating.

(4) Tests of volumetric efficiency with constant mixture strength and varying heat input to the carbureter.

(5) Tests of volumetric efficiency with hot and cold cylinder walls at a constant compression ratio and with other conditions constant.

In a previous article dealing with power output the writer referred to the apparent variation in volumetric efficiency at different compression ratios, and pointed out that it was not at all easy to explain why this should occur. That it was the volumetric efficiency alone that varied was evident from the following considerations:

(a) With increase of compression the thermal inefficiency rose at a rate in excess of the rise in mean pressure.

(b) No mechanical or external temperature conditions were in any way affected by the change in compression ratio.

The only possible inference to be drawn from these phenomena was that for some reason the volumetric efficiency became less as the compression ratio was raised. The data obtained from recent tests with the air measuring device referred to above confirm this. From Fig. 22 it will be observed that direct air measurements under identical conditions show a steady fall in air consumption as the compression ratio is raised. Every care was taken to insure that neither the mixture strength, the temperature of the cylinder jackets, nor the rate of heat input to the carbureter were varied.

The curve shown in Fig. 23 illustrates the observed variation in volumetric efficiency over a wide range of mixture strength for gasoline "A." As might be anticipated, the variation is small. It is seen that the volumetric efficiency is at a minimum when the mixture strength is that giving just complete combustion, and that it rises slightly as the mixture is either enriched or weakened from the normal; the former because of the increased proportion of liquid fuel entering the cylinder and the consequent fall in suction temperature due to the latent heat of evaporation and the latter, presumably, because of the lower

(Continued on page 477)

# A New Design of High Speed Engine Indicator

German instrument employs steel pencil to trace extremely small diagram on soot-covered glass plate. Diagram is then enlarged by use of microscope. Indicator is self-contained and carried directly on engine cylinder.

By Benno R. Dierfeld

THE disadvantages of the optical indicator or manograph as a factory testing instrument are well known, and considerable work has been done in recent years, especially in connection with the experimental development of aircraft engines, with a view to producing an indicator that should be either more reliable and more handy to use. Dr. Ing. Mader, chief engineer of the testing laboratory of Prof. Junkers, has developed a new type of indicator for high speed engines which is claimed to be free of the various defects of the ordinary optical indicator. It is based on the same principle as the ordinary steam engine indicator. In the steam engine indicator the stroke of the piston is  $3/8$  to  $5/8$  in., and a magnifying linkage must be used for tracing the diagram on an oscillating drum driven from the engine. The difficulty of constructing an accurate, strongly magnifying linkage led Dr. Mader to divide the process of taking indicator cards into the following two phases:

1—The direct tracing of the piston movement with extremely small strokes, with the idea of reducing all movements and all moving masses to a minimum, so as to diminish inertia effects at high speeds of revolution.

2—The enlargement of this indicator card later on in a special enlarging machine.

This new principle makes it possible to trace the piston movement with sufficient exactness by a linkage which is kinematically quite simple, and by a transverse movement of the light writing pencil itself, instead of by the movement of a large drum. The results obtained with an instrument based on this principle and the dimensions chosen for the Micro-indicator in the first place depend upon the fineness of the lines which can be traced. For this reason the steel pencil must be provided with an exceedingly fine point, which must pass over a very smooth scribing surface and leave a permanent line. It has been found that the best surface is furnished by glass with a

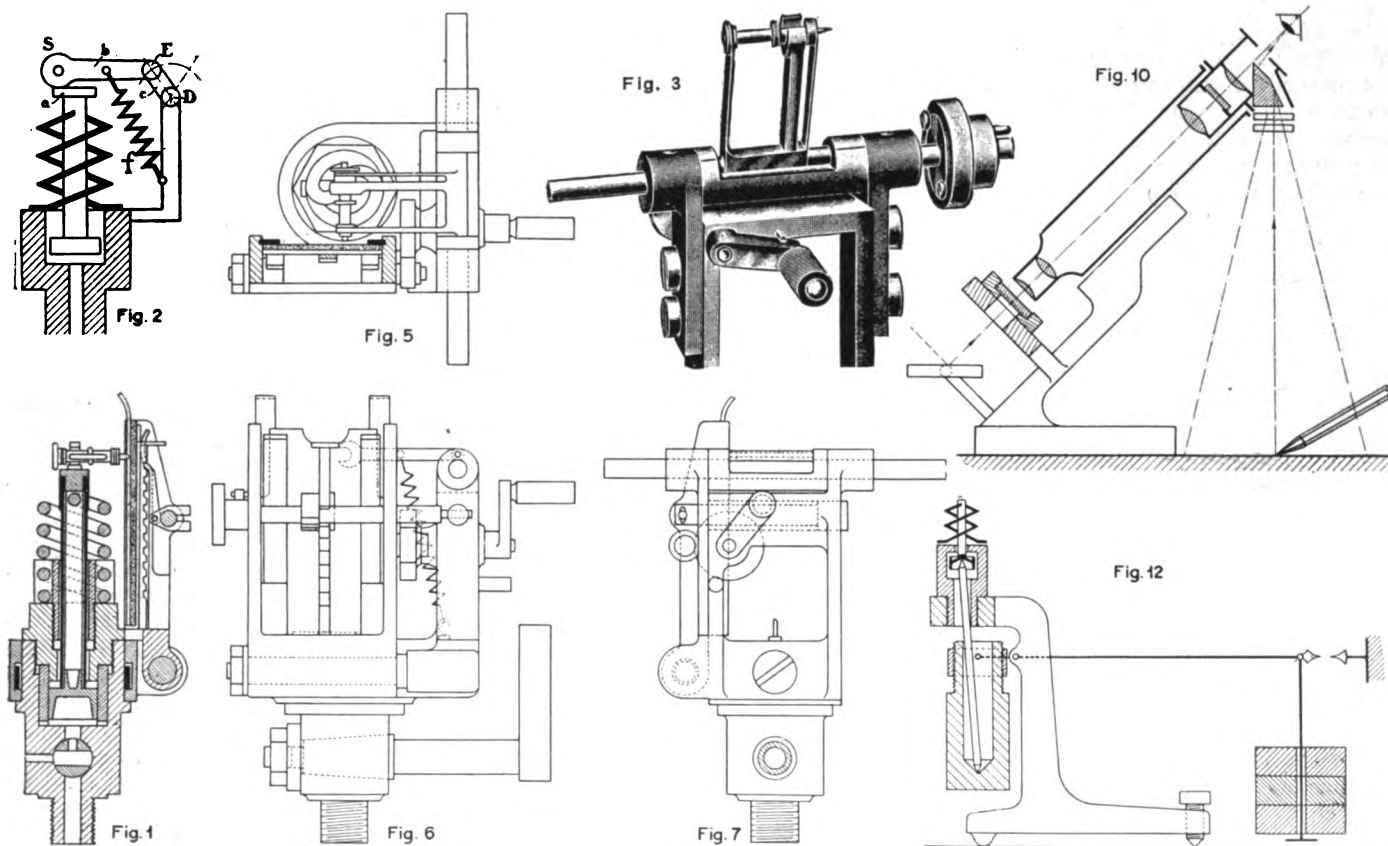


Fig. 1—Section through cylinder of Micro-Indicator. Fig. 2—Diagram of linkage of Micro-Indicator. Fig. 3—Pencil holding lever and adjacent mechanism. Fig. 5, 6 and 7—Outline drawings of complete indicator. Fig. 10—Diagram of Litz drafting ocular applied to microscope. Fig. 12—Apparatus for calibrating springs for Micro-indicator.

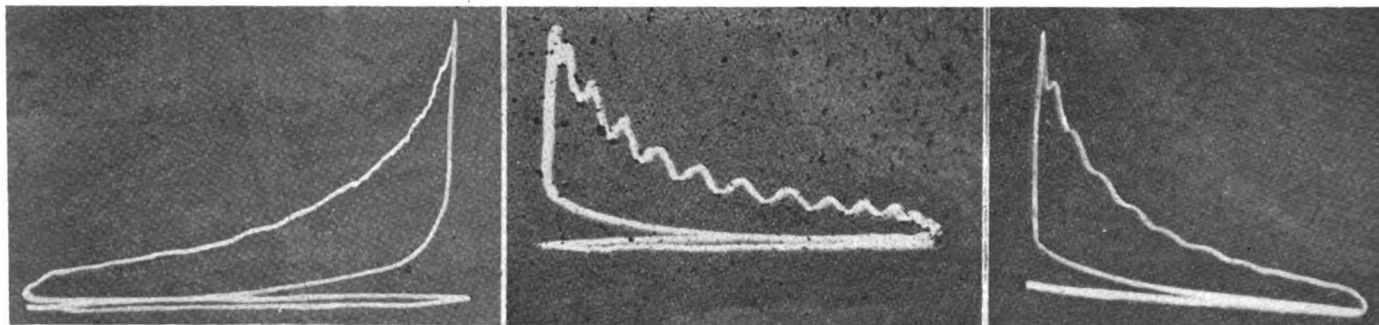


Fig. 13—Diagram taken on single cylinder engine at 960 r.p.m., showing 294 lbs. explosion pressure. Fig. 14—Diagram from same engine at 2,000 r.p.m. with dulled pencil. Fig. 15—Diagram taken after indicator piston had been reground and lubricated with heavier oil

thin covering of soot. This also has the advantage that it permits of considerable enlargement of the record in the transmitted light of the microscope.

Sooting of the plate may be effected by means of an ordinary candle. If the sooted records are to be kept, they may be fixed by pouring (not spraying) a colorless drying lacquer over the glass. By wiping such fixed plates off with alcohol, the glass is immediately available for making new records. The fineness of line obtainable in these records is about  $1/50$  mm. (slightly less than 0.001 in.) and the dimensions of the whole record are 2 mm. ( $5/64$  in.) in both directions. As the pencil is applied to the surface of the glass plate with some pressure, its point becomes dulled, which results in the tracing of wider lines; for ordinary tests this is of little consequence, but if the highest degree of accuracy is desired the pencil must be changed. Both the pencil and the pencil holder are standardized.

The principal parts of the Micro-indicator (Fig. 1) are the same as those of the steam engine indicator, but there is a difference in that the piston and rod assembly is guided only at two points, by the piston below and by the spring above, the latter being a double helical spring. This method of guiding does not seem to provide against oblique motion of the piston rod, but slight obliquity has been proven by tests to be of no consequence, as regards accuracy of the diagram, and great obliquity is impossible. With this construction sticking of the piston is evidently impossible. The piston, hollow piston rod and spring are assembled into a single unit and are removed together if it is desired to use a spring of different scale. This avoids the need for all dismantling of the individual parts in service and obviates chances of incorrect assembly.

The piston, which is ground on its cylindrical surface, is made rather short, so as to allow of slightly oblique positions of the rod. The bore is such as to give a piston head area of exactly one square centimeter for pressure up to 30 atmospheres. For higher pressures, up to 100 atmospheres, instead of the spring being made stronger, the piston diameter is decreased. Within the cylinder body of the indicator there is provided a cock. This cock would be required in any case, and, rather than making it a separate piece, it is placed right in the cylinder body so as to shorten the connection to the cylinder, slightly throttling the gas entrance to the piston and minimizing the change in volume of the compression chamber by the connection of the indicator. The gas space below the indicator piston, inclusive of that of the cock plug and connection, is only about  $1/4$  cu. in., so the instrument can be connected to the smallest automotive cylinders such as those of motor cycle engines.

The movement of the indicator pencil, which traces both the variation of the gas pressure and the piston motion, is imparted to the pencil by the simple linkage illustrated diagrammatically in Fig. 2. The piston rod

is provided with a mushroom head a, upon which rests the rounded end of the rod b. The point of the indicator pencil passes exactly through the center of the rounded end S of this rod. The other end E of the rod is moved to and fro by a small lever c oscillating around D. A coiled spring f with numerous convolutions prevents backlash in the joints and insures good contact of the end of rod b upon the head of the piston rod. The tension of spring f, which increases very slightly as the spring extends, has only an infinitesimal influence upon the scale of the main spring of the indicator. This tension must be at least equal to the maximum force of acceleration on the rod b, so as to prevent the end of the rod from breaking contact with the piston rod. The head of the piston rod and the end of the rod b are hardened, and these parts must be carefully lubricated to prevent wear. The simple linkage a, b, c makes possible, by lifting the piston rod a, the tracing of the pressure coordinate, and by turning rod c, the tracing of the piston stroke in a system of rectangular coordinates. The tracing of the piston stroke is not absolutely accurate, as the mechanism is not a reduction of the crank and connecting rod mechanism of the engine, but the maximum possible error is said to be only 1.3 per cent.

In the design of the pencil carrying lever the following requirements must be met: The pencil must be gently pressed against the plate on which the diagram is to be traced. The axis of the pencil and the axes D and E must be maintained accurately parallel. The pencil must be removable with a single motion of the hand, and, finally, there must be no transverse rotation of the pencil in the direction of the piston axis in the case of high accelerations. The design Fig. 3 is said to meet all these requirements. It has no screw connection and the blade springs are integral with the hub of the pencil lever. The yieldably mounted pencil holder is riveted to the spring blades. The pencil is inserted or removed by grasping the disk pressed over its end, which projects above the holder. A shoulder on the holder bears against the strong lever and the spring blades cannot be bent or twisted.

A photograph of the complete Micro-indicator is reproduced in Fig. 4 and Figs. 5, 6 and 7 are assembly views. It comprises the glass plate holder A, a U-shaped frame which, together with the spring and back shield, holds the sooted glass plate, which is inserted from above. The plate holder is rotatable around an axis and is pressed against a cam by a spring. By one turn of this cam with a small hand crank the glass plate can be pressed against the indicator pencil or withdrawn. If a second record is to be taken the glass plate is shifted slightly forward by means of a ratchet. In this way as many as 24 records can be traced on a single plate (in two rows).

For the drive of the Micro-indicator the ordinary spring pulley mechanism was out of the question. A simple linkage with as few joints as possible, no backlash and

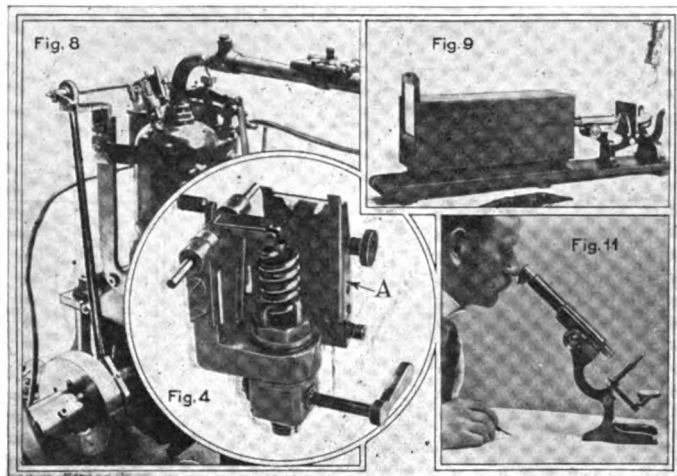


Fig. 4—Photographic view of complete Micro-Indicator. Fig. 8—Micro-Indicator applied to single cylinder vertical engine. Fig. 9—Camera used with Micro-Indicator. Fig. 11—Microscope with Leitz drafting ocular applied.

no danger of bending was required. A suitable device is the oscillating drive shown in Fig. 7, which, however, does not make correction for the finite length of the connecting rod, and, therefore, calls for a correction of the diagram for accurate research work. For ordinary factory tests, such as ignition and valve timing check tests, determination of the compression and explosion pressures, the small error in the record is of no consequence. This kinematic error of the oscillating drive could be reduced in a simple manner by shortening or lengthening the central rod. The drive consists of a divided eccentric disk with an eccentricity of 12 to 15 mm. ( $\frac{1}{2}$  to  $\frac{5}{8}$  in.), the connecting rod (whose length varies with the height of the engine), and the upper oscillating lever which is 45 mm. (1.77 in.) long the shaft of which drives the indicator. The bearing of the oscillating lever must be rigidly supported on the engine, so that it participates in all vibrations of the engine.

The pencil can be changed only while the pencil holder is at rest, and for that reason a disengaging clutch must be provided in the linkage which must have absolutely no backlash. This function is performed by means of a simple clutch with spring-supported pins. The drive must be very carefully synchronized, otherwise the diagram will be faulty.

If the dead center position cannot be determined very accurately, the middle of the piston stroke is taken as a reference point, for which the indicator pencil must stand in exactly the same position for both the up and the down stroke. This synchronizing adjustment is made by turning the eccentric disk. However, it is necessary that the fork of the indicator oscillate equal distances to both sides of the central position, which are marked by lines to avoid faults in the drive.

The Micro-indicator is usually fitted into the hole of the priming cock, spark plug or valve cap. In the case of small air-cooled engines a hole may be drilled directly into the cylinder wall, but in that case the indicator must be supported otherwise. In every case the admission passage of the indicator should be made as short as possible, and in this respect the Micro-indicator is quite an improvement over the usual optical indicator.

For the second phase of the indicating operation a well known and highly developed instrument can be used—the microscope with its auxiliary apparatus. For purposes of valve or ignition timing the record can be inspected with the microscope, for which purpose the sooted glass plate is placed on the table of the microscope like a microscopic slide and is illuminated from below by a

mirror. A magnification of thirty-two to eighty times is usually sufficient. With such magnifications a slight distortion of the rectangular coordinates can be perceived, but only at the margin of the plate.

Measurement of the diagram can be effected either directly by means of an ocular-micrometer, or, after enlargement by micro-photograph or by planimetric means. For scientific purposes and purposes of reproduction the micro-photographic method is to be recommended as the most reliable, because the difficulty of providing an intense source of light and because unequal periods of exposure are done away with. A simple photographic camera without bellows (Fig. 9) serves this purpose. The microscope is arranged horizontally on a sliding base; the end of the tube with the ocular projects into a solid box, into the rear end of which are slid the opaque ground glass or the plate holder. Focussing is effected by means of the microscope.

This procedure, however, involves the inconveniences of all photographic processes. This may be obviated by means of a drafting device used as an auxiliary to the microscope. Well adapted for this purpose is the drafting ocular of Leitz (Figs. 10 and 11). It is inserted in the tube of the microscope like an ordinary ocular. Then the rays reflected by the mirror, which trace the image of the microscopic slide, pass in the usual way through object holder, object and ocular to the eye of the observer without change in direction. Simultaneously on the same perspective plane there appears a drafting plane by double reflection, so that the diagram may be traced accurately by hand with a pencil. The rays from the drafting plane pass through the upper and lower face of the prism almost at right angles and are totally reflected by the side faces of the prism. Generally the image of the microscopic slide will not appear with the same intensity as the drafting plane, therefore the latter image must be softened by smoked glasses of different degrees of transparency. The drafting plane appears at the standard visual distance.

Instead of copying the image and later on measuring it up with a planimeter, the diagram may be measured up directly under the drafting ocular with the compass. In order to obtain equally spaced ordinates, suitable ink lines are traced on the drafting plane. In order to correctly interpret the diagram it is absolutely necessary to accurately determine the scale, that is, the magnification and the calibration of the spring. The magnification is most readily determined by means of a finely divided scale, as, for instance, 2 mm. divided into 200 parts. This glass scale is put in the place of the record, is magnified the same number of times and therefore measures directly.

For calibrating the indicator spring a device of the type illustrated diagrammatically in Fig. 12 is used. The lever arms bear to each other a ratio of 1 to 10, and comparatively small weights can therefore be worked with. By means of an adjusting device the beam of the scale can always be brought back to its horizontal position. The Micro-indicator is screwed to the top of the calibrating device and is accessible from all sides.

A few diagrams taken from the old single cylinder engine of Fig. 8 are reproduced herewith. These, of course, are considerably enlarged from the 2 x 2 mm. micro records. Fig. 13 shows a card taken at 960 r.p.m. The maximum explosion pressure is 294 lbs. p. sq. in., the compression being faulty. At higher speeds the oscillations of the indicator become stronger, but the defect may be easily corrected. Fig. 14 shows a card taken at 2000 r.p.m., the heavy line being in part due to a dulled pencil point but chiefly to the fact that a large number of diagrams were traced one over the other. After the indicator piston had been reground and supplied with heavier lubricating oil the diagram Fig. 15 was obtained.

# Casting an Aluminum Head on a Steel Cylinder

Experiments being conducted in efforts to solve this problem at McCook Field indicate that a good bond can be secured by first sherardizing the steel barrel. Phosphor bronze employed for valve seats.

By E. H. Dix, Jr.\*

THE metallurgical aspects of the problem of casting an aluminum head on a steel cylinder for an air cooled aviation engine are interesting. A good idea of one design is obtained from the accompanying cut (Fig. 1), of a casting made in the McCook Field foundry. The first problem considered was whether or not an alloy bond could be formed between the steel cylinder and the cast aluminum head. This was attached by making up dummy rings to represent the portion of the cylinder on which the head was to be cast. Six different rings were experimented with: 1—uncoated, 2—sherardized, 3—zinc electro-plated, 4—copper plated, 5—calorized, 6—tinned. It was found that a satisfactory bond was formed with either the sherardized coating or the tinned coating. Sherardizing was decided upon because of the higher melting point of zinc. Fig. 2 is a composite photo-micrograph showing the nature of the bond formed with the sherardized coating. The lettering explains the four different zones.

The next problem was the choice of an alloy for valve seat inserts and spark plug bushings to be cast into the head. A number of alloys were tested and it was found possible to obtain a satisfactory cast-in seat using rolled phosphor bronze of  $3\frac{1}{2}$  per cent tin, Monel metal or cast iron, but the rolled phosphor bronze was chosen because its coefficient of expansion is closer to that of aluminum.

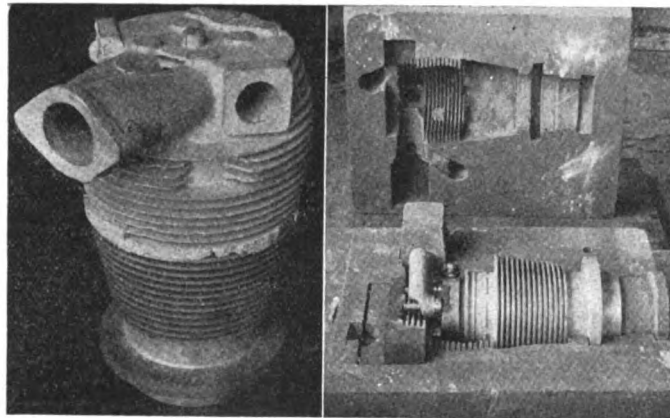
The next step after these preliminary experiments was to make the actual casting. Fig. 3 shows the open mold with steel cylinder, cores, valve seat inserts and spark plug bushings in place. The job was made up using dry sand cores inside and outside. The method of gating is evident from the view of the cope. Three overflow risers were placed to allow for the pouring of metal through the mold.

Metal was poured through the mold so as to heat the cylinder and prevent the cracking of the aluminum casting if possible. However, the first casting showed a serious axial crack just over the steel ring. It was therefore decided to put a heating coil inside of the cylinder. This

was done and a second casting poured. In this case, however, the cores were thoroughly heated before pouring, and the whole mold was placed in a core oven at 500 deg. Fahr. immediately after pouring and allowed to anneal for a day and a half. This eliminated the cracking around the steel cylinder but a crack developed between two of the valve seat inserts. It is believed that these difficulties can be overcome by slight changes in the method outlined although preheating the mold and the subsequent annealing would make a rather expensive production job.

It was therefore decided to endeavor to find an alloy which is less liable to crack than the one previously used which was 7 per cent copper, 1 per cent tin, balance aluminum, this being recommended from the experience gained in England on similar work. To guide us in this selection a hot shortness test was devised. This consisted in casting a test bar around steel lugs fixed 12 in. apart. The first three bars were 8 per cent copper, 10 per cent copper, 7 per cent copper and 1 per cent tin, respectively and they all cracked. The fourth bar was a silicon aluminum

alloy on which the Material Section is experimenting at this time. This bar, not only showed no crack when cast in this manner but afterwards showed a tensile strength of about 21,000 lb. per sq. in. with  $1\frac{1}{2}$  per cent elongation. This is the normal strength for this alloy but the elongation is slightly low. This alloy has further been investigated for strength at high temperatures and it has been found that the tensile strength at 300 deg. Fahr. is only  $2\frac{1}{2}$  per cent less than at normal temperature and at 500 deg. Fahr. 20 per cent less than normal. Previous tests have shown that the tensile strength of 12 per cent copper alloy falls off about 24 per cent at 300 deg. Fahr. and 30 per cent at 500 deg. Fahr. It is thus concluded that the silicon alloy is satisfactory for the cylinder working temperature. Porosity tests have shown that it is possible to cast a cup  $\frac{1}{8}$  in. thick and remove the skin from both the inside and outside and yet have it hold 120 lb. air pressure without any leak. Arrangements are being made at the Bureau of Standards to have coefficient of expansion tests made on this alloy. The problem is now of very vital importance to the Air Service.



Left, Fig. 1—Steel cylinder with cast-on aluminum head made in McCook Field Foundry

Right, Fig. 3—Open mold with steel cylinder, dry sand cores, valve seats and plug bushing in place

\*Slightly condensed from a paper presented at the joint meeting of the Society of Automotive Engineers and the American Society of Mechanical Engineers at McCook Field, Dayton, Ohio.



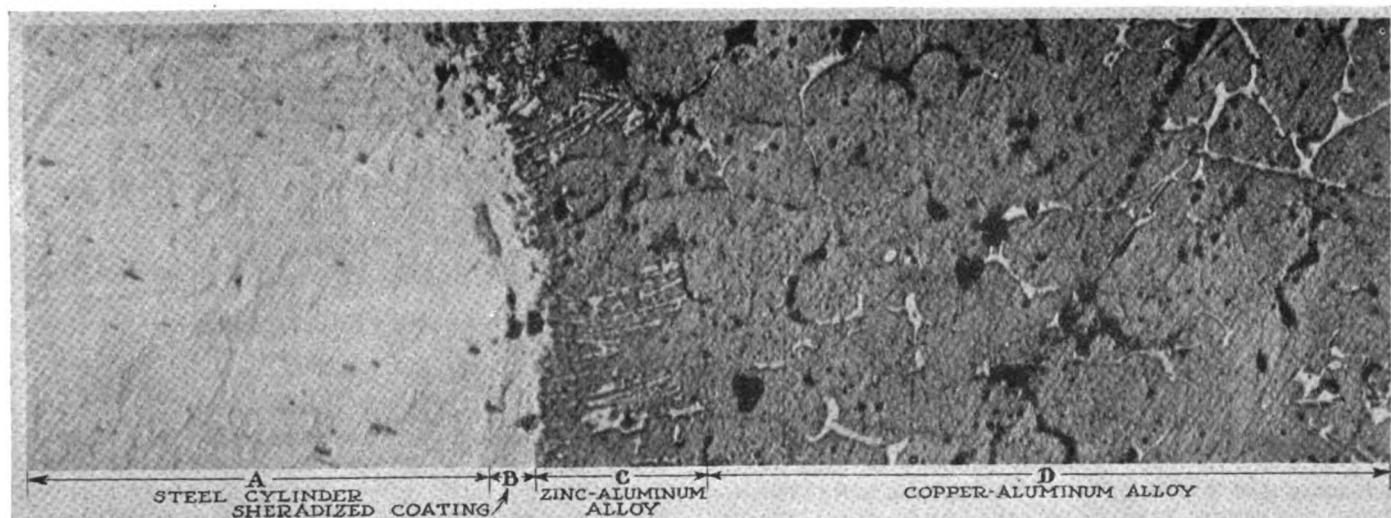


Fig. 2—Unetched composite photomicrograph showing nature of bond formed with the sherardized coating between steel cylinders and aluminum head

## New Electric Self-Loading Truck

**T**HERE are two outstanding features in the electric industrial truck illustrated herewith, which is a product of the Cowan Truck Co. One is the anti-kick device, which takes the jar off the steering handle, and another the vertical lift mechanism, which is of different design from that used in the previous type of Cowan electric self-loading truck. This lifting mechanism is of the bell crank type and is actuated by an independent G.E. series wound motor with worm gear drive. The platform elevates vertically with a maximum rise of  $4\frac{1}{2}$  in. obtained in 5 seconds while carrying 5,000 lbs. load. The lowering time is only 3 seconds. The platform may be stopped at any point going up or down, and the motion reversed. A brake on the motor shaft prevents coasting or accidental dropping of the load. An automatic trip stops the load platform when fully elevated or lowered. The lifting mechanism is controlled by a switch at the driving end of the truck. The lifting mechanism is installed under the load platform where it is well protected yet accessible, it requiring only the removal of two pins to tip up the load platform and thus expose the whole mechanism.

Flexibility in operation is secured by the provision of three forward speeds and three reverse. Steering is by all four wheels and this enables the truck to turn in a radius of 7 ft.  $5\frac{1}{2}$  in. This means that the truck can be operated in intersecting aisles 57 in. wide. To start the truck, the operator steps on the pedal, which releases the

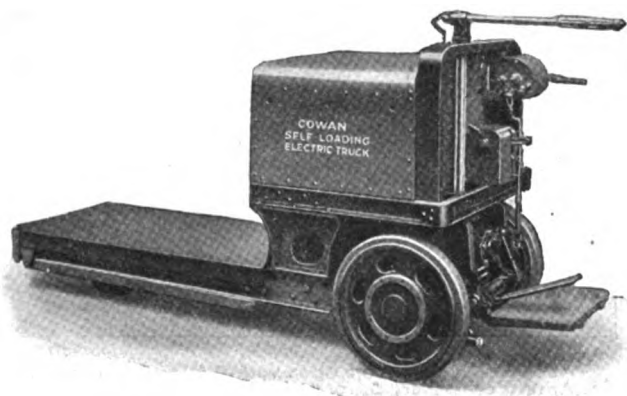
brake and closes the battery circuit. The circuit breaker will close only when the controller is in the neutral position. This compels the operator to always start in the first speed and increase the speed gradually. Whenever the pressure on the pedal is removed the circuit is broken and the brakes are applied automatically. To prevent meddling, the controller handle is arranged detachably.

The power equipment comprises either a 12-cell Exide battery of 238 ampere-hours capacity or a 21 cell Edison A-6 battery. Either battery provides power for 12 hours continuous operation, it is claimed. The driving motor is of G.-E. make, series wound, of the railway type.

## A German Automobile Engineering Handbook

**A**N engineering handbook printed in German, somewhat similar to Kent and other standard American engineering handbooks but covering automobile engineering only, has been published for a good many years by M. Krayn of Berlin, and this work has just appeared in its tenth edition. It should be pointed out, however, that while the book is similar to the American handbooks in form, method of treatment and voluminousness, it is not their equal in the quality of typography, which is, of course, readily explained in view of the much narrower field to which it appeals.

The present, tenth edition, which has been brought out under the direction of Richard Bussien, is completely revised and contains a great deal of new matter. In former editions the first part of the book contained general mathematical and mechanical material, but this has been wisely omitted in the new edition, because it can be found in better form in any of the well-known mechanical engineering handbooks. The chapter on Motorcycles has been entirely rewritten, and there is also in the new edition a very informative chapter on Motor Fuels. The work is not confined to automobiles but also covers motor boats, motor cycles and farm tractors. Every part of an automobile is thoroughly covered by text and illustrations, and many formulæ and much tabular material are given. The work is of pocket book form, and contains close to 1200 pages text and nearly 1000 illustrations.



Cowan industrial truck

# Adapters Designed to Increase the Output of Various Machine Tools

Devices here described are intended to reduce attention required by operator and enable machine to turn out more parts per hour. They are applicable to several types of manually controlled machine tools.

**A**DAPTERS (or conversion units) designed to give a machine of older model or simple type some of the advantages of a more up to date model or a more elaborate type, are quite familiar in the automotive industry. Lately the plan of providing adapters seems to have come into vogue in the machine tool industry. Of course, special attachments for machine tools, permitting of doing certain kinds of work on the tool for which it was not designed originally, have been offered for a long time, but we are here concerned with a different type of attachment, which is not intended to change the range of adaptability of the tool, but rather to increase its output, reduce the attention required and permit one operator to look after two or more machines. These are features incorporated to a remarkable degree in the newer designs of production tools, the appearance of which upon the market has often made it expedient to scrap tools of earlier design still in a serviceable condition. Two examples of such attachments are illustrated herewith.

An oil pressure feed control system for machine tools has been developed by the Oilgear Co. It has been applied to lathes, boring mills, hydraulic presses, etc. The advantages of such a feed control are that it reduces operators' fatigue and permits of an increase in output.

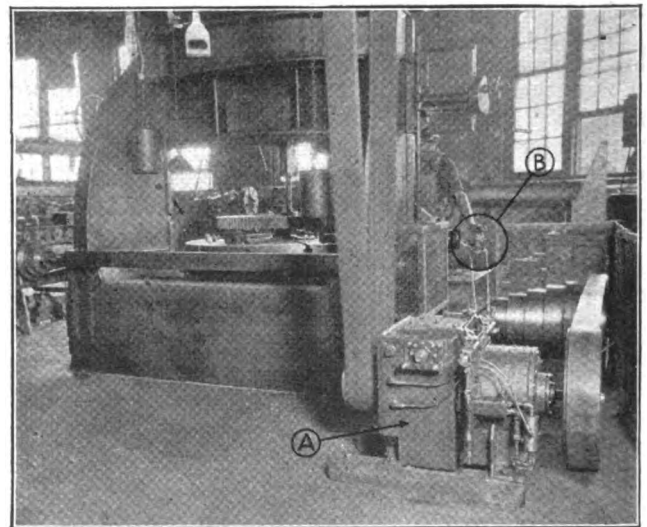
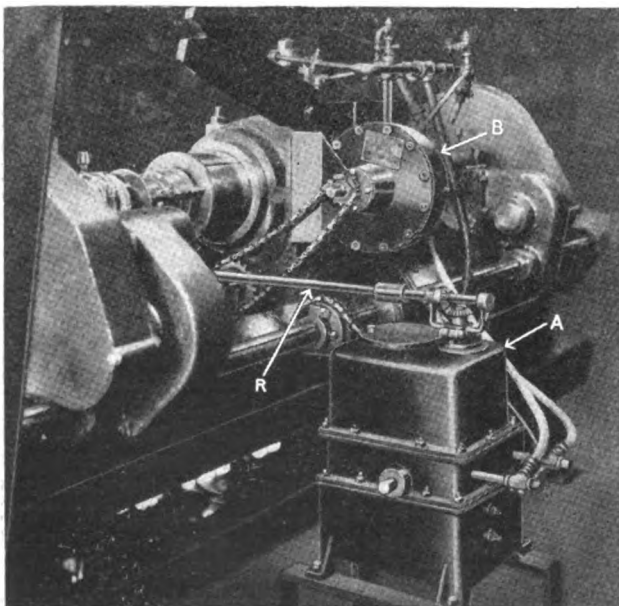
The feed control system consists essentially of a pump with variable delivery, and a motor driven by the working fluid, that is, oil received from the pump. The pump is ordinarily driven from the countershaft of the machine tool, and the motor attached to the carriage or ram on which the feed is desired.

Two types of feeding motors are employed; the direct

acting pushing cylinder, and the rotary motor, the former being used when space conditions permit. In equipping old lathes the pushing cylinder is ordinarily mounted at the rear of the lathe bed behind the head stock, the piston rod extending toward the tailstock and being bracketed to the rear part of the carriage. The rotary type of motor is shown at B in Fig. 1 geared to the lead screw of a lathe. This form of installation is necessary for very long machines, and frequently for cross feeds, where it is necessary to have a screw control of the tool slide.

It is claimed that this type of feed gear has many advantages for heavy machine tools. Prominent among these is the rapid traverse movement, which is obtained without any additional mechanism. This enables the operator to move heavy carriages and rams quickly and without the usual fatigue. The hydraulic feed permits the operator to readily increase the feed when cuts become lighter, back out the tool for examining the cutting edge, and return it quickly into the cut without any disconnection of friction clutches, etc. Another important advantage on production jobs is the ability to use two or three different feeds in quick succession, when the cuts only last a short time. In such cases geared feed boxes cannot be operated quick enough to be available.

Fluid from the feed controller is delivered at a rate and in the direction required for the function desired by the operator. The pressure in the system varies with the resistance offered to the cutting tool. If this pressure rises above the maximum required for feeding, a relief valve opens and permits the feed motor to come to a stand-



At Left (Fig. 1)—Lathe fitted with Oilgear feed control. A, feed controller; B, rotary motor driving lead screw; R, control shaft. Above—Variable speed drive applied to 7 foot boring mill. A, Oilgear drive; B, control handle

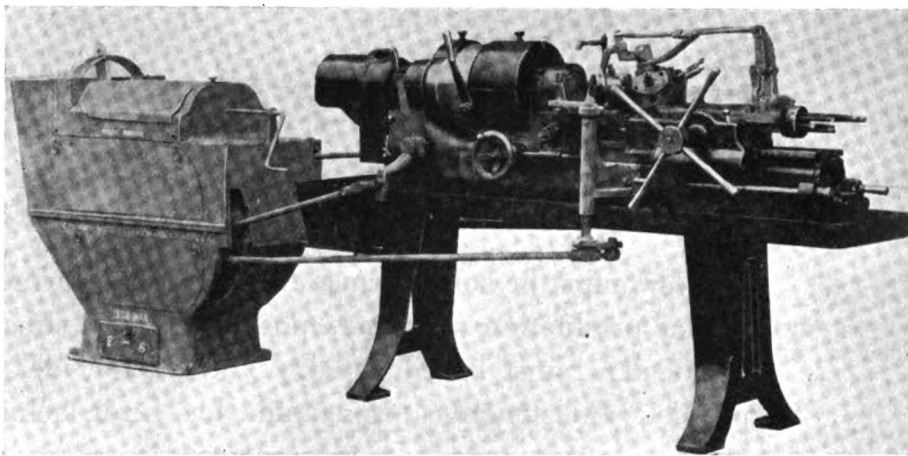
still. This function is made use of in locating shoulders, etc., in work to be machined; as it is only necessary to set rigid stops and let the carriage run against them.

#### Variable Speed Spindle Drive

The Oilgear Co. has also developed a larger type of machine designed to drive the spindles of machine tools at any desired speed, from a line shaft, a constant speed electric motor, or a gasoline engine. The unit is designed for driving lathes, boring and milling machines, etc. The principle of operation is similar to that of the feed control system, affording an infinite number of speed changes in either direction through the manipulation of a single control handle. The speed is independent of changes in load, unless the load becomes excessive in which case an automatic overload gear comes into action. The overload gear may be adjusted to any desired maximum load. When this is exceeded, the speed will be reduced, even to stopping the tool entirely in case of a jam.

#### The "Iron Man."

An attachment for hand screw machines known as the Iron Man, which imparts to them the qualities of the automatic screw machine, notably the feature of automaticity permitting one operator to run a number of machines, has been developed by the Pearson-Scott Co.



The Iron Man—an attachment for hand screw machine.

The attachment weighs less than 1,000 lbs., occupies a space 2 by 4 ft. and can be applied to the machine in 5 min., it is claimed. The only change which needs to be made on the screw machine is the removal of the hand wheel on the cross slide. The turret locking and unlocking device and the stock feed control are features which can be used with any machine, but they are essential when the attachment is to be used. The bracket supporting the cross slide feed must be attached to the machine. It is claimed that the machine can be set for even a difficult job in about 2 hours' time. The attachment can be applied either to the head end or the turret end of the screw machine.

## Influence of Various Fuels on Engine Performance

(Continued from page 470)

surface temperature of the head, cylinder walls and piston resulting from the lower flame temperature at very weak mixtures. Fig. 24 shows the variation in I.M.E.P. and in volumetric efficiency with varying mixture strength for gasoline "A" and for ethyl alcohol 95 vol. per cent. It is seen that the increase in maximum power (as shown by the I.M.E.P.), comparing gasoline and alcohol, is more than the increase of volumetric efficiency between these two fuels. This is probably to be explained by a fact, which has been established by previous tests, that the thermal efficiency with alcohol is slightly higher than with gasoline. The rise in volumetric efficiency at rich mixtures is clearly shown in this figure, particularly in the case of the curve for alcohol, indicating, as was suggested in the last paragraph, that the rise in volumetric efficiency and power is mainly due to the extra cooling of the charge by evaporation.

In Fig. 25 is shown the variation of volumetric efficiency and maximum I.M.E.P. when the heat input to the carbureter is varied. The relation between volumetric efficiency and heat input was found to be substantially the same for any of the fuels tested with the exception of the alcohols. The variations in temperature as recorded in the induction pipe due to differences in volatility of fuel appeared to have no influence on volumetric efficiency. The exception provided by the tests on ethyl alcohol confirms the conclusion arrived at previously by tests on power output, namely, that the whole of the liquid, with a fuel of very high latent heat, is not evaporated before the inlet valve closes, and the whole of the theoretical fall in suction temperature does not occur in practice.

In Fig. 26 is shown the change of volumetric efficiency with different temperatures in the water jacket of the

cylinder. It will be seen that an increase in temperature of 60 deg. C. (108 deg. Fahr.) caused a fall of volumetric efficiency from 7.40 per cent to 72.2 per cent. It can be calculated from this result that a change of cylinder temperature of 60 deg. C. (108 deg. Fahr.) caused a change of suction temperature of approximately 12 deg. C. (21.6 deg. Fahr.).

Speaking generally, the tests at present carried out with the air-measuring device have revealed nothing new, but they have served to confirm the assumptions made previously as to the variations in volumetric efficiency with different fuels, different compression ratios, and different temperature conditions. They have shown also that the apparatus may be relied on to give consistent results, and have demonstrated that certain phenomena which yet need investigation can be examined by the use of the variable compression engine with this addition.

(To Be Continued.)

SOME tests have been made by the Belgian Colonial Army with Drott surface ignition oil engines of 120 brake horsepower down to 3½ brake horsepower, using palm oil as fuel. It costs 250 francs per metric ton, compared with 2000 francs per ton for mineral crude oil in the Belgian Congo. Fatty acids were completely burned and did not corrode the cylinders. The oil was of 16,610 B.t.u., and the consumptions registered were 310 to 557 grammes per brake horsepower-hour respectively. The exhaust gases were used to liquefy the oil partially. The annual exports of palm oil from West Africa now amount to about 130,000 tons.

# Problems Involved in Tractor Merchandising

Tractors must be sold because they offer the farmer a solution to his particular production problem—not merely as a substitute for horses. Tractor dealers must be educated. The tractor idea must be sold to more people. Constructive propaganda has been lacking in tractor publicity.

**S**ERIOUS marketing problems face the tractor industry. During recent months the National Implement and Vehicle Association has been interested in discussing "marketing conditions, channels of distribution for farm operating equipment, and, incidentally, the factors entering into the increasing cost of distribution." The interest of the association in these fundamental problems indicates that there is a necessity for a study of basic factors in regard to tractor and farm implement merchandising; that extensive changes in method may be necessary to solve the marketing problems of the future for the tractor industry.

In any discussion of tractor merchandising, the dealer must play an important part. The relationship between the dealer and the manufacturer constitutes a major factor in determining success or failure. After reviewing the history of the farm implement dealer in an address some months ago, G. W. Collins said: "I trust that the experience of the years gone by will lead you unquestionably to the conclusion that the implement dealer of the present is a most valuable member of your family—that your interests in a very large measure are mutual, and that the closest harmony in which you can work will be for the greatest benefit of both parties."

A more detailed discussion of the factors involved in dealer relationships was presented several months ago by Arch R. Crawford to the Minneapolis Section of the S. A. E. Mr. Crawford is editor of *The Farmer* and his remarks on "The Present Status of the Tractor Industry from the Standpoint of the Dealer and Farmer" contains much material worth serious consideration. His paper in part was as follows:

Nobody questions the suitability of a specific tractor for a specific purpose. Nobody doubts that the tractor has its place in industry. But enough people are wondering and doubting and criticizing and picking flaws, with or without good reason to do so, so that we believe it is a good thing for us to take stock of what we are doing to make the tractor business the established, permanent and prosperous business we all desire it to be.

Harm has been done to the tractor business by a lot of hasty expressions on the subject and by a lot of hasty assumptions on the part of people connected in some capacity or another with the sale of tractors. The statement by a writer in a scientific publication that a certain size of tractor would replace twenty horses and that therefore on the basis of 30,000 tractors sold in a given year, twenty times 30,000 or 600,000 horses would be released from service on the farm was the rankest kind of nonsense. It was so recognized, branded and brought an immediately apology from the publication.

There have been too many ill-considered statements of this kind. Much ill-effect upon the business has been

produced by people who worked on the assumption that a tractor would replace one horse or two horses or four horses or six horses, if you please, under any given circumstances and at any given time.

**Tractors must be sold because they offer farmers a solution to their farm production problems—not merely as a substitute for horses.**

Now, a tractor may be a necessity for every farm; it may be that somebody can sell a tractor to every farmer; granted that the farmer has the money and that his resistance can be overcome by the salesman. But that does not guarantee that any tractor is suitable for that particular farm, that it will do the work required of it, and will increase the profits of the owner by reducing his production cost.

Blanket theories of sales will not work in selling tractors. They will not get the tractor off the dealer's floor on to somebody's farm, make this farmer a better farmer and the dealer himself a better booster for the tractor business.

Your dealer is conscious of the things I have mentioned. If he has a surplus stock on the floor at the end of the season he is often conscious of a number of things. For instance, a present waning enthusiasm on the part of the tractor manufacturer. Often a failure to back him up with forceful advertising and good, sensible merchandising effort sustained long enough for him to dispose of all his stock. He is inclined to think that the tractor industry may have been expanded too much. He feels that there is too little information available in print, in the movies, in the minds and mouths of salesmen on the comparative merits of power farming and horse-farming methods. That there is a lack of basic understanding of what a given type of tractor is best suited for, or conversely, what type of tractor or what types should be considered logical for a farm of a given size and type in a given territory. He is inclined to think that sales of tractors to dealers in some localities have been forced beyond the ability of the dealer to turn the machines over.

The man who made a total of \$1,000 on his first four tractors in 1920 and who still has remaining two, unsold, in which he has an investment of \$2,400 and who feels himself abandoned until such time as the salesman comes along and tries to sell him six for next year, is not feeling good.

He is liable to criticize anything from the man who invented the tractor to some minor matter of design, such as the fact that if one reaches carelessly into the bowels of the machine to adjust the carbureter, he will burn his hand on the exhaust pipe. You know that numberless minor complaints regarding the design of tractors have

originated in the fact that the dealer was seeking some reasonable explanation for his failure to make sales. He could not, by virtue of lack of training along these lines, sense the fact that the prime difficulty lay in his own lack of general knowledge of the usefulness of the power farming machinery.

In other words, we have not sold the tractor idea to enough people. We have neglected the business of reselling tractor owners and tractor dealers. Now, of a sudden, some folks find themselves shaken somewhat in their faith in the immediate future of the tractor industry and wondering how to remedy the failure to educate in the basic facts and on the technical details of the business, the man who must finally sell the goods, the dealer.

Hampered by the fact that its product is limited to only one size and one type, one of the great tractor manufacturers has already begun to overcome the very difficulties that I have just outlined. They are getting their dealers together and telling them,

First, that tractors must be sold;

Second, that the sales field must be studied in the unit, the dealer made fit to discuss the especial types of attachments suited to that field, and operation, care and economy. In other words, they are training their dealer organization in "Tractor Economics."

The company is following this with service men who help the dealer keep better books, to know what his stock is and to keep it properly displayed, to check up his advertising, to keep him educated and stimulated as a sales outlet for their tractors.

A number of types of tractors have been successfully merchandized for many years and will continue to be sold and stay sold as long as there are farms to be worked and grain to be threshed.

Do not misunderstand me to say that the implement dealer does not know his business. If he did not he would not have been able to survive the years before these last war-prosperity years. Much less would he be in a business on this first day of December, 1920. He does know his business up to a certain point and that point in the majority of cases is the practical application of the tractor to the farming business.

It is up to manufacturers to prove to dealers that advertising has really been planned to help him sell tractors and not merely to get him to buy them.

Having considered the dealers' side of the situation let us turn to that of his customer—the farmer—the man who in the final analysis determines whether or not business shall be "good" or "bad" for you as a tractor manufacturer.

Frankly the average farmer is in a bewildered frame of mind—not panicky, but bewildered. He must be shown before he will invest money in anything. Added to this he has a feeling that farmers are the only class which is really suffering a serious decline in prices.

Unfortunately farmers as a class have not learned to study deeply the subject of economics. National and international conditions which vitally affect agriculture as a whole have little weight in balancing his mind. Still more unfortunate is the fact that many publications, farm and political, are finding it easier to appeal to his prejudices than to serve his best interests, and are simply throwing oil on the fire. It behooves every one of you men to study the editorial contents of farm papers as never before; not for tractor material but to see the sort of advice and counsel now being offered to farmers. Some is sound, but much is written to prejudice rather than help the farmer.

Headlines like the following from the market pages of the newspapers are another source of information which give the farmer little on which to study for causes but plenty to worry over.

"Grains Reach New Low Levels."

"Wheat Tumbles Again."

"Hogs Hit Lowest Mark in Three Years."

"Corn on Toboggan."

"Cattle at 1916 Prices."

"Pre-War Levels Reached."

It is little wonder then that he is bewildered as well as decidedly disgruntled, especially when there are no bold headlines or even small type information concerning lower implement prices.

A large percentage of all tractors bought during the past two years were bought in the hope that they would solve the help problem. With prices high for products of the farm, the farmer could and did take a chance on a tractor in his endeavor to cope with the impossible help situation rather than because he was concerned that the tractor is an economic success.

Only last week one of our subscribers in the Red River Valley was in the office and emphasized this point. He has four tractors and quoted figures on what they have cost him. But, he said, "I don't care, they kept my boys on the land. They like to run the tractors and they won't drive horses."

This particular farmer marketed 3000 bushels of wheat early this fall at the higher price, but is still holding 5000 bushels, and the lower price he will have to take on this latter wheat is forcing him to buy equipment not on the basis of likes or dislikes, but absolutely on the basis of economic results.

#### Farmers' View of Prices

Farmers maintain, and the figures prove their contention, that prices are below cost of production. That nullifies the argument that tractors will increase production unless you can at the same time show him that as a dollars and cents proposition the tractor is an economic success from the standpoint of the user.

Figures as given out by manufacturers get little consideration from the farmer in his present state of mind. The manufacturer of tractors claims his selling price is based on cost of production plus a profit, but the farmer knows that his selling price is far below his cost of production to say nothing of a profit either small or large.

We are not attempting to defend or justify this attitude on the part of the farmer. Rather we are attempting to analyze the elements of sales resistance which must be overcome in order to sell tractors under present conditions.

In this connection permit us to touch on a point that apparently has been overlooked by nearly all tractor manufacturers. That is the lack of constructive propaganda on the tractor as an economic success. The farm press has carried a large amount of tractor advertising but most of it has been under heads like these:

"The Leader of the 1920 Tractor Field."

"A Different Tractor."

"Simplest Tractor Built."

"The Outfit for Your Quality Jobs."

"Power Plus."

"A Complete Power Farming Line."

"They Grip the Ground."

"Principles Proven by Twelve Years of Service."

"Guarantee to Burn Kerosene Successfully."

"The Champion of Engineering Excellence."

"Breaks Work Record."

"No More Plowing for the Horse."



# Belgian and Spanish Car Imports

American cars continue to outsell those from other countries in Spain, but imports fall off in Belgium due to the 20 per cent ad valorem duty. Belgian exports of automobiles show increase

**B**ELGIUM imported 1,934 automobiles, during the first six months of the present year, compared with 2,545 for the corresponding period of 1920. She exported 770 automobiles this year compared with 723 for the first six months of 1920.

The figures for January to end of June 1921 are the first to appear since the new Belgian 20 per cent ad valorem duties went into effect. The outstanding feature of these statistics is the drop in business done by American firms. Whereas 1,033 American automobiles came into Belgium in the first half of 1920, only 225 were imported this year. One of the results of the new law has been to encourage the importation of chassis only, which receive a Belgian body. This of course does not apply to the cheaper American cars, nor to such cheap European types as the Citroen, Renault and Fiat, which are practically always sold with standard body.

France is doing by far the biggest business with Belgium, the number of automobiles imported in the first six months of this year being 1060. Italy comes second with 342 cars. This number was artificially increased by a big importation of the popular 10 h.p. Fiat just before the higher tax duties went into effect. Germany is becoming rather important on the Belgian market, her imports being 202 and 327 for the first six months of 1921 and 1920 respectively. Benz and Mercedes are the leading figures in this business. England is losing ground, having dropped from 89 to 27 automobiles. She maintains a stronger position in the bicycle and motor cycle lines. Holland possessing only one automobile manufacturer, the 50 cars sent from that country to Belgium need explaining. A large number of these were French cars which had been re-exported from Holland to Belgium.

The following figures cover the Belgian imports and exports for the first six months of 1920 and 1921.

	Imports Into Belgium		Exports from Belgium	
	1920	1921	1920	1921
Germany .....	327	202	7	35
Spain .....	...	...	73	61
America .....	1,033	225	3	15
France .....	846	1,060	46	72
Great Britain .....	89	27	283	171
Italy .....	173	342	2	...
Holland .....	24	50	173	142
Portugal .....	...	1	62	9
Other countries .....	43	27	74	265
Total for six months..	2,545	1,934	723	770

Great Britain is the best individual client of the Belgian automobile industry, 171 automobiles having been sent to that country this year and 283 in the first six months of 1920. Germany took 35 automobiles, compared with 7 during the earlier period, but a certain number of these were for the Allied forces in Germany. Business with Spain and Portugal has dropped, this being attributed to German competition. The United States purchased 15 Belgian automobiles in the first half of this year, compared with 3 last year.

During 1920 Belgium imported 4,460 automobiles and exported 1,848 chassis or finished cars.

## Spanish Automobile Imports

American cars continued to outsell those of other countries in Spain during 1920, 5782 American built cars were imported into Spain during that year. The import figures given below show in detail the cars imported into Spain during the last three years. These numbers practically indicate the number of cars sold in Spain during that period, since domestic manufacture is almost negligible in Spain:

Open Cars Up to 1000 Kilos			
	1918	1919	1920
Germany .....	...	...	160
Belgium .....	...	...	23
United States .....	418	758	4,177
France .....	8	101	959
Great Britain .....	1	11	42
Italy .....	10	25	111
Other countries .....	2	1	12
Total .....	437	896	5,488

Closed Cars Under 1000 Kilos			
	1918	1919	1920
Germany .....	...	...	39
Belgium .....	...	...	7
United States .....	30	26	488
France .....	1	26	268
Great Britain .....	...	...	4
Italy .....	5	2	19
Other countries .....	3	...	3
Total .....	39	54	828

Open Cars Over 1000 Kilos			
	1918	1919	1920
Germany .....	...	4	249
Belgium .....	1	...	14
United States .....	322	294	949
France .....	4	39	285
Great Britain .....	3	8	62
Italy .....	7	23	81
Others .....	3	1	17
Total .....	340	369	1,657

Closed Cars Over 1000 Kilos			
	1918	1919	1920
Germany .....	...	2	111
Belgium .....	...	...	14
United States .....	41	42	168
France .....	5	16	161
Great Britain .....	4	2	17
Italy .....	2	1	27
Others .....	1	...	7
Total .....	53	57	505

Total Imports—All Types			
	1918	1919	1920
Germany .....	...	6	559
Belgium .....	1	...	58
United States .....	811	1,120	5,782
France .....	17	176	1,673
Great Britain .....	8	21	125
Italy .....	24	51	238
Others .....	9	2	39
Total .....	870	1,376	8,474

## Exports of Automobiles and Tires for July, 1921

COUNTRIES	COMMERCIAL		PASSENGER				Parts	TIRES			All other Tires		
	Complete Cars	Chassis	Complete Cars	Chassis	For Automobiles								
					Casings	Inner Tubes		Solid Tires					
Austria							\$440						
Azores and Madeira Islands							38	\$360					
Belgium	35	\$17,931	87	\$66,761			17,297	196	\$54				
Bulgaria							146						
Czechoslovakia											\$15		
Denmark			2	950			236,555	16,037	1,112	\$65			
Finland			1	800			168	263	27	636	655		
France	3	1,434	14	30,863	1	\$1,800	9,325	1,806					
Germany			1	3,503			1,098	119					
Gibraltar								30	125				
Greece			3	3,000			3,739	2,128	133				
Latvia							330						
Iceland and Faroe Islands							1,117	1,310	158				
Italy			1	2,500			3,529	1,018	200				
Lithuania			1	1,200									
Yugoslavia, Albania, etc.			1	2,340									
Netherlands	14	6,014	4	\$10,253	33	33,179	1	305	10,013	10,544	1,345	175	
Norway					1	1,800			17,956	24,723	1,393	554	
Poland and Danzig					6	3,590			3,580	160			
Portugal					1	3,500			1,806	453	80		
Romania	3	16,963			8	11,961			758	1,155	363		
Spain					18	16,612	3	2,080	25,934	4,456	119	3,417	
Sweden	1	706	1	1,405	31	34,436	2	1,164	12,621	60,757	1,727	287	
Switzerland					27	36,576	1	1,200	8,166	1,234	79		
Turkey in Europe					3	3,850			1,528			1,328	
England			10	14,550	15	56,700			213,032	440,633	35,349	10,755	
Scotland					1	1,300			1,065				
Bermuda												177	
British Honduras	1	250							68	615	217		
Canada	26	38,563	17	42,287	574	565,671	6	3,805	839,455	51,990	4,394	6,887	
Costa Rica						2,500			25	996	11	154	
Guatemala	5	2,390			7	13,590			7,362	2,531	508		
Honduras					2	2,200			1,237	1,710	138		
Nicaragua									660	430	25		
Panama	4	20,083			10	12,664			8,025	6,199	1,307	786	
Salvador					1	750			2,331	1,508	480		
Mexico	61	41,288	31	12,401	696	499,434	91	32,995	89,729	140,042	11,724	5,210	
Miquelon, Langley, etc.									12				
Newfoundland and Labrador					1	350			1,901	3,109	609		
Barbados									3,644	653	25		
Jamaica	2	816	2	560	16	9,598			6,958	4,384		2,280	
Trinidad and Tobago					5	5,957			4,419	7,380	1,803	472	
Other British West Indies					5	2,600	1	380	1,501	519	159	540	
Cuba	16	12,333	1	408	81	55,931	2	1,438	72,350	51,962	22,911	8,022	
Virgin Islands of U. S.					1	1,350			2,388	1,124	188		
Dutch West Indies					2	1,410			259	1,830	207		
French West Indies									650	450		446	
Haiti									2,754	3,259	318	150	
Dominican Republic	1	478	1	408	6	3,033			3,950	4,806	190		
Argentina					3	3,000			24,518	11,093	999	1,386	
Bolivia									1,197				
Brazil					7	12,397			16,094	5,895			
Chile					1	2,000			1,884	1,000	181	197	
Colombia	2	2,620			2	2,626			1,123	2,099	155		
Ecuador			4	1,633	4	1,683			1,544	1,017	187		
British Guiana									1,467	255	336		
Dutch Guiana									653	321			
French Guiana										25	3		
Peru					2	4,615			7,628	1,861	321	86	
Uruguay									10,675	5,092	645		
Venezuela					6	11,766			5,230	7,523	1,282	169	
Aden									686				
China					15	19,311	4	3,465	1,796	1,244	53		
British India					4	4,471			20,623	4,757	936	200	
Straits Settlements					6	6,932			2,318	3,560	71	879	
Other British East India									1,101	237			
Dutch East Indies					13	13,523			12,163	25,178	456	975	
French Indo China									2,369				
Greece in Asia					1	1,250			48				
Hajaz, Arabia and Mesopotamia	10	4,783			40	19,296			2,910	137	196		
Hongkong			4	12,000	1	1,500			2,712	320	30		
Japan	10	5,800	50	25,950	17	13,422	100	43,300	42,013	18,743	1,191	3,022	
Palestine and Syria	1	408			32	9,320			10,949	87	9		
Persia										1,799			
Siam					2	3,000			618				
Turkey in Asia	8	3,909	1	3,000	51	22,214	3	1,115	1,212	3,256	418		
Australia			5	5,550	32	35,426	56	49,829	90,118	13,378	1,170	239	
New Zealand			1	3,300	8	9,973	6	6,032	16,979	21,792	1,630	4, 51	
Other British Oceania									329		48	277	
French Oceania									915	1,187	135		
Other Oceania					4	3,168			771	333			
Philippine Islands									18,307	46,437	3,250	12,393	
British West Africa			1	615					9,684	3,485	1,177		
British South Africa			2	2,670	11	13,062			8,613	4,003	276		
British East Africa					2	6,000			4,117	2,937			
Canary Islands					10	4,710			672	218			
French Africa	1	478			1	490	2	1,018	585				
Madagascar									65				
Morocco									2,080				
Portuguese Africa									1,130				
Egypt					7	5,798			4,790	1,713	2,066		
Total	204	\$177,247	135	\$ 136,990	1,946	\$1,723,462	278	\$149,906	\$1,952,525	\$1,046,981	\$104,739	\$66,645	\$22,061

# Restoring Craftsmanship Pride to the Worker

Interest in work varies with the degree of visible accomplishment—The longer a man has been operating under routine conditions, the more difficult it is to restore the spirit of craftsmanship. The greatest difficulty in modern industry is lack of opportunity to satisfy the creative instinct.

By Harry Tipper

**W**HILE I was spending a week or two away from the office and from any connection with business affairs, I came across a lady who had been in charge of occupational work at the reconstruction hospitals. At these places the wounded soldiers are given various occupations in cases where they have been incapacitated for their previous work or where there is a therapeutic value to the occupations themselves.

The lady had no experience in industry as we know it in the modern factory system, but she was skilled in the craftsmanship of wood carving, basket weaving, and tapestry work.

Many of her stories were extremely interesting apart from the suggestion they offered to industry, and they made me wish some of the thinkers among the executives in industry had been associated with this kind of work.

The men who had learned their new work at the hands of this lady came from all lines of interest and from many different ranks in business. The unskilled laborer, the automobile mechanic, the machine tender, the office clerk, and so on, were among her students.

Being an observant woman, she noticed many things in her work, some of which puzzled her considerably.

In the course of conversation she said: "I wish you could have heard them talk about their industries, the jobs and the bosses they had had. Most of them were very worth while and, of course, much that they said was in entire ignorance of the real state of affairs.

"It was the first time I have been in intimate contact with workers of all kinds and their reactions to their work and industry were very definite.

"It made me see how conflicts arose in the industrial field. What I could not understand, however, was that the same men who could think of nothing more important than less hours and more pay in their previous jobs, would be lined up before the door of my shop before I opened it in the morning and could hardly be kept away when the door was closed at night, and they were just as proud of their work as they could be."

Of course, the interest in the work which she had observed was due to the visible accomplishment of the work. There was a sense of craftsmanship, of creation, and of visible accomplishment in this work, which had been denied them in the ordinary work in industry. This sense of accomplishment overcame all ideas about hours and they forgot even how much the work was worth in the satisfaction of doing it.

In these cases the men had been rudely shaken out of

their ordinary routine and they were suffering from the prospect of being unable to return to their ordinary work, so that it was possible to create a spirit of craftsmanship much more rapidly than under normal conditions.

Nevertheless, when the man got through choosing the reed for the particular job he was doing, laying out the work, finishing the basket, the results of his work were entirely visible to him, the mistakes of his work were equally emphasized and the possibilities of improvement suggested.

**The most important difficulty in modern industry is this lack of craftsmanship, the sense of visible accomplishment, the individuality and responsibility for the work, and a sense of proprietorship in the product which has been made.**

In occasional instances something has been done in this respect in the individual factory and the result has been remarkable in its effect upon efficiency.

The way in which interest governs the character, the accuracy, and speed of the work has not been sufficiently considered.

One of the instances mentioned in the conversation I have spoken of showed the force exerted in the work, by the interest itself. One of the men who was taught wood carving had his right hand so badly paralyzed that he could not close it and it was necessary for him to use a large lump of beeswax so that the tool could be held. Gradually the muscles of the hand began to function until the beeswax could be thrown away. The intensity of interest and the unconscious effort to gain skill and accuracy because of the interest had its effect upon the whole physical co-ordination.

**The reverse is true and unconsciously we find our systems of industry producing a mass of materials, but requiring more inspection, more supervision, and more constant attention, because the interest is not developed and the accuracy and skill are not improved materially under the conditions.**

In the August number of *The Rotarian* there is a statement by Mr. Charles Gates of the Gates Rubber Company, called to my attention by a subscriber to *AUTOMOTIVE INDUSTRIES*. This statement is worthy of the consideration of every manufacturer. It is quoted below.

"Restore to the worker—the man or woman in your office, your store, or your factory—one of the greatest gifts that man can possess—the pride of craftsmanship, the feeling of individual or collective responsibility, and the sense of proprietorship.

"You can do this, no matter what your business, and

it will increase your production. It will give birth to creative ability that has never before expressed itself. It will cut your costs and it will pay dividends both to you and to your employees. And, more than this, it will elevate the intellectual, the moral and the spiritual level of your whole organization.

"When you have given back to your workers the opportunity to express that pride of craftsmanship that will mean more to them than the gifts of thousands of dollars, you will have performed a service to mankind that will do more to lift the moral stan-

dard of humanity than all the preachments of the past fifty years, and it will come nearer to the realization of a true spirit of democracy than has existed in this country since the signing of the Declaration of Independence."

It is interesting to note that as a result of the deliberate attempt to put this idea into practice, the individual production jumped from 60 per cent in 1919 to over 80 per cent in 1920, and this manufacturer is enabled to keep up his volume of business and his percentage of profit with a smaller organization.

## New 1-Ton Bevel Gear Axle

A 1-TON bevel gear-driven axle for speed trucks has been brought out by the Clark Equipment Co., manufacturers of internal gear driven truck axles. This new member of the Clark line is known as Model B-21.

A feature of the design is the short pinion shaft, which reduces the overhang of this member, which has a straddle mounting. The entire shaft assembly is mounted on a pinion carrier which can be easily removed from the axle. A Brown-Lipe differential is used.

The weight of the axle, inclusive of wood wheel hubs, brake drums and bearings, is 380 lbs., while the allowable load on the spring pads is 3500 lbs.

Various gear reductions can be furnished, the maximum being 6.25 to 1. There are both internal and external brakes acting on the rear wheel drums, which latter are 16 in. in diameter. The internal brake bands are 1½ in. wide and the external bands 2½ in. With 36 in. tires a road clearance of 10½ in. is obtained. Spring centers vary from 38½ to 40 in., 39½ in. being standard.

The axle is designed for the Hotchkiss drive. The drive is by spiral bevel gears with seven and 44 teeth of 3.48 diametral pitch and 1 5-16 in. face. The pinion is formed integral with its shaft. The drive shafts are of nickel steel, 2 in. in diameter at the wheel end and 1 9-16 in. at the differential, both ends being splined. The propeller shaft forward end is machined for an S. A. E. No. 6-B spline joint 1¾ in. in diameter.

Both brake levers are located inside the springs. The wheel hubs are 9 in. in diameter and are designed for 14-spoke wood wheels. The bearings are of the non-adjustable type and are said to be of unusually large capacity. The brake drums are piloted on the rear hubs and are secured in place by bolts which have their nuts on the outside of the spokes, so that the drums can be readily removed in case of need. Hard felt washers are used at various points of the axle for the exclusion of dirt and the retention of lubricant.

The wheels are said to be readily removable and re-

placeable, and they are so arranged that they can be put on only one way. All nuts are locked either by cotter pins, lock rings or lock washers. The wheel bearings are designed to take thrust in both directions, this practice being considered preferable to that of transmitting the thrust from the inside through the shafts to the bearing on the opposite side, as is commonly done in passenger car axles.

## Wire Wheel Demountable at Rim

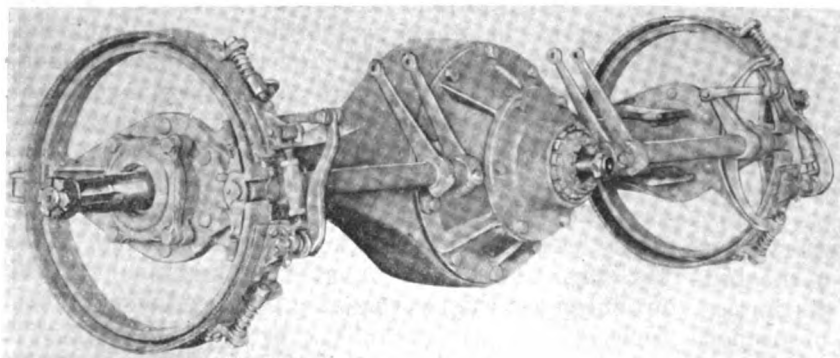
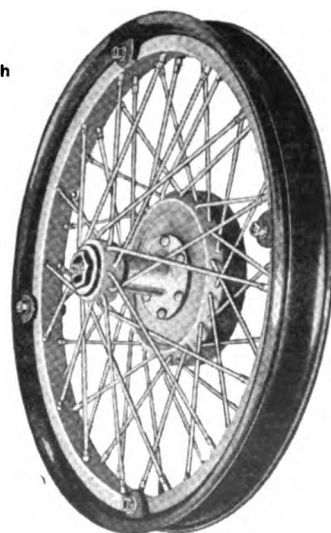
SOME time ago the Hayes Wheel Co. perfected a wood wheel with steel felloe in which the loose wedge was eliminated and fixed lugs securely fastened to the rim used instead. This type of wood wheel has been adopted by several large manufacturers of motor cars.

Now the fixed lug construction has also been applied to wire wheels. The same kind of steel felloe and the same kind of demountable rim are used, and the new Hayes wood wheel rims are interchangeable with the new wire wheel rims. The attached lugs on the wire wheels are claimed to do away with loosening of the spokes and with throwing the wheel out of round.

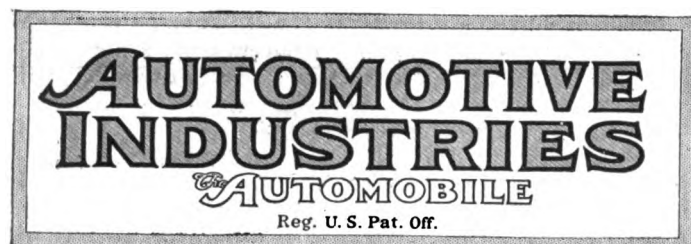
The following advantages are claimed by the Hayes company for its new product: In mounting the rim the full pulling power of each lug bolt can be exerted in drawing the rim to the felloe, and only one-half the number of bolts otherwise required are needed; each lug bolt also becomes a driver, preventing slippage of the rim; there are no loose lugs and misalignment of rims is impossible, which means longer tire life.

At present the wheels can be supplied only for Fords and Chevrolets 490, but they will soon be available for other makes also.

Hayes wire wheel with demountable rim



Clark Model B-21 bevel gear axle for speed trucks.



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## A Bureau of Civil Aeronautics

A COMPREHENSIVE bill to provide for a Bureau of Civil Aeronautics has been introduced in Congress by Senator Wadsworth. The bill provides for the control, regulation and development of civil aviation by the Bureau under the Department of Commerce.

This measure constitutes perhaps the most constructive effort yet made in this country to place the development of our commercial aviation on a sound basis. Other countries have already gone far in regard to such developments. In France a complete system of landing fields has been developed and regular passenger service is being successfully provided. Government efforts have made possible this development over there.

While the proposed bureau is to have supervision of all phases of aviation matters, provided the bill is adopted, perhaps the most important of its immediate functions would be the development of proper landing fields and air ports throughout the country. Civil aviation is dependent upon the facilities for

landing to a very large extent and it is in this direction that least has actually been accomplished in the United States.

The disseminating of weather reports and operating signals for aviators is another immediate function which such a Bureau would assume in addition to that of inspecting and laying out air routes and the establishment of air ports and terminals. The establishment of such a Bureau would be a definite step in advance for American civil aviation.

## Producer Gas as Automotive Fuel

AMONG the fuels which have received consideration during the last several years as possible substitutes for gasoline in internal combustion engines is producer gas, which is extensively used for industrial purposes. Some ten years ago attempts were made in this country to develop producer gas plants for use on motor boats. This enterprise did not prove a success, probably because in any kind of pleasure craft the dirt always associated with solid fuel is a great objection. The present movement to develop such plants originated in England during the war, when gasoline was practically non-available for private purposes.

Naturally, solid fuels are far less convenient to handle than liquid fuels, as they cannot be fed automatically in the exact proportion required by the engine. Moreover, for a certain amount of heat energy they occupy much more room. On the other hand, producer gas from hard coal or coke is a considerably cheaper fuel than gasoline, especially in countries possessing no oil wells. Some of the advantages of operation are also on the side of gas, as there can be no difficulties of distribution and no crankcase dilution, and there are, moreover, no unusual starting difficulties in winter time. The water could be kept from freezing by dissolving alcohol in it; as comparatively little water is used and as the fuel value of the alcohol would be utilized, there would be very little added expense due to the need for an anti-freeze solution.

In considering the advantages offered by producer gas obtained from anthracite or coke, it is quite natural to make a comparison with the use of these same fuels in steam trucks or tractors. Twenty years ago the steam system would have had a practical advantage in that then many more people were familiar with steam than with the internal combustion engine. To-day the situation is reversed. One of the great objections to the steam system using solid fuels is the development of smoke. It appears from work done so far that a producer gas plant can be made much lighter than a steam plant of equal output, and there is less need for automatic devices on the gas power plant than on the steam plant. Finally, when solid fuel is used, the thing aimed at mainly is fuel economy, and it has been shown in stationary practice that the cost per horse power hour in small units is much less with producer gas than with steam produced with the same fuels.

In a series of articles beginning in this issue the theory of the use of producer gas and the systems which



have been developed in England in recent years are discussed.

The one thing that will bear watching on trucks driven by producer gas power is their behavior in dense traffic. As the draft from the engine stops when the engine is stalled, there is a tendency for the fire in the producer to die down and gas production to stop, which would be likely to make quick acceleration impossible. By means of the blower always carried on trucks equipped with producers, the fire can of course be kept up, but in congested traffic the driver is generally so occupied that he can give little attention to the blower.

## Present Human Problems

**R**EFUSING to address a certain group of American labor, Bernard Shaw is quoted as saying that labor needs to hear all sides of the case in order to have a fair understanding of the entire industrial situation; that one of the greatest defects in labor at present is its lack of knowledge and understanding of the case of the employing and capitalist classes. He is quoted as suggesting that this group get Marshal Foch to speak to them, since he believes they would find themselves in agreement with him on many points, were they really to understand his views.

The limited newspaper reports of Shaw's refusal do not give sufficient evidence to determine whether or not he meant what he said or was playing at his favorite pastime of meaning exactly what he doesn't say. Taking the opinions at their face value, however, much sound common sense is revealed.

Many of the labor difficulties which have accrued to some automobile manufacturers in the past have been due to a lack of honesty and frankness in dealing with workers. In a few cases perhaps this lack of frank contact was intentional; in most cases, however, it has been the result of a type of indifference. The manufacturer has been too busy with other things; he has not considered the task of getting his workmen to know the company of sufficient importance to warrant careful study and studious investigation. Too often the task has been intrusted to house organ editors utterly incapable of even sensing the problem, let alone handling it effectively.

Even some of those employers who did give serious attention to this problem for a time during the period of acute labor difficulties are no longer interested. They seem to feel that the problem has gone. It is true that temporary conditions render the labor problem no longer acute; but the lack of surface trouble is no indication that the inherent difficulties are not still present.

The employer who senses this fact and who recognizes the present as a time specially suited for studying the details of the human problems in his plant, especially those phases which relate to details of production, will lay up for himself a store of future profit. The average workman is in an excellent frame of mind to-day to be approached by the employer. Equipped with a fundamental sincerity of purpose, the employer to-day has an opportunity to study and to build constructively in the human phases

of his production. The reflex from present methods in this regard will show up some months hence.

## Noiseless Cars

**T**HE ideal car is one which is silent in operation, not only so far as the operating mechanism is concerned, but one in which the exhaust is silenced and whose passage over the road is noiseless, even when the going is rough. This ideal is approximated in some of the higher grade cars when they are new, but there is much room for improvement in the less expensive makes, while even the higher priced jobs are far from noiseless after a few months of use.

Much money and effort has been spent by many manufacturers in building engines which are practically noiseless, and the majority of engines are open to relatively little criticism in this regard. The remainder of the car has not kept pace in this regard. Many gearsets are far more noisy than there is need for their being if a little more care were given to their design and construction, while starting gears almost always offend the ear during the brief periods they are in use. So far as the rear axle is concerned, the quite general use of spiral bevels has improved conditions to a marked degree.

In the rest of the chassis and in the body there is, however, a great need as well as possibility for improvement. Spring shackles, especially after they have become slightly worn, are the source of much preventable rattle. Some manufacturers are seeking to eliminate this very general defect by better designed shackles, some of which have means for taking up wear either by springs or by positive adjustment. This is a step in the right direction, but there is reason to believe that it is entirely feasible to eliminate the spring shackle and provide in its place a flexible or yielding member which cannot rattle. One prominent truck manufacturer has completed successful experiments in the use of rubber blocks of special design in place of shackles, and is regularly equipping his product with these so-called "shock insulators," which will be described in an early issue of AUTOMOTIVE INDUSTRIES. These blocks are said to render the vehicle much less noisy and to greatly improve its riding qualities; besides which they require no lubrication or other attention on the part of the user. Further experiments in this direction seem highly desirable.

Among other parts which cause unnecessary noise are brakes and brake connections (especially external band brakes), front axle steering connections, sheet metal parts, such as mudguards, splash guards and underpans; license plate brackets and lamps; doors and other body parts and body hardware. All of this, and much other noise can and should be eliminated. In many cases a little more care in assembly or thought in design will produce the desired results with but slight if any increase in cost. The fact that a car is noiseless in operation is at least an excellent sales asset—a tangible quality which every owner would appreciate and from which the manufacturer would profit accordingly.

# Factories Set Fast Production Pace

## September Business Will Exceed August

### Ford, Dodge, Buick and Studebaker Lead in August Output Records

DETROIT, Sept. 6—Under the leadership of Ford, Dodge, Buick and Studebaker business in September is expected to run considerably ahead of August in the passenger-car field and probably will show a slight betterment in the truck field, owing to development of light delivery truck buying.

August production held very close to the marks set in July. Manufacturing in all plants was practically on a sales basis. Some reported a falling off from July totals, but others reported improvement.

Ford led all others in improvement over July, the August total of 117,696 being the highest production mark yet reached. This is capacity production, practically for all plants and assembly stations and under the impetus of the new prices it is believed this figure will be equalled or exceeded in September.

Dodge is continuing at the rate of 550 cars daily and orders are said to be far enough in advance to continue this pace to the first of the year.

Studebaker continues at maximum monthly production of 8900 cars and reports no indication of a let-up in orders.

Buick led all General Motors units with an August production of 11,750 as outlined. The same pace will be held in September.

Oldsmobile has stepped up its production schedule for September to 80 daily, being influenced in this by the rush of orders following announcement of new prices.

Cadillac will hold its schedule of approximately 75 daily for September.

Oakland ran 25 per cent ahead of July in its August production and looks for a similar gain in September. The company reports its new sport model getting a large share of business.

Scripps-Booth will continue its schedule of 25 daily for the present.

Reo Motor Car Co. reports 100 per cent production in August, the month being its third biggest since it began business. The same production totals or better are looked for in September, the business being divided evenly between passenger cars and speed-wagons.

Briscoe Motor Car Co. reports August business of 30 daily with the same schedule outlined for September.

Handley-Knight looks for a 50 per cent better business in September than in July or August.

Barley Motor Car Co. will increase its output in September.

Saxon looks for increased sales in September owing to increases in its dealer organization and reports from its investigators in the field.

Columbia Motors business increased in August and further increases are looked for in September. Announcement of its new models and prices brought a rush of orders which is continuing.

Hupp will step up from an August production of about 1500 to a September output of 2000.

Paige, operating in August on a 65 per cent basis, looks for a decided improvement in September.

Hudson-Essex beat its July figures slightly in August and looks for a real increase in September.

Lincoln with a production of 225 in August plans to build 275 in September.

Jackson Motors, operating in August at less than half of capacity, will step up in September.

Dort Motor Car Co. has started a series of fall openings in its distributor territories which will run into October. These are expected to carry business to new high marks in the fall months. August business was on a par with July.

Packard Motor Car Co. will reopen Sept. 10 after a two-weeks' vacation period. Orders are reported running high on its twin six and single six cars and production will be speeded up when the factory reopens, to meet demand. Truck business is light but showing more life than for several months.

## Dealer Says Business Is Brisk in Manila

SAN FRANCISCO, CAL., Sept. 6—The automobile business in Manila is brisk, roads are fairly good and more are being built, but the great drawback to the handling, distribution and service of cars is the inability to get competent mechanics at any salary. This is the interesting statement of O. Porter, who has been in the automotive business in Manila for fifteen years, and returned late in August to San Francisco for his first visit to the United States in 22 years. He said:

"In Manila I handled several makes of cars, having sometimes as many as 150 new and second-hand cars on hand. When I sold out a few weeks ago, I had 60 cars in the store. Roads in the islands, speaking generally, are good; better, in fact, than those I saw on the way here from Vancouver. The automobile business in Manila is brisk, but the one drawback is a lack of mechanics. The last few years, however, has developed a few good native mechanics, and this supply may increase as time goes on."

## Air Control Bill Up After Recess

### Will Be Considered When Congress Reconvenes—Senator Wadsworth Gives Details

WASHINGTON, Sept. 7—The bill providing for a Bureau of Civil Aeronautics in the Department of Commerce introduced by Senator Wadsworth, was referred to the Senate Committee of Commerce and will be taken up for consideration at the end of the recess. The measure provides for the control, regulation and development of civil aviation in accordance with the recommendations made by President Harding in his inaugural message. It would provide commercial flying with a centralization already possessed by the air services of the army and navy. In introducing the bill, Senator Wadsworth said:

"Through control, regulation and development, civil aviation can make a real contribution to our transportation needs, particularly in the carriage of mail, and at the same time provide an economical and indispensable reserve for the military and naval services.

"Already 1,200 commercial aircraft are in operation, but due to the lack of Federal control there were 40 serious accidents in civil aviation the first six months of the year in which 14 persons were killed and 52 injured.

"Of equal importance with the inspection and laying out of air routes is the establishment of terminals and the provision of means for disseminating weather reports and operating signals for aviators—all provided by this bill.

"This bill is also designed to correct a curious and extraordinary situation that is developing in customs and quarantine. Smuggling of persons and goods—including liquor—is easier by air than by many other methods, and contraband flying cannot be controlled except by special law with all the force of the Government behind it.

"This bill was prepared in response to the urgent solicitation of a score of organizations throughout the United States representing the operating, engineering, constructing, commercial and sporting elements in aviation. Its early enactment is imperative as a means of saving life and property, aiding our economic development and strengthening our national defence."

## NEW RANGER MODEL

HOUSTON, TEX., Sept. 6—The Southern Motor Mfg. Assn., Ltd., is now at work on the production of a six-cylinder model. This will be known as the Ranger, having the same name as the previous four-cylinder model, which has been on the market for some time. The new six will be fitted with a number of different style bodies, including both sport and conservative designs.

# Robert Bosch Magneto Incorporates

## Heins Heads German New York Company

### Will Manufacture on Old Patents Pending Result of Suits Against A. Mitchell Palmer

NEW YORK, Sept. 7.—The Robert Bosch Magneto Co., Inc., which has been incorporated at Albany with a capital of \$250,000, has opened offices in the Goodyear Rubber Co. Building, at 123 West 64th Street. Otto Heins, who was president of the Bosch Magneto Co. before it was taken over by the alien property custodian and reorganized into the American Bosch Magneto Corp., is president of the new corporation.

#### Await Suit Outcome

Heins has a suit pending against A. Mitchell Palmer, former alien property custodian, and officers of the American Bosch Magneto Corp. for the return of the property and patents on the ground that fraud was practiced in their sale. Pending the outcome of the litigation for the return of the original Bosch property and patents, Heins says the new company is going ahead with the manufacture of magnetos on the old patents.

Harvey T. Andrews, attorney for Heins in his action against Palmer, is secretary and general counsel of the new company. He does not deny that the American holders of the patents may sue for infringement of their rights when the new company begins production of Bosch magnetos, but in this connection he contends that the purchasers of the patents at the sale by the alien property custodian paid only \$1 for the patents.

"Under these circumstances," Andrews said, "it would be interesting to find out what part of that amount, if any, would finally be allowed by the court as damages, assuming that the present holders of the patent sue for infringement and that they are successful in such a suit."

The treasurer of the new company is Guenther Jahn, who was a stockholder and an officer of the original Bosch Magneto Co.

#### Heins German Citizen

Heins is a German citizen and an engineer of long experience. He organized the Bosch Magneto Co. in this country with a small capital and asserts that he controlled the company at the time it was seized by the alien property custodian although Palmer contended that the stock actually was owned by Germans living in Germany, chiefly by Robert Bosch.

Heins has not selected a factory site but says he is considering several plants

already built. According to his statement, the new company will manufacture magnetos, spark plugs, starting and lighting systems for automobiles, airplanes and motorboats as well as other electrical devices.

#### Plans Competition

It is the purpose of the Robert Bosch Co. to compete with the American Bosch Magneto Corp. and it will offer for sale magnetos manufactured here and also in Germany. The Germans claim to be able to manufacture such articles more cheaply than they can be made in America. The company also claims to have a new Bosch invention for use in low priced automobiles. This is a combination battery and ignition system. It also will offer a new Bosch electric lighting system for high priced cars. Heins has filed applications for new patents in the patent office at Washington.

## Grand Jury May Probe Revere Motor Affairs

INDIANAPOLIS, IND., Sept. 6.—Paul M. Souder, judge of the Cass Circuit Court, will be requested to call the Cass County grand jury in session at Logansport, Ind., during the September term of court, to investigate various rumors and allegations regarding the Revere Motor Car Corp. The prosecuting attorney asserts that the question of the return of Newton VanZant, formerly president of the Revere Motor Car Corp., wanted on a charge of grand larceny, would have no bearing on his determination to make the request. The charges against VanZant were filed by John B. Porter, a stockholder, in connection with sale of stock. A damage suit for \$10,000 against VanZant has also been filed by Porter.

The Citizens Loan & Trust Co. of Logansport, receiver for the Revere Motor Car Corp., has filed a cross complaint asking \$7,500,000 damages against the Revere Motor Sales Co., Inc. In its original suit, the sales company asked \$500,000 damages for alleged failure of the manufacturing corporation to live up to a contract under which it was to supply 3000 cars a year for five years.

## Philadelphia May Get Fokker Plane Plant

PHILADELPHIA, Sept. 5.—Philadelphia expects soon to have a branch of the Fokker airplane factory of Holland. A representative of the Dutch company, H. P. French, has been conferring with leading men here interested in aviation on the prospects of establishing a plane plant here.

There has not been any definite plan proposed as yet.

## Engineers to Visit Big Proving Ground

### S. A. E. Members Will Be Guests of General Williams October 7th

NEW YORK, Sept. 7.—The Washington, Pennsylvania and Metropolitan sections of the Society of Automotive Engineers, together with members of the parent organization, will visit the Aberdeen Proving Ground on Oct. 7 at the invitation of Major General Williams, chief of ordnance. Members of the American Society of Mechanical Engineers and the Army Ordnance Assn. will be members of the party. The invitation of General Williams provides an unusual opportunity to note the progress made recently in the development of guns, projectiles, bombs, aircraft and mobile mounts. The meeting will last all day.

Several announcements of section meetings for the fall have been received at the headquarters of the S. A. E.

The Dayton section expects to hold its first fall meeting about Oct. 1. The subject to be considered will be radiation.

The Detroit section will hold meetings on Sept. 23 and Oct. 21. One of the most important subjects to be considered will be the fuel problem.

While the Midwest section has not decided on dates, there will be a series of meetings in Chicago for the discussion of thermodynamics, principles of carburetion, combustion phenomena and the fundamental losses in internal combustion engines.

The Indiana section will hold a meeting on chassis design in Indianapolis, Sept. 23.

The Metropolitan section will hear on Sept. 15 a synopsis of the papers presented at the fuel session of the society in May.

The Minneapolis section will have sessions during the season on manifold design and fuels, tractor wheels and traction, steam power for farm tractors, road building machinery and engineering, power cultivation, tractor publicity and demonstrations.

The New England section will follow the custom established last year of holding meetings in various cities throughout its territory. The first will be an outdoor meeting in Worcester, Sept. 17.

The Pennsylvania section will open its season with a meeting at the Torresdale Golf Club the afternoon and evening of Sept. 22. Sports will occupy the afternoon and after dinner there will be a brief discussion of some of the more important papers presented at the meeting of the Society in May.

## Big Drop in English Trade in 7 Months

Export and Import Figures Are Lower Than Same Period in 1920

LONDON, Aug. 26 (By Mail)—July's automobile trade returns in Britain reflect the effect of the thirteen weeks of the coal trade's cessation. England imported 318 cars, 382 chassis, 133 trucks, 78 motorcycles, having a combined value of \$1,100,000. The month's import of chassis parts had a value of \$721,000, of motorcycle parts \$74,400, and tires \$1,772,680.

The shrinkage in the month's import is sufficiently indicated by noting merely the corresponding numbers for July, 1920. They were as follows: Cars, 2,325; chassis, 1,116; trucks, 1,290; and motorcycles, 666. The shrinkage in value of the chassis parts imports was as 5 to 1; of motorcycle parts as 3 to 5; and of tires as 3 to 5.

The following figures show the relative gross imports for the seven months ended July, 1920, and July, 1921, respectively: July, 1920, figures being given in brackets: Cars 3113 (15,779), chassis 2315 (7792), motorcycles 2024 (6681) while the value of the parts and tire imports for the seven months were: Chassis parts \$9,741,065 (\$21,374,000), motorcycle parts \$439,000 (\$321,200)—there is an increase on this head—and tires \$9,560,000 (\$15,475,000).

British automobile exports for July were: 93 cars (401), 77 chassis (341), 71 trucks (97) and 646 motorcycles (2641), the figures in brackets denoting the corresponding number in 1920. The month's value of British export chassis parts was \$428,110 (\$1,183,600), motorcycle parts \$120,000 (\$336,150), and tires \$538,500 (\$3,618,000), the bracketed figures, as before, denoting the corresponding month's value in 1920.

The gross value of British automobile exports for the seven months was: Cars \$5,561,000 (\$5,558,000), chassis \$3,546,000 (\$4,837,250), trucks \$2,150,125 (\$2,011,730), motorcycles \$2,500,000 (\$3,925,000), chassis parts \$4,317,000 (\$5,428,190), motorcycle parts \$1,028,635 (\$1,694,000), and tires \$6,529,000 (\$20,000,000), the figures in brackets being for the seven months corresponding, 1920.

## Gibbes, Well Known Distributor, Is Dead

COLUMBIA, S. C., Sept. 6—A. Mason Gibbes, head of the Gibbes Machinery Co., Packard, Paige and Durant distributor in South Carolina, died suddenly in his office to-day. Gibbes, whose company did an extensive machinery and foundry business as well as wholesaling and retailing automobiles, was one of the strong men in the industry in the Southeastern States. He was one of the organizers and first president of the South Carolina

Automotive Trade Association, and was holding the office when he died.

Gibbes had been influential in bringing about legislation in his home state favorable to the industry and through Senator Dial of South Carolina had exercised considerable influence on Federal legislation. He had done a great deal of work to help elevate the tone of the trade in his home state. He was 44 years of age. A brother, Frank H. Gibbes, had been associated with him in the affairs of the company.

## G. B. Bell Named Chief of Vehicle Division

WASHINGTON, Sept. 6—The appointment of George B. Bell of Jamaica, New York, as chief of the Agricultural Implements and Vehicles Division of the Bureau of Foreign and Domestic Commerce was announced to-day. This is one of the new commodity divisions. Bell has had wide experience in the agricultural implements field. He was with B. F. Avery & Sons of Louisville, Ky., engaged in export work for twenty years.

## Canada Will Issue Trade Certificates

OTTAWA, ONT., Sept. 7—The government has been empowered to institute a system of certificates to be attached to all invoices of foreign goods imported into Canada. It is proposed to charge a fee of \$2.50 for certificates on invoices of \$100 or over, these certificates to be signed by a Canadian trade commissioner, British consul or other person duly authorized.

Canada spent \$240,000 in paying expenses of the various trade commission officers and received nothing in return during the year. The United States Consulate during the same time spent about \$270,000 and received in fees something like \$500,000 from Canada's exports of about \$500,000,000.

## Bassick-Rimtco Suit Is Settled Amicably

NEW YORK, Sept. 7—The difference over the patent rights between the Bassick Mfg. Co. of Chicago, manufacturer of the Alemite system of lubrication, and the Rhode Island Machine & Tool Co. of Woonsocket, R. I., manufacturer of Rimtco high pressure system of lubrication, has been settled. The Rimtco gun will be manufactured as heretofore, but under an agreement with the Bassick company, which gives the former full rights to manufacture and sell the Rimtco pressure grease gun.

## F. R. BLAUVELT DIES

NEW YORK, Sept. 7—Frank Remington Blauvelt, first vice-president of R. K. Carter & Co., buyers for jobbers of automotive supplies, died here this week. He spent most of his business life in the hardware trade. He traveled extensively all over the country.

## Steady Increases in Tire Production

Rubber Association Figures Show Manufacture Heavier with Decline in Stocks

NEW YORK, Sept. 6—Statistics compiled by the Rubber Association of America on tire production, shipments and inventory, for the Department of Commerce, show a steadily increasing volume of manufacture and an equally steady decline in stocks on hand. The figures by months since November, 1920, which is taken as the base month, up to August, follow:

PNEUMATIC CASINGS			
1920	Inventory	Production	Shipments
Nov. ....	5,880,016	649,742	806,023
Dec. ....	5,508,350	506,111	1,327,153
1921			
Jan. ....	5,319,605	703,430	965,417
Feb. ....	5,193,018	819,892	1,073,756
Mar. ....	4,597,103	1,163,314	1,614,651
Apr. ....	4,527,445	1,651,418	1,785,951
May ....	4,451,668	2,100,917	2,085,882
June ....	4,154,456	2,313,265	2,643,850
July ....	3,892,037	2,570,524	2,757,581

INNER TUBES			
1920			
Nov. ....	6,131,935	742,815	920,938
Dec. ....	5,786,929	508,446	1,481,285
1921			
Jan. ....	5,586,163	740,824	1,042,617
Feb. ....	5,415,464	916,627	1,129,881
Mar. ....	5,044,861	1,346,483	1,643,690
Apr. ....	4,916,772	1,762,122	1,983,571
May ....	4,751,880	2,210,040	2,342,567
June ....	3,835,098	2,359,928	3,232,673
July ....	3,122,815	3,020,981	3,603,248

SOLID TIRES			
1920			
Nov. ....	298,875	21,355	34,217
Dec. ....	303,473	16,297	40,828
1921			
Jan. ....	303,753	21,220	29,116
Feb. ....	304,374	23,365	29,599
Mar. ....	283,800	28,710	43,926
Apr. ....	269,985	28,859	42,080
May ....	264,633	35,156	40,122
June ....	240,336	28,395	49,867
July ....	220,003	35,123	55,678

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

## NO TAX PENALTY FOR LABELLE

WASHINGTON, Sept. 7—Under Treasury decision 3220, dated Aug. 26, but made public this week, taxpayers in the automobile industry who included "appreciation" in invested capital contrary to the recent decision of United States Supreme Court in La Belle Iron Works case may file amended returns within ninety days and pay taxes without penalty. There had been some question as to penalties but the Treasury ultimately decided on this liberal policy.

## PREST-O-LITE BATTERY CUT

NEW YORK, Sept. 6—Prest-O-Lite Battery Co. has announced a new price. The new price is \$23.50, a reduction of \$12.40. The old price was \$31.15.

## N.A.C.C. Will Present Legislation Views

### Members to Meet Law Makers on Highway, Taxation and Re- imports Measures

NEW YORK, Sept. 6—The National Automobile Chamber of Commerce has sent to its members a bulletin calling their attention to the fact that the month's recess taken by Congress will give an opportunity to meet members of both houses in person and present views on legislation which will be taken up during this session. From the viewpoint of the automotive industry the most important measures are:

1. The Phipps-Dowell-Townsend highway bill which has been passed by the House and Senate and now is in the hands of conferees. The measure as it stands carries an appropriation of \$75,000,000 for one year for main highways.

2. The taxation bill which has been passed by the House and is now in the hands of the Senate Finance Committee. As the measure now stands it does not remove the excise tax on automotive vehicles, tires, parts and accessories.

3. The Graham bill which provides for the imposition of a 90 per cent ad valorem duty on all American made goods exported for use by the American Expeditionary Forces or allied governments, sold to other governments by the United States Liquidation Commission and later sold to speculators who have been reimporting large quantities to this country including motor trucks and passenger cars. The measure was passed by the House and reported favorably by the Senate Finance Committee with an amendment which would limit its effect to goods purchased after Aug. 15 and reimported after Nov. 1, 1921. Passage in the Senate under unanimous consent was prevented by objections by Senators Pomerene and Hitchcock.

4. The Dyer Motor Vehicle Theft Act which was passed by the Senate and reported favorably by the House Judiciary Committee, but passage by unanimous consent was prevented by Representative Mann of Illinois.

5. The tariff bill which would reduce the import duty on automobiles to a uniform rate of 25 per cent and which would provide for a 5c. per pound duty on aluminum instead of placing it on the free list or retention of the present duty of 2c. per pound asked by the N. A. C. C.

### Ford Statement Shows \$54,844,538 in Cash

LANSING, MICH., Sept. 6—The Ford Motor Co., according to a statement filed with the Department of State, had \$54,844,538 cash on hand and in the bank at the close of business on June 30. Its plant, including land, buildings and improvements, was valued at \$46,926,010, machinery and equipment at \$21,182,990 and good will at \$20,517,985. Its total

assets were listed at \$263,363,179. Its property in Michigan was valued at \$133,025,079. Total capital and surplus were given as \$173,951,172 and the amount of capital and surplus \$87,861,284.

Liabilities include: Accounts payable \$28,724,701; accrued payrolls, \$2,827,546; income tax reserve, \$46,266,008; reserve for other taxes, \$2,167,600; reserves for employees' bonus, \$946,640; miscellaneous liabilities (estimated) \$8,484,487.

### Motor Excise Taxes Show Marked Decrease

WASHINGTON, Sept. 6—Tabulation of total collections of internal revenue from all sources for the fiscal year, 1921, show a decrease of \$28,377,631 in the excise tax on automobiles from the figure for 1920, when this form of taxation brought in \$143,922,792.

Carried out in detail, the payments of automobile excise taxes follow:

1920—Automobile trucks and automobile wagons.....	\$14,471,464.32
1921—Automobile trucks and automobile wagons.....	11,640,051.98
Decrease .....	\$2,831,412.34
1920—Other automobiles and motorcycles .....	\$76,315,814.26
1921—Other automobiles and motorcycles .....	64,388,105.80
Decrease .....	\$11,927,708.46
1920—Tires, parts, or accessories for automobiles.....	\$53,135,513.43
1921—Tires, parts, or accessories for automobiles.....	39,517,602.69
Decrease .....	\$13,617,910.83

### Production Steady at Indianapolis Plants

INDIANAPOLIS, IND., Sept. 8—In spite of the uncertainty of prices due to decreases by Ford, the Franklin and others during the past week, actual production in the Indianapolis plants is going forward as usual. No changes in production schedules has been made during the past week and the general opinion by some of the biggest men of the industry here is that so far as Indianapolis made cars are concerned the bottom has been reached. Demand continues steady.

The Marmon plant is working with a production of about fourteen cars a day. The Cole plant is having a steady production and officials believe there is a stronger trend in the demand. The H. C. S. plant schedule is holding to five cars a day, this being the amount fixed before the last price decrease. Officials of the Premier plant say that while their production is down, cars are being moved from the warehouse at a steady rate and it will not be long before the surplus will have been disposed of.

The big price slash by the Ford took the local Ford dealers by surprise as is customary in such events. None of them was expecting a cut at this time. The business had been good here and August sales were equal to July sales, which had been about the biggest in volume of the present year.

## General Motors Men Convene in Detroit

### Make Plans for Even Closer Working Arrangement—More Meetings Are Scheduled

NEW YORK, Sept. 6—Policies which will shape the future of General Motors Corp. were discussed at a joint meeting of the executive committee and the operations committee held in the new General Motors Building in Detroit.

Those present comprising the executive committee were Pierre S. duPont, chairman; J. Amory Haskell, J. J. Raskob and A. P. Sloan, Jr. The operations committee is headed by C. S. Mott. Representing the various General Motors companies were: H. H. Bassett, Buick Motor Co.; K. W. Zimmerschied, Chevrolet Motor Co.; H. H. Rice, Cadillac Motor Car Co.; A. B. C. Hardy, Olds Motor Works; G. H. Hannum, Oakland Motor Car Co.; W. L. Day, G. M. C. Truck Co.; J. A. Craig, Samson Tractor Co.; DeWitt Page, New Departure Mfg. Co.; Fred J. Fisher, Fisher Body Corp.; C. F. Kettering, Dayton Engineering Laboratories; R. S. McLaughlin, McLaughlin Motor Car Co. of Ontario; J. L. Pratt, accessory division; E. F. Johnson, inter-company parts division.

The meeting was practically in line with an important new policy which provides for an even closer working arrangement between the executive heads of the corporation and the constituent companies. The magnitude of the operations is indicated by the fact that General Motors now includes 78 subsidiary and affiliated companies.

It is regarded as significant that the most important conferences dealing with major affairs of the corporation apart from finance, are being transferred from New York to the center of productive activities in Detroit. In other words, men of large affairs who control the destinies of General Motors are getting closer to the firing line and in more direct contact with the actual making and selling of motor vehicles and allied products. Joint meetings of the executive and operations committees are now scheduled to take place at frequent intervals in Detroit.

A movement to bring about a greater co-ordination of the productive activities of the corporation was inaugurated soon after the duPont interests assumed a commanding position in General Motors affairs and the result of this common sense program has been reflected in lower costs, improved quality and increased production.

### NASH ORDERS HEAVY

KENOSHA, WIS., Sept. 6—The Nash Motors Co. in August had orders 50 per cent in excess of production. Both the Milwaukee and Kenosha plants are making every effort to catch up with the demand and indications point to an unusually busy fall.



## South Africa Talks on Trade Conditions

### Dealers Show Interest in New Duesenberg—Hupp Remains Industry Leader

JOHANNESBURG, Aug. 5 (*By Mail*)—The Council of the South African Motor Traders Assn. met at Durban this month in the City Hall for the transaction of business. Members from all parts of the country attended and the trade conditions formed the main topic of discussion. The S. A. M. T. A. has become an important body as regards the automobile trade of South Africa and its efforts to foster trade are being attended with considerable success.

Representations have been made to the Government from time to time dealing with the motor industry and the results obtained have amply justified the existence of the association. Almost every dealer of any importance in the country is now a member. The organizing secretary is making a comprehensive tour of all provinces of the Union in an endeavor to draw even small dealers in out of the way places into the association. Some of the tire companies held aloof from the organization at first but all have now joined.

Considerable interest has been aroused here by the latest Duesenberg "Straight Eight" performances in other countries and it is possible that models may be imported before long. The automotive engineers in South Africa are alive to the possibilities of the car and are exhaustively going into the proposition. High grade American cars are finding favor with a large section of the buying public as the prices of English cars are almost prohibitive. In view of recent price reductions in numbers of American models the English cars are not finding a ready sale.

#### Demand Light Cars

Price reductions are regarded rather dubiously by prospective buyers and for this reason sales have fallen off in some districts. The demand for serviceable, light cars still continues strong.

Guy G. Catlin, the Hupmobile representative, who is well known in this country, has returned to the States on business but announced that he hoped to return to South Africa before long. Catlin was instrumental in combining all the Hupp dealers into the firm known as Hupp Garages, Ltd. This organization has branches in all the important cities and towns in South Africa and holds the exclusive distributorship for the Union of South Africa.

The road problem is still under discussion as it is feared that the reduced subsidies given for this purpose by the Transvaal Provincial Council will be entirely inadequate to keep the roads of the province in anything like good order. Motoring bodies are strongly protesting against the reduction of the subsidy and

contend that roads must be kept in good order and that if economy is to be exercised it must not take the form of allowing the traffic arteries to deteriorate. In a country where the roads form an important means of feeding to the railway the factor of efficient transport is not to be lightly neglected.

#### Trucks Find Favor

Steam trucks are finding favor for country work and several English models are now being assembled for use in different parts. The South African railways use steam trucks and the results given are excellent.

The first petrol and oil service station has just been opened in Johannesburg. It stands in the heart of the motor center, and yet easily accessible for all the commercial centers of the town. It has been built on the regular American plan. It stands well back from the street, and has a paved roadway in front capable of accommodating many cars. This is an advance for the motor center. Many garages have petrol and oil pumps installed in front of their buildings, and also supply free air, but this is the first real petrol and oil service station to start operations in South Africa.

### Severin Oakland Factory Soon to Be Erected

OAKLAND, CAL., Sept. 6—Construction on the first building of the Severin Motor Co. factory in Oakland will start Sept. 15, according to an announcement made here by Maury L. Diggs, architect in charge of the building of the new plant. The first unit, according to Diggs, will be 60 x 450 feet. When completed, the plant will cover an area of four acres, and have a capacity of 20 cars a day. The company is moving to Oakland from Kansas City, where the factory has been making cars for three years. Equipment of the Kansas City factory is being packed, under direction of H. T. Severin, president of the company, and is expected to arrive here before the end of December. The company is capitalized for \$1,000,000.

### Action Taken Against Ford Owner Association

INDIANAPOLIS, IND., Sept. 6—Indiana Insurance Commissioner Thomas S. McMurray has notified the prosecuting attorney of Allen County to take immediate legal action against the Ford Car Owners Protective Assn., operating in Indiana out of Fort Wayne, for alleged violation of the State insurance laws.

McMurray took action against the organization after he had been advised by Attorney-General U. S. Lesh that the association is doing an insurance business in Indiana, although attempting to cover up the real purpose of its operations. State insurance departments of Michigan and Wisconsin are co-operating with McMurray in bringing action against the association.

## "Gas" Consumption Greater than 1920

### First Six Months Shows Increase of 259,313,353 Gallons in United States

NEW YORK, Sept. 6—The consumption of gasoline in the United States during the first half of the current year was larger by 259,313,353 gallons or a daily average of 710,447 gallons, than that of the corresponding period of 1920. Total consumption was 2,300,115,990 gallons compared with 2,142,705,363 gallons in the first six months of last year. Production was larger than the previous year by approximately 18 per cent, but in spite of the enormous demand prices of gasoline have declined in all sections of the country. The decline, however, is attributed solely to the lower cost of crude oil as it is contended that until recently there has been little or no reduction in the cost of refining, while transportation charges are at the same level as they were at the peak of 1920.

Reductions in gasoline prices on the average amount to 31 per cent, taking the leading cities of the United States as a whole. The average price at the close of August was 20.2 cents compared with 29.3 cents a gallon on Jan. 1 of this year. The drop, in all, amounts to 9.1 per cent. The largest declines since the beginning of the year have been at Dallas, Texas, and Denver, Colo., where they amounted to 13 cents a gallon in each city. The lowest wholesale price is 15 cents a gallon at Kansas City, Mo., while the highest is 25.5 cents in Boston.

### North Texas Business Shows Decided Gains

DALLAS, TEX., Sept. 6—The automobile business in Dallas and north Texas showed a decided improvement during the month of August, local retail dealers declare. This was especially true in the sales of modern priced cars. Truck dealers also reported improved business. The accessory men, the tire dealers and the garage men reported the past month has been the banner month of the year with them. Retailers of high priced cars reported that while sales have not materially increased with them they have held their own and that the outlook for the fall is exceedingly bright. Disposition of the grain crop at fairly good prices, moving of the cotton crop, reduction in prices of cars and employment of only salesmen who can and do deliver the goods are among the reasons assigned for the increased business in this section of the country.

#### ENGINEERS TO MAKE TOUR

MINNEAPOLIS, Sept. 6—The Minneapolis section of the Society of Automotive Engineers has decided to begin the year's program by a tour of inspection of the various automotive exhibits at the State fair this week.

## Hudson Car Is First in Peak Hill Climb

### Lexington Second in Annual Test —Eighteen Cars in Three Events

DENVER, COL., Sept. 5—Nearly 7000 people from 20 states saw King Rhiley in a Hudson win the Penrose trophy and a \$500 cash prize to-day in 19 min. 16 1/5 sec. in the main event of the Pike's Peak annual hill climb on a 12 2/5-mile course of the \$250,000 Pike's Peak automobile highway.

The second fastest time was 19 min. 47 4/5 sec., by Otto Loesch in a Lexington, trophy winner of last year, and to-day had first place in event No. 2 for 184 to 300 cu. in. piston displacement.

The third best time was 19 min. 51 1/5 sec., by Ralph Mulford's Paige, winning second place in the trophy event. The second place in event No. 2 was won by J. C. Williamson in an Allen, in 22 min. 49 3/5 sec.

Event No. 1 was for up to 183 cu. in., won by Glen Schultz in a Ford, in 21 min. 54 3/5 sec., with William Bentrup, a last year's winner, second to-day in 22 min. and 19 sec., driving a Chevrolet.

Course of 60 curves and grades 7 to 10 1/2 per cent starts six miles above the highway beginning, and ends 14,000 ft. altitude. The \$4,000 trophy was won first by Rea Lentz in a Romany Special, five years ago, while the course record of 18 min. 24 7/10 sec. was set by Mulford's Hudson that same year in the middle displacement class in a two-day meet. Mulford abandoned the race last year in a snowstorm. The weather conditions are ideal, with 18 cars starting in three events.

## Harper-Bean to Issue \$10,000,000 in Stock

LONDON, Aug. 25 (*By Mail*)—Directors of Harper Sons & Bean propose to issue three classes of debenture stock aggregating \$10,000,000 to meet claims of their various classes of creditors. Bankers will get \$1,500,000 of the stock; Lady Bean and her daughters an equal amount; Harper-Bean, Ltd., \$2,625,000, and unsecured creditors \$2,375,000.

Creditors with claims not in excess of \$125 will be paid in cash and creditors for larger sums will receive 16 cents per dollar of the amount due them.

A statement issued by the directors says that "no profits will be distributed among members of the company as long as money is due under the three trust deeds."

## International Books European Business

SPRINGFIELD, OHIO, Sept. 6—Foreign business is being booked by the Springfield works of the International Harvester Co., according to announce-

ment made by officials. The factory force is being increased slightly, although the demands for the light speed motor trucks have not increased sufficiently so far to warrant much of an addition. About 30 per cent of the regular force is being employed.

Within the past week the Springfield works have made a number of shipments to various points, to cities and rural sections of the country. Officials say they expect that the farmers will be in the market soon for trucks as they are now selling their grain. There is a better feeling among the people of the United States generally regarding the future, it is stated, and as a result there will be a gradual increase in business.

## Ballot Breaks Record in Italian Grand Prix

PARIS, Sept. 5 (*By Cable*)—Jules Goux in a Ballot broke the world's road record and established new records for cars of 183 cu. in. piston displacement in winning the Italian Grand Prix at Brescia, Sunday. His time for the distance of 324 miles was 3 hr. 35 min. and 9 sec.

Chassagne, in another Ballot, was second in 3 hr. 40 min. and 52 sec., and Wagner in a Fiat was third in 3 hr. 45 min. and 32 sec. Bordino in a Fiat broke the lap record with an average speed of 94 miles an hour, but was forced out when he had covered half the distance by a broken oil lead after being well in front from the beginning of the race. Sivocchi in a Fiat was forced out by a leaky tank and DePalma abandoned the race near the end.

## Westcott August Sales Set 1921 High Record

SPRINGFIELD, OHIO, Sept. 6—A high mark for 1921 was set in the sales of Westcott cars during the month of August, according to announcement made by the Westcott Motor Car Co. of this city. Although August normally is considered the second quietest month of the year, officials state that August business was higher than any month since June, 1920.

As a result of the constantly increasing business, the working force at the plant has been increased considerably recently. The force is now larger than at any time during the past year. The recent increase in employees, which practically doubled the force, is planned to take care of further production gains. Westcott officials say that they have noted an apparent improvement in general conditions in many sections of the country.

## GAS TAX RECOMMENDED

NEW ORLEANS, Sept. 6—Governor Parker has announced that he will recommend a sales tax of 1 cent a gal. on gasoline to the special session of the Louisiana Legislature which convened to-day. The constitution permits a 2 cent tax for road purposes.

## Georgia Business Shows Steady Gain

### First Seven Months of Year Indi- cate General Improvement for Fall

ATLANTA, GA., Sept. 6—A definite idea of automotive sales conditions in Atlanta and Georgia the first seven months of 1921 is given in a report issued the latter part of August by Charles Cook, cashier of the motor vehicle department in the office of the Secretary of State, covering the receipts of the department up to and including Aug. 15. Receipts are less by \$212,877.29 in 1921 than they were for the same period in 1920, and while the amount seems unusually large Atlanta dealers point to the fact that sales were very brisk during the early part of 1920.

The total amount received by the motor vehicle department up to Aug. 15, Mr. Cook reports, was \$1,692,308.09, while the total amount received to Aug. 15, 1920, was \$1,902,186.22. The total number of tags sold in 1921 to Aug. 15 was 119,500, and to the same date in 1920 was 137,129.

That the turning point for the better in the automotive industry in this section is at hand, however, is indicated by the fact that sales in the Atlanta territory during August have picked up to an appreciable extent. This is indicated not only by reports from various dealers, but the big increase in the issuance of license tags at the state capitol. For retail sales in Atlanta alone, not including any territory outside the city, the average has been about 50 per day, including new and used motor cars and trucks. A material increase also is noted in other sections of the state outside of Atlanta. Truck sales are gradually getting better, and more new passenger cars are being sold than for some months. A fair increase in used car sales also is noted, and the industry as a whole is experiencing such improvement that there is a more optimistic feeling among the dealers and distributors in Atlanta than they have known since last year. All are confident that the increase of the past two or three weeks portends the gradual return to normalcy.

## Cotton Has Climbed

Cotton has climbed in price about \$3 per bale at the present writing, a fact which means about \$20,000,000 to Southern producers on this year's crop alone. Governor M. B. Wellborn, of the Federal Reserve Bank of Atlanta, has given cause for further optimism in a statement in which he declares the bank is in stronger financial position than it was a year ago and will give substantial aid to Southern cotton for the orderly marketing of the crop. He declares that the general business and industrial outlook in the South is better than it has been since the armistice, and prophesies an early return to normal.

## Brazil in Market for American Cars

### Trucks and Tractors Also Could Be Marketed, Report There Shows

PORTO ALEGRE, BRAZIL, Aug. 15 (By Mail)—The opinion of automotive dealers here is that an opportunity exists for American cars, priced from \$2,000 to \$4,000, to sell in competition with European makes. They should be of the four or six-cylinder type, as it is said eight-cylinder machines would be difficult to sell here now, although there are one or two makes of eights that should prove satisfactory here. The makes offered should have magneto ignition and sturdy wheel and spring construction, as road conditions are irregular.

Trucks from one to two tons could be successfully marketed here, although the present number is few. Ford trucks, of course, lead the makes now here, although there are some German Durkops and Mulags, a few Fiats of various sizes and several Renaults. As to tractors, the opinion is that the smaller sizes are the more suitable. Two heavy European tractors recently failed in a test here, while one of the smaller American makes went through the demonstration with flying colors.

Prior to the war Porto Alegre, with a population of 200,000, had only 242 cars, mostly of European make, only two American lines being known. During the war, however, Ford, Studebaker, Nash and Chandler were successfully introduced and later Packard, Dodge, Cole, Elgin, Velie, Chalmers, Jordan, Essex and Hudson had no difficulty in getting into the market. At the beginning of last year there were registered here and in actual use 850 cars.

The small number of cars handled here is a surprise and it is the opinion that opportunity exists for other good makes.

## Farm Machinery Has Good Sale in Spain

WASHINGTON, Sept. 6—Unprecedented sale in Spain of American agricultural machinery to meet with requirements of the present harvest is reported. Evidences of a bumper crop, impelling the purchases, are to be observed on every side on a tour extending from Madrid to Barcelona.

Farmers and dealers in Zaragoza and Pamplona are all declared patrons of American Agricultural machinery, especially reapers and binders. There is also a good market offering for some sort of light threshing machine, possibly operated by horse power; a number of farmers have expressed a desire to obtain such a machine, buying and using it on a co-operative basis.

The large separator is somewhat too expensive and the output too great to

meet with general acceptance. The universal method of threshing is by means of a flail and tramping out by oxen.

The grain is tramped on the hard ground. It is then separated from the chaff by a process of throwing high in air and trusting to the wind to blow away the chaff.

Commercial Attaché Cunningham, in a report from Madrid made public by the Bureau of Foreign and Domestic Commerce, expresses enthusiasm over the prospect of this market.

## Plan to Merge Detroit Engineering Societies

DETROIT, Sept. 6—A plan to organize all of the engineering societies of Detroit into one group has been formulated by the Associated Technical Society. A number of preliminary meetings have been held and another will be called on Sept. 16 at the Board of Commerce. The purpose of the organization is to combine the clerical work into one organization, thus effecting a much needed economy, and, furthermore, it is purposed to so arrange the meetings of the various societies that while they are of particular interest to one group, they may be of general interest to the entire group or a large percentage of it.

Similar organizations have done very effective work in other cities. The Buffalo Engineering Society, of which the Buffalo Section of the S. A. E. is a member, is a very good instance. The Detroit Section of the S. A. E. has been approached on this new organization and Chairman Coffin of the local organization stated to-day that he is in favor of it.

## Charles J. Glidden Now Heads Martin Motor

SPRINGFIELD, MASS., Sept. 6—Charles J. Glidden, well known in the automobile world as the donor of the Glidden trophy and the originator of the Glidden tours, has re-entered commercial life as president of the Martin Motor Co., Springfield, Mass. This is a recently organized company which will manufacture a small three-wheel car designed by Charles H. Martin of the Martin Rocking Fifth Wheel Co. This small car weighs a little over 200 lbs. and will sell for approximately \$500.

## HARLEY-DAVIDSON WINS

NORTHBAY SPEEDWAY, COTATI, CAL., Sept. 6—Otto Walker, piloting a Harley-Davidson motorcycle, finished first in the 25-mile open professional race in the big bowl here Aug. 28, thereby setting a new national record for the distance of 16. min. 29 sec. This track is a mile and a quarter, so that there were 20 laps to the race, Walker maintaining a speed of 42 sec. to the lap, or 106 miles an hour. This record is faster than the record for the board track at Los Angeles, hitherto credited with being the fastest track in the country.

## Shipping by Truck Affects Railroads

### New England Roads Hit by Increase in General Commercial Work

PUTNAM, CONN., Sept. 5.—Operation of scores of motor trucks, engaged in general commercial work on either long or short hauls, through this section of New England, is eating into railroad freight business to such an extent as to attract attention of higher rail transportation officials, who have directed that an inquiry be conducted, with a view of bringing about remedial action. Railroad freight experts have been in this territory during the past week to interview shippers as to why the railroads cannot regain some of the business that they have lost.

Some of the shippers have been especially frank with the railroad men and have pointed out to them that the high freight rates and, oftentimes slow service, have resulted in much business being diverted to the truck service. This is especially true in regard to the handling of raw and finished material for the many manufacturing plants in this section and many of the mercantile houses.

Trucks are used not only between this territory and Boston, Providence and New York, but on shorter hauls to steamer termini at Norwich, New London and Stonington. Many of the mills and mercantile houses own and operate their own fleets of trucks, while many firms are engaged in the truck business by contract. Steamship lines, with a view of getting the patronage of small shippers and others without truck service, have inaugurated a truck service of their own, from their docks into the surrounding territory for a 50 or 100-mile radius.

### Much Freight Delay

In their conference with railroad representatives, shippers of this territory have cited numerous instances of freight delay that they claim are characteristic of general conditions. Shipments from Worcester, Mass., to within five miles of Putnam and only 30 miles from Worcester, in a direct line, have often, shippers say, been upward of a week in getting through. The same is more or less true, they claim, relative to shipments from Providence and other points into this territory. They point out that the trucks have proved dependable and have furnished a fast delivery service. The manner in which they have eaten into the so-called "local" business of the railroad lines, especially the New York, New Haven & Hartford Railroad, is little realized, it is stated, excepting by the railroad men. It is freely admitted by freight officials that the New Haven road, and probably the others, will seek means of speeding up their local freight services in an attempt to not only compete with the trucks but to regain some of the business they have lost.

## Many Will Attend Tire Convention

**Dealers Prepare for Three-Day  
Meeting at Cleveland, Oct.  
18, 19 and 20**

CLEVELAND, Sept. 6—Invitations for the National Tire Dealers Assn. convention have been mailed to more than 5000 dealers throughout the United States. The convention is to be held at Hotel Winton, this city, on Oct. 18, 19 and 20. At the headquarters of the association in this city, plans are being made to entertain 1000 delegates. This will be the first convention of the organization, and the assemblage will be the first one of strictly tire dealers ever held. The Cleveland branch is in charge of arrangements, and R. F. Valentine, of this city, is chairman of the committee on arrangements.

### A Complete Program

A program in which nothing has been left undone that would affect the comfort or pleasure of the delegates and visitors in any way has been arranged. From the minute they arrive in this city until they leave, their time has been taken care of on the schedule. Delegates are urged to plan their visit so that business sessions may start on time.

The Central Passenger Assn. has approved the application of the tire dealers' association for reduced fares, and a special rate of fare and a half for the round trip has been granted. The instructions for obtaining the reduced rate provide that a one-way tariff fare at the full rate be purchased on any of the following dates: Oct. 14, 15, 16, 17, 18, 19 or 20. When purchasing the ticket, the delegate must ask for a certificate. This certificate will be validated when the return ticket is purchased, and the fare will be one-half of the regular rate for the return journey.

### Oct. 18 the First Day

The program has been outlined as follows:

**Tuesday, Oct. 18:** 8.30 a. m. to 10 a. m., registration and assignment; 10 a. m. to 12 noon: Morning sessions—attendance recorded; reading of minutes of formative session held in Chicago, Jan. 30 to Feb. 2, 1921; report of president; report of board of directors; appointment of these committees, finance committee, nominating committee, auditing committee and resolutions committee. 12 noon to 2 p. m.: Luncheon; 2 p. m. to 4.30 p. m., report of secretary; report of treasurer; discussion of finances; recess.

**Tuesday evening:** Special demonstration of tire accessories and devices the dealer can employ in his business. The tire and accessory show will be open until 11 p. m.

**Wednesday, Oct. 19:** The entire day will be spent in Akron in inspecting the world's largest tire producing plants. It is planned also to send a delegation to Kent to inspect the only fabric mill in the Akron section. These two features will consume the entire second day and will prove very interesting and instructive to every delegate and visitor attending the convention.

### M. A. M. A. MESSAGE OF GOOD CHEER IS SENT BROADCAST BY 400 COMPANIES

NEW YORK, Sept. 6—This message of good cheer is being sent broadcast by the Motor and Accessory Manufacturers Assn. through its 400 affiliated companies, on stationery, advertising and catalogs:

### HAVE FAITH IN YOUR INDUSTRY!

The facts justify it—  
Courage compels it—  
Progress assures it—  
Destiny proclaims it—  
Business requires it—  
The World needs it—

### Civilization will not go into reverse THE AUTOMOBILE INDUSTRY MUST GO FORWARD!

This slogan expresses the spirit and plan of the credit convention which the association will hold at the Hotel Statler, Detroit, next week.

In addition to the topics relating to finance and credit, there will be a symposium by sales and advertising executives on the subject "Selling Strategy to Bring the Automotive Industry Back to Normal."

In line with the association's message of unswerving confidence, several speakers will discuss the topic, "Why I Have Faith in the Automotive Industry."

**Wednesday evening:** The Cleveland branch of the National Association has arranged a program of stunts. The evening entertainment will be held in the Rainbow room of the Hotel Winton, and, although it will be considered part of the sessions, it is not compulsory that the delegates attend this event.

**Thursday, Oct. 20:** 9.30 to 12 noon, reports of committees; reports of special committees, unfinished business; 12 to 2 p. m.: luncheon; 2 p. m. to 4.30 p. m., new business; election of officers; discussion of topics.

**Thursday evening:** This will be the "night of nights" so far as the convention is concerned. A banquet and musical program has been planned. There also will be entertainment by professionals. Two speakers of national reputation, yet to be chosen, will talk.

A special ladies' committee from the Cleveland association will entertain visiting ladies on sight-seeing trips, matinee parties and concerts.

The tire and accessory show which will be held in connection with the convention promises to exceed the expectations of those in charge. Applications for space have been coming in rapidly. Tires of all makes will be on exhibition.

The board of directors of the National Tire Dealers Assn. will meet in Cleveland Oct. 17, at the office of the association, to consider appointments for various committees and to outline business details that are to be brought to the attention of the delegates.

## Reports of August Sales Satisfactory

**N. A. C. C. Directors Well Satisfied—Price Cuts May Slow Up  
September**

NEW YORK, Sept. 8—Directors of the National Automobile Chamber of Commerce are meeting here to-day after the close of the vacation period. While they have no illusions concerning the future they are well satisfied with the condition of the automotive industry. They realize that they are in much better position than manufacturers in almost any other line. There is a strong feeling that whatever price adjustments are in prospect should be made immediately so that business can be stabilized for the fall. It is pointed out, however, that purchasers are getting the benefit of price reductions and that this is true of practically no other commodity.

Reports from 20 distribution centers show that retail business for August was on a par with July except for two agricultural districts. This is considered a very gratifying showing. The reports indicate that the frequent price changes in the last 10 days will have an adverse effect upon September sales but it is believed that if there are no other changes business will be stabilized and there will be a satisfactory volume of trade. After this month sales are expected to taper off gradually until the show period although there is in prospect an unusual demand for enclosed cars.

Reports from manufacturers of car shipments for August show that they were virtually the same as in July.

Application blanks and diagrams for the New York and Chicago shows have been sent out. All applications for space to be considered in the first space allotment must be received not later than noon of Oct. 1. Drawings for space in the automobile sections will be held at the N. A. C. C. headquarters here Oct. 6. Drawings by applicants who are not members of the N. A. C. C. will take place as soon thereafter as possible.

## Stockholders Agree on Fisk-Federal Merger

SPRINGFIELD, MASS., Sept. 8—Stockholders of the Fisk Rubber Co. and the Federal Rubber Co. have voted to accept the proposal of the directors for a consolidation of the two companies with the Ninigret Co. The consolidation will take the name of the Fisk Rubber Co.

The company will issue \$10,000,000 in first closed mortgage, 20 year 8 per cent sinking fund, gold bonds at 99 with interest to yield 8.10 per cent. The bonds are uncalled until Sept. 1, 1931. During the life of the bonds, control of the company through the right to elect two-thirds of the directors, will be vested in a group of business men.

# Price Stabilization Is Not Yet Here

## Another Reduction Epidemic Under Way

Several Lines Cut Third Time—  
Labor Lower—Material Costs  
Down

NEW YORK, Sept. 7—Price stabilization apparently has not been reached in the automotive industry. Another epidemic of reductions on passenger cars and trucks is sweeping over the factories. In the case of virtually every passenger car the cuts are the second in three months, and in many cases they are the third. There have been fewer reductions in the truck field, and the cuts have been less drastic, but with the stimulation in business which is becoming apparent here and there, especially in the demand for the lighter models, it is quite possible further reductions will be made.

Predictions as to whether there will be a fourth cut in passenger car models are unsafe, judging from the experience of the last three months. Manufacturers seem to be finding it possible to effect factory economies, chiefly by lower labor costs, and consumers are getting the benefit of these economies. Another factor tending towards lower car prices has been the gradually lessening cost of raw materials and parts.

The effect of the latest cuts on sales at retail is not yet altogether clear. Reports are filtering in from some distribution centers that prospective buyers are beginning to hold off on the theory that additional reductions are imminent. On the other hand, manufacturers report that the cuts have stimulated business.

It is generally agreed, however, that a maximum of retail sales cannot be reached until there is something approaching stabilization of prices.

## Sandusky Tractors to Sell for \$425 and \$500

NEW YORK, Sept. 6—The Cameron Motors Corp., which recently acquired the Sandusky Tractor Works, has issued some particulars of the new Sandusky tractor which it will manufacture. The machine will have a unit power plant with short axles set into the sides of the flywheel housing on which the driving wheels are mounted on flexible roller bearings. In addition to these driving wheels there are two small trailer wheels at the rear.

The engine is a four cylinder air-cooled Cameron, developing 10 hp. at 1000 r.p.m., the cylinder dimensions being 3 by 4½ in. Two forward speeds and a reverse are obtained by the enclosed spur gear transmission. There is a power

take-off pulley at the rear on an extension of the engine shaft. The power from the engine is transmitted through spur gears to a countershaft, then through bevel gears to a transverse shaft and finally through spur gears to the driving wheels. The weight of the machine is given as 1000 lbs. It is made in two models, a walking model and the riding model, the prices being \$425 and \$500, respectively.

## Willys-Knight and Overland Cars Cut

TOLEDO, Sept. 6—Another price reduction has been made by the Willys-Overland Co. on the prices of all models of Willys-Knight and Overland cars. It is stated that the reduction was made possible partly through manufacturing economies which have been in process of installation in the plants for the past year and a half and partly through lower costs of raw materials.

The Overland prices follow:

	New Price	Old Price
Touring .....	\$595	\$ 695
Coupe .....	850	1000
Sedan .....	895	1275

Willys-Knight prices are:

Touring .....	\$1525	\$1895
Coupe .....	2195	2550
Sedan .....	2395	2750

The present model of Overland touring car was first offered to the public in 1919 for \$845. The price later was raised to \$1,035, but it was cut to \$695 in June.

The Willys-Knight touring car sold for \$2,300 last year and the present reduction makes a total cut of 34 per cent.

## NEW FRANKLIN PRICES

SYRACUSE, N. Y., Sept. 6—The H. H. Franklin Mfg. Co. announce the following price cuts:

	Old Price	New Price
Sedan .....	\$3,650	\$3,350
Touring .....	2,650	2,350
Brougham .....	3,550	3,250
Roadster .....	2,550	2,300

## INDIANA TRUCKS REDUCED

MARION, IND., Sept. 6—Reduction of \$705 on the 1½-ton and reductions from \$115 to \$450 on all other sizes of Indiana trucks were announced here to-day by the Indiana Truck Corp. The price cut brings the 1½-ton truck to \$1,745 list. No change in specifications has been made.

## CANADIAN FORD DOWN

DETROIT, Sept. 7—The Ford Motor Co. of Canada, Ltd., has announced new prices on all models. The touring car hereafter will sell for \$565, the roadster for \$515, the chassis for \$470, the coupe for \$890, and the sedan for \$990. The truck chassis will sell for \$615. Starting and lighting equipment will cost \$85.

## Ford Prices Are Cut Third Time in Year

Roadster Now Selling for \$325—  
Production Beats All High  
Records

DETROIT, Sept. 2—The third reduction in Ford prices in the past 12 months now places the Ford at the lowest price in its history, being under the prices for which it sold before the war. Reductions are made on all models of the passenger car, on the chassis and on the truck, but the price of the tractor remains unchanged. The reductions range from \$45 to \$100 as follows:

	Old Price	New Price	Reduction
Chassis .....	\$345	\$295	\$ 50
Touring car* ..	415	355	60
Roadster* .....	370	325	45
Coupe .....	695	595	100
Sedan .....	760	660	100
1-ton truck ..	495	445	50

\* Price without starter and demountable rims.

In making the announcement, the company states:

"We are taking advantage of every known economy in the manufacture of our products in order that we may give them to the public at the lowest possible price and by doing that we feel that we are doing one big thing that will help this country into more prosperous times. People are interested in prices and are buying when prices are right."

The production of Ford cars and trucks for August again broke all previous high records with the total reaching 117,696. This is the fourth consecutive month in which the output has gone over the hundred thousand mark. The total for the four months being 463,774, which has gone a long way in making possible the present reductions. June of this year with an output of 117,247 was the previous record month.

## CHEVROLET HAS NEW CUT

NEW YORK, Sept. 6—The Chevrolet Motor Co. has announced the following price cuts for the 490 model, fully equipped, effective Sept. 3: Touring car, \$525; roadster, \$525; coupe, \$875; sedan, \$875. This is a reduction of \$100. It is the third reduction on the model since June, when the price was \$1,185.

Changes in specifications have been made. The model has undergone construction changes whereby the rear axle used with spiral bevel ring gear and pinion and hand controlled emergency brake lever. Timken roller bearings are substituted in the front wheels. A new assembly method has been introduced, securing positive alignment of transmission.

(Other price cuts on page 497)



# Kansas City Fall Outlook Is Brighter

## Marked Increases Noted for August

### Conditions Generally Improved in Rural Sections Due to Favor- able Crops

KANSAS CITY, MO., Sept. 6.—During August a marked improvement in business was reported from the smaller towns of the Kansas City district, directly reflecting the movement of crop money. This movement is reaching the larger centers in the shape of orders to wholesalers in many lines. The improvement in general conditions in the outlying territory is being shown in an increased movement of motor cars from dealers' hands; and from distributors' hands to dealers.

#### Crop Starts Business

This new factor is a very great relief to the Kansas City distributors for the retail trade in the city has declined in the past six weeks. Whereas other lines of merchandise at wholesale have maintained good volume throughout nearly the whole year in Kansas City, it seems fairly sure that trends are changing, and that the motor car distributor will have proportionately nearer his share, this fall. This was indicated in the results of a "market week," held Aug. 29-Sept. 3 by the Kansas City dry goods, shoe and clothing houses. There was a small attendance of merchants and while visitors bought fairly heavily of dry goods staples on which prices are rising, they did not buy hardware or clothing, on which prices are uncertain.

The reluctance of the merchants to buy—clothing, for example—was due partly to their own uncertainty as to the future course of prices but even more, to the uncertainty of their own retail demand. Many of these merchants say that farmers are buying this fall only for their children and the cheapest apparel. They are postponing other purchases, and may go through the winter with practically none of their usual demand.

#### Prices Fail to Enthuse

The price matter is a dominant one in fixing the farmer's purchasing program. Agitation of this question continues in the motor field. And the motor car price fluctuations are having influence far beyond that industry. Whereas a price reduction a few months ago would result in quickened sales a price reduction now has comparatively little effect in stimulating sales. The public seemingly concludes, when a price cut is made now, that perhaps another cut

will be made in another month or so—or that some other car perhaps more desirable, will be cheaper a little later. This is the effect in the motor field.

The motor car price cuts disturb the whole buying practice of the public, however. When the cuts were announced Sept. 1, many comments were heard in numerous industries and by citizens regarding a great variety of commodities that evidently prices were coming down on everything.

Effort to sell motor cars has resulted in many a firm loading up with used cars to the point where the bank is at any time likely to demand liquidation. The larger firms and those with sound reputation with bankers and public, have been conducting business conservatively, preferring to forego sales where long trades were demanded or where credit was not first class. They have had small volume but they have preserved their credit intact and will enter the fall and winter season fully able to withstand any depression. Some of the smaller firms and those which have sought immediate volume, are in hard straits.

The banks have plenty of money but they naturally are not going to risk it unduly. The declining prices of motor cars is a factor in the bankers' hesitancy to take on motor car credits or grant extensions.

(Continued on page 497)

## Weeks Asks Ford Again to Confer on Offer

WASHINGTON, Sept. 7.—Secretary of War Weeks has sent a letter to Henry Ford suggesting a conference to discuss Ford's offer to take over the Government's nitrate and power plant at Muscle Shoals, Ala. As the Ford offer stands at present, Weeks said, it is not satisfactory but it is quite possible the proposal may be so modified that it will be satisfactory to the Government and Ford. If the automobile manufacturer can meet Weeks' suggestions, he can have the United States plant so far as the recommendation of the Secretary of War has weight with Congress.

#### BUS PURCHASE DELAYED

DETROIT, Sept. 7.—Purchase by the city of trolley buses, such as demonstrated by Packard, has been laid over until after the October election to permit an amendment to the charter. The present charter will only permit the railway commission to purchase the regular type trolley car. An amendment to provide for the purchase of gasoline buses or other types of trackless trolleys will be substituted. A three-fifths vote will be necessary to pass the amendment.

## Receiver Appointed for American Motors

### Action Follows Equity Suit Filed by Attorneys for 80% of Creditors

NEWARK, N. J., Sept. 7.—Federal Judge Lynch has appointed receivers for the American Motors Corp. of Plainfield in an equity suit filed by attorneys representing 80 per cent of the creditors of the company. The action is understood to have been taken with the consent of the company and is said to be equally for the protection of the creditors and the stockholders. The nominal assets are listed at \$3,500,000 and the liabilities at \$600,000. The company is a Virginia corporation with a paid up capital of \$1,260,000.

The receivers appointed were Proctor W. Hansel, first vice-president and treasurer of the company, Plainfield, and James Kearney of Trenton. They were authorized to carry on the business for 30 days. The Fisk Rubber Co., with unpaid bills aggregating \$29,257, is the largest creditor.

The American Motors Corp. was incorporated in 1916 to manufacture the "American Balanced Six." Production was begun in the early part of 1917. The 1919 dividend on the preferred stock was paid April 15, 1920. The general balance sheet as of Jan. 1, 1921, fixes the value of the plant and equipment at \$272,907 and the inventory at \$433,865. Cash amounted to \$152,396 and notes and accounts receivable to \$91,493. Good will was valued at \$1,558,272. The notes and accounts payable amounted to \$357,571. There is a mortgage for \$55,000.

The directors of the company are Robert Bursner and R. D. Mock of Cleveland; P. W. Hansel, Guy Morgan, E. G. Hines and George G. Gates of New York; C. B. Penny and William Newcorn of Plainfield, and R. J. Mebane of Greensboro, N. C.

Affiliated with the corporation is the American-Southern Motors Corp., incorporated in North Carolina in 1919 to assemble the American Balanced Six for distribution exclusively in 12 Southern States. The subsidiary company merely assembles the car which is manufactured at Plainfield. The plant is located in Greensboro, N. C.

#### WANT TIRE STANDARDS

NEW YORK, Sept. 7.—The Rubber Association of America has appointed a special committee to investigate the possibilities of formulating and adopting a table of tire standards for use on tractor wheels. A report is expected in the near future.

## Credit Convention Program Is Timely

### Bringing Business Back to Normal Big Theme of M. A. M. A. Detroit Meeting

NEW YORK, Sept. 7—The program for the fifth annual credit convention of the Motor and Accessory Mfrs. Assn., which will be held at Detroit next Wednesday, Thursday and Friday, has been practically completed. The keynote of the convention will be "Bringing the Automotive Industry Back to Normal." All the addresses and discussions will be along this line and the subject will be considered from the viewpoint of all branches of the industry. The tentative program follows:

#### FIRST DAY

##### (Morning)

The President's Address—by E. H. Broadwell, vice-president, Fisk Rubber Co., Chicopee Falls, Mass.

General Address on Association's Activities (including group plan of inter-organization)—by M. L. Heminway, general manager, Motor and Accessory Mfrs. Assn.

The Association's Credit Department as the Safety Valve of the Industry—by C. A. Burrell, manager credit department, Motor and Accessory Mfrs. Assn.

How the Association's Traffic Department Delivers the Goods—by Herman Deuster, manager traffic dept., Motor and Accessory Mfrs. Assn.

##### (Afternoon)

General Keynote: Business Conditions in the Automotive Industry and Prospects for the Future.

From the standpoint of the Raw Material Producer—by J. M. McComb, vice-president, Crucible Steel Co., Pittsburgh, Pa.

From the standpoint of the Parts Makers—by M. A. Moynihan, secretary and treasurer, Gemmer Mfg. Co., Detroit, Mich.

From the standpoint of the Banker—by J. P. Harris, vice-president Union Trust Co., Cleveland, Ohio.

From the standpoint of the Car Manufacturer—by a prominent manufacturer.

From the standpoint of Selling Automobiles to the Consumer Market—by Harry G. Moock, general manager National Automobile Dealers Assn.

General Open Discussion from the Credit Standpoint.

#### Discussion Leaders

L. L. Smith, credit manager, B. F. Goodrich Rubber Co., New York.

Charles Burr, treasurer, S. K. F. Industries.

O. K. Schnaitter, assistant secretary and treasurer, Willard Storage Battery Co., Cleveland, Ohio.

Thomas M. Simpson, credit manager, Continental Motors Corp., Detroit, Mich.

E. R. Ailes, treasurer, Detroit Steel Products Co., Detroit, Mich.

#### SECOND DAY

##### (Morning)

The Work of the Credit Grading Committee—by Geo. J. Johnstone, credit department, Armour & Co., Chicago, Ill.

Credit Policies Under Present Conditions—by C. W. Dickerson, vice-president, Timken-Detroit Axle Co., Detroit, Mich.

The Personal Equation in Granting Credit—by A. H. D. Altree, vice-president, American Bosch Magneto Corp., Springfield, Mass.

Why I Have Faith in the Automotive Industry.

##### (Afternoon)

Getting the Most From the Credit Interchange Groups—by C. S. Davis, secretary and treasurer, Warner Gear Co., Muncie, Ind.

Selling Strategy to Bring the Automotive Industry Back to Normal—(A symposium)—led by W. O. Rutherford, vice-president, B. F. Goodrich Rubber Co., Akron, Ohio.

Walter Coghlan, general sales manager, American Hammered Piston Ring Co., Baltimore, Md.

E. W. Clark, advertising manager, Clark Equipment Co., Buchanan, Mich.

William H. Huff, advertising manager, Distel Wheel Corp., Detroit, Mich.

F. S. Armstrong, sales manager, Vesta Storage Battery Co., Chicago, Ill.

Frank N. Sima, assistant sales manager, Timken-Detroit Axle Co.

General Open Forum on Business Conditions and Association's Activities—Group Plan—G. Brewer, manager, Automotive Equipment Dept., Westinghouse Electric & Mfg. Co., Springfield, Mass.

H. R. McMahon, Standard Steel Spring Co., Coraopolis, Pa.

H. P. Carrow, Hayes Mfg. Co., Detroit, Mich.

#### LONG RACE IS PLANNED

NEW YORK, Sept. 7—A transcontinental automobile race across South America, from Santiago, Chile, to Buenos Aires, Argentina, is planned to be held on Feb. 1, 1922, according to advices received here from those countries. This international touring route was recently opened by a pathfinding party of the Argentine Automobile Club, taking in the cities of Bahia Blanca, Neuquen, Curacautin, Chillian and Talca, a total of 2630 kilometers.

The race will be held under the auspices of the newspapers *El Mercurio*, of Santiago, and *La Nacion*, of the Argentine capital, and a prize of 20,000 pesos will go to the winner. The competition will be open to all cars of both European and American makes, and it is to be expected that a large number will take part.

The charting of the international route which took place early this year is reported to have given a strong impetus to touring and to road races.

## Insurance Company Accepts N.A.C.C. Ideas

### National Liberty Agrees "Moral Hazard" Has Much to Do With Big Losses

NEW YORK, Sept. 7—The contention of the National Automobile Chamber of Commerce that the heavy losses of insurance companies on automobiles with the consequent necessity for imposing high rates has been due largely to lack of consideration for the "moral hazard," has been accepted by the National Liberty Insurance Co., which has ordered a clean up of its automobile business.

#### Character Overlooked

A statement by the company says that "many policies have been issued without reference to the character and standing of the assured and without adequate knowledge of the risks assumed" and that "many policies as now written are invitations to the unscrupulous to perpetuate frauds upon the insurance companies."

These statements are contained in a letter sent to agents announcing that commissions payable hereafter will be uniformly 15 per cent with a contingent of 15 per cent subject to certain conditions.

#### Readjustment Planned

"Many automobile policies issued by this company, now enforced, are for amounts in excess of present market values," says the letter. "Should total loss occur, the assured should not expect to receive more than the replacement value of the car, which in many cases will be several hundred dollars less than the insurance carried. A readjustment will be made of such policies reducing the amounts of insurance to approximately the present market value."

## English Bean Model Appears in Japan

SEATTLE, Sept. 5—The latest newcomer to the light car ranks on the Japanese market is the Bean, an English product, with a small four-cylinder motor, and a R. A. C. rating of 11.9 horsepower. The Japanese rating is 9.92 horsepower, so that the Bean just manages to come into the 5 to 10 horsepower tax valuation, and for this reason it has a very strong talking point in view of the prohibitive taxes being imposed on automobiles of greater horsepower in Japan.

The Bean is of the conventional British light car design, but is produced in rather larger quantities than other British light cars. The British bodies include a four-passenger touring, a two-passenger roadster and a coupé, and it is believed that the Japanese agents will also supply closed bodies of Japanese manufacture for the chassis.

## Hares Motors May Have Its Own Line

### Engineers Have Plans Completed for Full Line of Passenger Cars and Trucks

NEW YORK, Sept. 7—Dissolution of the contract with the Locomobile Co. held by Hares Motors will have no effect on the future of the latter corporation. Hares Motors will continue to handle sales for the Kelly-Springfield Motor Truck Co., and it is understood negotiations are pending for taking over the sales of one or more established passenger car lines.

If Hares Motors does not enter into contracts similar to those it held with the Mercer and Locomobile companies, it intends to revert to its original plan of developing a complete line of passenger cars and trucks. The engineering department of the company has worked out detailed plans for a complete line of both classes of vehicles. This would include passenger cars in three price classes and trucks of various capacities. The Hares Motors organization remains intact and no changes are contemplated.

No successor has been appointed as yet to A. K. Stewart, who has resigned as general manager of the Kelly-Springfield Truck Co. and returned to New York. Stewart took charge of the factory Feb. 1. The Kelly-Springfield plant is being operated on about the same basis as for the past few months, but the outlook for business is understood to be gradually improving.

## Kansas City Outlook Brighter for Fall

(Continued from page 495)

The opening of the fall term of the county circuit court is revealing many suits on motor car transactions—suits by securities companies, by sellers of cars, by distributors of accessories, and by banks. There is also a quickened current of bankruptcies in the federal court, in which motor equipment figures. It seems that nearly every bankrupt owes money on a motor car.

Nearly every bankrupt owes money to a bank—which will result in an increased tendency on the part of bankers to watch their accounts closely and require good moral or other security from borrowers, the securities being accepted at mighty low valuations.

E. F. Fader, director of the United States Employment Service in the Fourth district is unable to see any hope for relief for unemployment in any concerted action by business men, except as directed towards road building. He has suggested that cities, counties, states and the government should undertake highway construction programs at once so that before Oct. 1 in every community, there will be common labor available for every man who is out of work.

Fader suggests that instead of con-

tracts being let for road building, the counties themselves do the work, hiring the men—and hiring them frankly and definitely as an eleemosynary project, to provide them with money honestly earned. Because of the great amount of unemployment it is inevitable that wages will decline for common labor and even for many classes of labor.

An obstacle to the undertaking of road-building programs, is the difficulty of selling road bonds profitably but this is a phase which financiers, it is suggested, ought to be able to overcome as perhaps less expensive and objectionable in the long run than the conditions that will accompany widespread unemployment in the winter period.

The net conclusion from a survey of the entire field is:

That general merchandising will be fairly good in the smaller towns, merchants buying from hand to mouth.

That motor trade will be fair in small towns.

That city merchants and city motor car retailing will be light.

That there will be an army of unemployed.

That if road construction is promptly undertaken on a big scale rural business will be greatly increased and city wholesalers will reach a normal volume, city retailers profiting by the better condition of the territory.

That motor car dealers who have not sailed close to shore will be in trouble whatever happens.

## Reductions in Cars and Trucks Continue

(Continued from page 494)

### STUDEBAKER CUTS AGAIN

SOUTH BEND, IND., Sept. 8—Another reduction in prices of the "Light Six" Studebaker cars is announced by President Erskine. He attributed the cut to lower manufacturing costs resulting from larger production. The prices follow:

	New Price	Old Price
Roadster .....	\$1,125	\$1,300
Touring .....	1,150	1,335
Coupe .....	1,550	1,695
Sedan .....	1,850	1,995

Last December the price of the touring car was \$1,485 and the sedan \$2,450. The Studebaker plants are operating at capacity and production is larger than ever before.

### DEFIANCE TRUCKS CUT

DEFIANCE, OHIO, Sept. 7—The Defiance Truck Co. has announced price reductions ranging from \$200 to \$375. The 1-ton model now will sell for \$1,695 and the 2-ton for \$2,275.

### CHEVROLET TRUCK CUT

DETROIT, Sept. 7—Price cuts have been made in Chevrolet Model T 1-ton truck and Model G  $\frac{3}{4}$ -ton, the former from \$1,225 to \$1,125 and the latter from \$820 to \$745.

## Industry Has 3.06% Drop in Employment

### August Report Shows 5,520 Less Workers Than on July 31— Trade Recovering

WASHINGTON, Sept. 6—Survey of industrial conditions by the United States Employment Service shows that business is slowly recovering from the depression and that the future will widen employment of a healthy and lasting character. However, among the industries reporting a decrease in employment in August was the automotive trade, which showed a decline of 3.06 per cent or 5520 less employees on the payroll than on July 31.

These figures are based upon returns from firms usually employing 501 or more, located in 65 industrial centers but they do not cover the smaller establishments, which are by far more numerous and employ less than 500.

A survey of manufacturing regions shows that the automobile trade in Michigan is recovering rapidly. It is stated that the rapidly exhausting stocks give promise of an early resumption of manufacture. This is the most helpful sign in the situation. A trying winter, with considerable unemployment, is anticipated. The employment service has noted that larger manufacturers of low priced automobiles are operating at full capacity but with considerably fewer men than they had in January and February, 1920. Certain departments of automobile factories in Flint are reported as running overtime, and this situation lends encouragement to local business men.

In Wisconsin, automobiles and rubber tires show increased activity, while agricultural implements are dull. The State has undertaken a large road construction project involving the building of 2400 miles of concrete and gravel highways. Price cuts have increased as have many local motor companies.

The belief exists that the movement of crops to market during this month will result in increased sales of all commodities. Until the crops are harvested, there is little ground to determine whether or not definite permanent employment is under way, for much depends upon the purchasing power of the farmer. Better business conditions are directly traceable to the harvest and the movement of crops. It is stated that among manufacturers and jobbers of agricultural implements prospects are not very encouraging.

### FIRESTONE CUTS OUTPUT

AKRON, OHIO, Sept. 8—The Firestone Tire & Rubber Co. has decreased production from 28,000 to 25,000 tires a day to conform with a decline in sales. The slump is seasonal and has been expected. Further reductions in output will be made as sales fall off with the end of the touring season.

## METAL MARKETS

**A**LTHOUGH no flourish of orders accompanied the steel market's entrance upon its autumnal activity, there is no denying the change in the atmosphere from that of mid-summer. To the superficial observer it might appear that producers had suddenly acquired a greater amount of backbone. Such a deduction, however, leaves the real cause concealed. In a period of liquidation there are always sharp declines which become less and less marked as the equation of supply and demand is approached. While the potential supply of steel is probably three times as great as the present demand, over-production has ceased so that for the time being supply is more nearly on a par with demand than it has been in a long time. Moreover, price levels have settled on a fairly rational basis. They represent, on the whole, an advance of about 60 per cent over the 1914-1915 "low". This 60 per cent represents the actual increase in labor, fuel and taxes while freight rates are still twice what they were at the outbreak of the European war. Reduction of freight rates is confidently expected in the course of the next few weeks. In fact, definite announcement of a sharp cut in transcontinental rates on iron and steel is scheduled for early in October. Additional shading of labor costs is also under way. It is only natural that producers should claim that in their present quotations they have discounted all these economies. When they are once put into effect, it will depend upon the extent of the demand for steel whether their attitude or that of consumers who hold that all such reductions should be subtracted from the price of steel, will prevail. In other words, these savings in costs will form debatable ground between buyer and seller. Until they materialize, however, the enhanced stability of steel prices, which is the outstanding feature of the present constellation, must be reckoned with by consumers. There has also been in evidence a marked lessening in the floating supply of resale steel, most of it having passed into hands which will hold it for consumption.

**Pig Iron.**—Although the present quota of pig iron buying hardly justifies the advances which have been put through, producers appear to have recovered sufficient strength to dictate prices. What little buying there is by automotive foundries in the Middle West, is at the advanced rates. Many automotive foundries provided themselves with fairly good-sized stocks while low prices prevailed.

**Steel.**—Interest on the part of automotive consumers who used to buy sheet bars for conversion, has died out and, although the \$30 level seemed very attractive, very little in the way of purchases is reported. The price on full-finished automobile sheet appears to be a matter of individual negotiation. Some of the old-established mills refuse to meet the prices quoted by newcomers in the field. The former claim to know the difficult specifications which accompany orders for this class of sheets and assert that any mill which cuts below the base price of 4.70 for No. 22 gage is cutting under cost. In quite a few instances mills that set the pace in price failed to secure the business. Several large tonnages of sheets are in progress of negotiation. The same is true of bolts and nuts.

**Aluminum.**—Better inquiry is noted in the market for aluminum sheets. Sellers are quoting 31¢. Some consumers are seeking

to buy 98 to 99 per cent virgin ingots at below 19¢ but holders apparently refuse to go below 19.50¢, some asking 20¢ for duty paid metal.

**Copper.**—The market continues unchanged and easy to weak.

**Tin.**—On the basis of the improved statistical position, the market displays a somewhat better tone.

**Lead.**—As the result of the resumption of activities by Australian lead smelters, the international position of this metal has become somewhat confused. The American market continues steady with battery makers buying in routine quantities.

**Zinc.**—The zinc market continues in the doldrums.

## FINANCIAL NOTES

**Southern Motors Co.** of Louisville has been purchased by L. J. Hannah, vice-president of the company, and Lee Miles, president of the Louisville Taxicab & Transfer Co. The late A. T. Hert was one of the principal stockholders in the company at the time of his death, and stock of the Hert estate was included in the transaction. The company is capitalized at \$125,000. Amended articles of incorporation were filed immediately, changing the name of the company to the Hannah-Miles Co. The concern will continue to handle Dodge Bros. cars exclusively. The amendment was signed by Messrs. Hannah, Miles and A. J. Carroll.

**Martin Tire Corp.**, New York, has declared the regular semi-annual dividend of 4 per cent on its preferred stock, payable Sept. 20 to stockholders of record Sept. 10. In his report to stockholders James Martin, president, declared that sales during the first six months of the year were greatly in excess of those during the same period last year. He said that business during July and August continued to be on the upward trend.

**Ireland & Matthews Mfg. Co.**, Detroit, has announced that it will increase its capital stock by \$700,000. This firm, established since 1889, supplies automobile parts to practically every automobile concern in the United States, mostly metal stampings, ranging from hub caps to instrument board plates.

**Moline Plow Co.** announces that interest on \$4,000,000 notes and payment of \$1,000,000 of these notes which matured Sept. 1 was in default on that date. It was stated that an organization plan has been practically completed and might be announced soon.

**International Harvester Co.** has announced a regular quarterly meeting of directors, which ordinarily would have been held Sept. 2 to act on the common stock dividend, has gone over until the following week, owing to a lack of quorum.

**Portage Rubber Co.** has planned for the floating of an issue of \$1,000,000 first mortgage 8 per cent bonds. All common stock has been withdrawn and new common issued, share for share, to stockholders, with no par value.

**Kelly-Springfield Tire Co.** has announced a quarterly dividend of \$1.50 per share on the 6 per cent preferred stock, payable Oct. 1, 1921, to stockholders of record Sept. 16, 1921.

**Goodyear Tire and Rubber Co.**, stockholders have approved a plan for the dissolution of the New York company.

Maxwell-Chalmers  
Has Plenty of Cash

Reorganized Company Has Over  
\$8,400,000 — Starts Under  
Favorable Conditions

**DETROIT, Sept. 6.**—Favorable conditions under which the reorganized Maxwell Motor Corp. and Chalmers Motor Co., now known as Maxwell-Chalmers Co., start off, are shown by comparing first consolidated balance sheet of the new company as of June 1, 1921, with combined balance sheets of Maxwell and Chalmers companies as of June 30, 1920.

The reorganization had \$7,931,361 cash June 1. It is understood this has since been augmented about \$490,000.

Where the former companies had current liabilities to current assets in ratio of \$54,455,000 to \$33,166,000 the reorganization's current assets June 1, 1921, were \$34,871,224 against current liabilities of \$1,855,179.

## Many Increases

Land, buildings, machinery and equipment are increased \$4,317,000 in the statement of the reorganization. This is due partly to a reappraisal and partly to new construction, chief of which is the general office building at the Oakland Avenue plant.

The balance due from the London account has been reduced to approximately \$1,000,000 since the June 1 statement of the reorganization.

Deferred expenses which were \$592,240 are \$106,848 in the new statement. Deferred liabilities, however, are increased \$10,840,000, due mainly to execution of one, two and three-year notes aggregating \$11,600,000, which represent the funded portion of the heavy current indebtedness of the former companies.

## \$15,886,000 in Reserve

Reserves totaling \$15,886,000 have been set aside by the reorganization compared with \$5,053,000 so set up by the former companies.

With reference to the good will account of \$25,030,296, which stands practically the same, an official of the company points out that there is a possibility of offsetting about \$8,500,000 of this item through unused reserve credits. He declares the reserve account balances are inordinately generous. Around \$500,000 will remain unused in the \$1,081,671 account, carried as a liability for further payments account of purchase price.

Deducting good will account from \$33,696,104 book value of Class B Maxwell Corp. stock, there remains a book equity of \$8,666,000 applying to this class of stock. Adding estimated gains of about \$8,500,000 from over-necessary reserve credits there appears a fund of \$17,166,000 to be divided by 620,179 shares of Maxwell B stock, or a book value of \$27 per share after deducting the entire good will account.

## MEN OF THE INDUSTRY

**Cassius F. Baker**, better known throughout the trade as "Cash" Baker, has resumed his connection with the National Motor Car & Vehicle Corp., Indianapolis, as district sales manager for Michigan, Ohio, West Virginia and western Pennsylvania. Baker is one of the veteran factory salesmen in the industry, starting back with the old Pope Toledo, from there to the American and Fiat to National. About three years ago he left National to represent another line. This connection he severed Aug. 14 to again sell National motor cars.

**A. C. Maucher**, who was connected with the Peerless and the Cadillac cars in Philadelphia for fifteen years and lately with the Standard Steel Car Co. of Pittsburgh, in sales, advertising and production capacities, recently resigned from the latter company to become general manager of the Ray Battery Sales Corp. of New York, distributing the Ray storage battery in the eastern part of New York State and northern New Jersey. The sales headquarters and service station are located at 1926 Broadway, New York.

**Guy W. Vaughan**, while still remaining a vice-president and a member of the board of directors, has resigned as general manager of the Van Blerck Motor Co., Monroe, Mich., and has taken up the duties of vice-president and general manager for Standard Steel & Bearings, Inc., Philadelphia, Pa., manufacturers of ball bearings. Vaughan is succeeded at Monroe by **George Sykes**, who has spent six years with big German electrical interests in their engineering, manufacturing and sales activities in Europe.

**Frank Johnson**, a well-known automotive engineer, has just joined the engineering staff of the Cadillac Motor Car Co. at Detroit. Johnson began his automotive career in Detroit in 1900. He was chief draftsman and designer of the Cadillac automobile and also on the tools for manufacturing the car. For the last several months Johnson has been associated with **George H. Layng**, vice-president of the Cadillac Motor Car Co., in the manufacturing department.

**Guy M. Collette** on Sept. 1 became general manager of the Lambert Tire & Rubber Co. of Akron. He succeeds **John Hausam**, who continues as director of the company, but will give his active interest to other lines. Collette was for a number of years assistant cashier of the Diamond Rubber Co. He was long the chief clerk of the Firestone advertising department. Prior to joining the Lambert company he was with the Whitman & Barnes Mfg. Co. of Akron.

**C. C. Cottrell**, former Nevada State Highway Engineer, has assumed his new duties as manager of the good roads bureau of the California State Automobile Assn., in succession to **Ben Blow**, who resigned recently to become manager of the Victory Highway Assn., with headquarters in Kansas City. Prior to his appointment to the Nevada job Cottrell was superintendent of construction for the California State Highway Department from 1913 to 1917.

**Howard A. Coffin**, formerly manager of the Distel Wheel plant of the Detroit Pressed Steel Co., has gone with Cadillac Motor Car Co. as assistant to the president. It was recently reported that he was going with a refining company as vice-president, but he has changed his plans and has already assumed his duties with the Cadillac organization.

**A. E. Vinton**, formerly with the National, has returned to become assistant sales

manager. Vinton left National three years ago to become sales manager for the Mansfield Tire & Rubber Co. Other additions to the National sales department are **H. J. Ayers**, **L. A. Bell** and **A. H. Vay** as district representatives.

**Charles S. Turner**, who for some years has been in charge of export sales of automotive equipment for the Robertson-Cole Co., has joined the sales department of the Liberty Motor Car Co., Detroit, in an executive capacity. His duties with the Liberty company will include both foreign and domestic business.

**W. Clark Little**, for eighteen months in an executive capacity with the Snodgrass & Gayness advertising agency of New York, has joined the Anderson Motor Co. of Rock Hill, S. C., in the capacity of advertising manager.

**Charles B. Seger**, president of the United States Rubber Co., has been elected chairman of the board to succeed the late Colonel S. P. Colt. Seger remains as president also. **Lester Leland** continues as vice-chairman of the board.

**Henry G. Shirley** of Maryland has been appointed chairman of the Good Roads Board of the American Automobile Association. He was the first president of the American Association of State Highway officials.

**Chas. L. Pouncey**, formerly shop instructor in the automotive division of the A. and M. College at Bryan, Tex., has accepted a similar position with the American Automotive School at Dallas, Tex.

**W. A. Murfey** has resigned as sales promotion manager of the Standard Motor Truck Co., Detroit. He has not announced his future plans.

## INDUSTRIAL NOTES

**McKay Carriage Co.** of Grove City, Pa., have just completed a new addition to their plant which will more than double capacity. The building is of brick and structural steel with Lupton steel sash of wire glass which gives ample light and ventilation. The new plant has the latest electric equipment and automatic sprinklers. This building will be used for manufacturing of bus and school bodies, which the company manufactures for all types of chassis.

**Johnson Spring Co.**, Kansas City, Mo., has been incorporated and is planning to secure permanent and adequate quarters. It will make springs for motor vehicles. **H. A. Daugherty** and **Estel Scott**, well known in motor car and truck circles, are among the incorporators.

**South Bend Wrench & Tool Co.** has been incorporated at South Bend, Ind., with a capital stock of \$10,000. The organizers of the company are **Jas. C. Romanie**, **B. V. Romanie** and **Emmet S. Webster**. The company will manufacture automobile tool supplies.

**Oshkosh Tractor Co.**, La Crosse, Wis., has secured an order for 25 Model H Happy Farmer tractors to be shipped to Paris, France, immediately. This is the first foreign order that the new organization has received.

**Rolls-Royce of America, Inc.**, has announced a delay of three or four weeks beyond September 6 in the resumption of duties. The slowness of deliveries of automobile bodies by coach builders is said to be the chief reason.

**Kroyer Motors Co.**, Stockton, Cal., invested in thirty acres of ground and buildings, approximately \$175,000.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

**NEW YORK, Sept. 7**—The ease of the local money market last week in the face of first-of-the-month's settlements and crop moving demands is an indication of the substantial improvement which has taken place in the banking and credit situation. Call money covered a range of 4½ per cent to 5½ per cent against 5 per cent to 5½ per cent the previous week. The renewal rate did not get as high as 5½ per cent until Thursday. "Outside rates" were as low as 4 per cent and 4½ per cent. Time money remained unchanged at 5½ per cent to 6 per cent in a quiet market with little demand and few important transactions. Commercial paper rates were unchanged from those prevailing in the previous week.

## Reserve System Improves

The Federal Reserve System continues to show a steady improvement. On Aug. 31, the ratio of total reserves to deposit and Federal Reserve note liabilities combined was 66.8 per cent as against 66.5 per cent the previous week. The ratio of gold reserve to Federal Reserve notes in circulation after setting aside 35 per cent against deposit liabilities increased from 87.7 per cent to 88.5 per cent. This improvement was a result largely of increased gold reserves of \$21,983,000, a decline in total bills on hand of \$3,305,000 and in note circulation of \$4,448,000. Total deposits increased \$17,123,000. Similar improvement was made by the New York Federal Reserve Bank whose ratio increased from 74.6 per cent to 75.5 per cent.

## Failures on Increase

Business failures during the month of August again showed an increase. While failures for the month were below the maximum for the year as regards both number and amount, there was an increase of 8.2 per cent in the number of failures, as compared with July. The August failures numbered 1562 and the liabilities involved amounted to \$42,904,409. The corresponding figures for July were 1444 and \$42,774,163, respectively.

R. E. Cowden Receiver  
for Master Rubber

**DAYTON, OHIO, Sept. 8**—Robert E. Cowden has been appointed receiver for the Master Tire and Rubber Co., a \$1,000,000 corporation. His bond was fixed at \$25,000. Application for receiver was made by the Jenckes Spinning Co. of Pawtucket, R. I., the largest creditor.

The Master company is one of five Dayton corporations which tried to re-finance themselves through the French-Worthington "swindle gang." Attorneys said the receivership action was necessary before a reorganization could be effected.



# Calendar

## SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28 - Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show.

Coliseum, Auspices of N.A.C.C.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Associao Automobilista Brasileira.

## CONVENTIONS

Sept. 14-15-16—Cleveland, Second International Cost Conference, Auspices National Association of Cost Accountants.

Sept. 14-15-16—Detroit, Credit Convention Motor and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## Goodyear Textile to Pay a Dividend

**Tire Company in California Has Deficit, However, of Approximately \$2,400,000**

LOS ANGELES, Sept. 6—The Goodyear Textile Mills Co. will begin the payment of dividends next Oct. 1. The Goodyear Tire and Rubber Co. of California has a deficit of approximately \$2,400,000 which must be paid before dividends can be declared. The latter company has been operating at an average profit of \$200,000 for the past four months. The financial status of the Goodyear companies in Los Angeles was thus stated by President E. G. Wilmer at the close of the directorate meetings held here.

F. A. Seiberling, J. S. Willaman and J. R. Reilly were replaced on the board of directors of the Goodyear Tire and Rubber Co. of California by Wilmer, G. M. Stadleman and P. W. Litchfield. Wilmer, who is president of the Goodyear company of Akron, succeeds Seiberling as president of the California company.

Seiberling, S. A. Steere and C. N. Turner were replaced on the board of directors of the Goodyear Textile Mills Co. by Messrs. Wilmer, Stadleman and Litchfield and Wilmer was elected president of that organization, succeeding Seiberling. The board of the textile company declared a quarterly dividend on its preferred stock of 1½ per cent payable next Oct. 1 and it was announced that when, and as the company's situation will permit. Three dividends have been passed.

Wilmer stated that the textile company now has a surplus sufficient to cover all dividends in arrears, but that, due to investments in inventories, etc., the directors deem it advisable to restrict the present declaration to the dividend to be paid in October.

## N. A. C. C. Report Shows August Shipments 2% More Than Those of July and 72% of August Last Year

NEW YORK, Sept. 8.—Reports of August shipments of cars and trucks made to the National Automobile Chamber of Commerce by its members show that there was an increase of 2 per cent over shipments for July and that the total was 72 per cent of the shipments for August, 1920. In August last year shipments were 14 per cent less than in July. Shipment figures by months thus far this year are:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
January	25,057	6,485	29,283	3,185	....	93
February	25,505	9,986	43,719	7,507	....	99
March	29,326	16,287	57,273	9,939	....	75
April	17,147	20,187	64,634	14,197	....	1,619
May	21,977	18,608	74,286	15,193	....	2,381
June	22,516	20,269	60,746	18,834	8,350	3,947
July	23,082	19,470	52,342	15,320	8,702	3,725
August	23,386	20,350	34,060	14,290	7,095	3,565

Wilmer's outlook on the future of the local Goodyear organization is optimistic. While the present rate of profit will pay off the deficit in a year Wilmer declined to make a prediction as to the probable time when the tire and rubber company can pay dividends. He stated, however, that some months recently have shown a greater profit than \$200,000 and expressed his belief that the company's business outlook is excellent.

## St. Louis Company Will Make Cars to Suit Taste

ST. LOUIS, Sept. 7—A new and novel idea in the manufacturing of a tailored automobile, outfitted to suit the taste of the purchaser with color scheme to match is to be built in St. Louis. John M. Neskov, president of the Neskov-Mumperow Motor Car Co., who has been known for several years as distributor of the Anderson car and dealer in Dort and Gardner lines, is the originator of the plan.

Neskov is now forming a corporation backed by ample capital which will manufacture the new car. The first production, however, will be by the Neskov-

Mumperow Motor Car Co.

The first two cars are now in construction and will make a bow to St. Louis motorists at the Automobile Exposition to be held in the General Motors plant in St. Louis Oct. 15 to 22.

The standard models will be a four-passenger sport car and a speedster for three people, both built along unusual and striking lines as to bodies. It is the aim of the builders, however, to give the purchaser what he wants in the way of novelty of body design and lines or in effect a custom-built automobile.

The new car will be equipped with a Weidely four-cylinder motor, 3½ x 5½ bore and stroke, Bosch magneto, Bosch generator and starter, Muncie transmission and clutch, Salisbury three-quarter floating axle. The chassis will have a frame 7½ inches deep. The Weidely motor has overhead valves with force feed lubrication and aluminum crank case and flywheel housing.

Both models will have a 125 inch wheel base with 60-in. rear and 39-in. front springs. A very novel system of lubrication for all springs and other bolts is a patented hollow bolt, a type which will be filled with oil providing for lubrication from four to six months.

# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

Vol. XLV  
Number 11

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NEW YORK, SEPTEMBER 15, 1921

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# ATWATER KENT

*Ignition, Starting and Lighting*

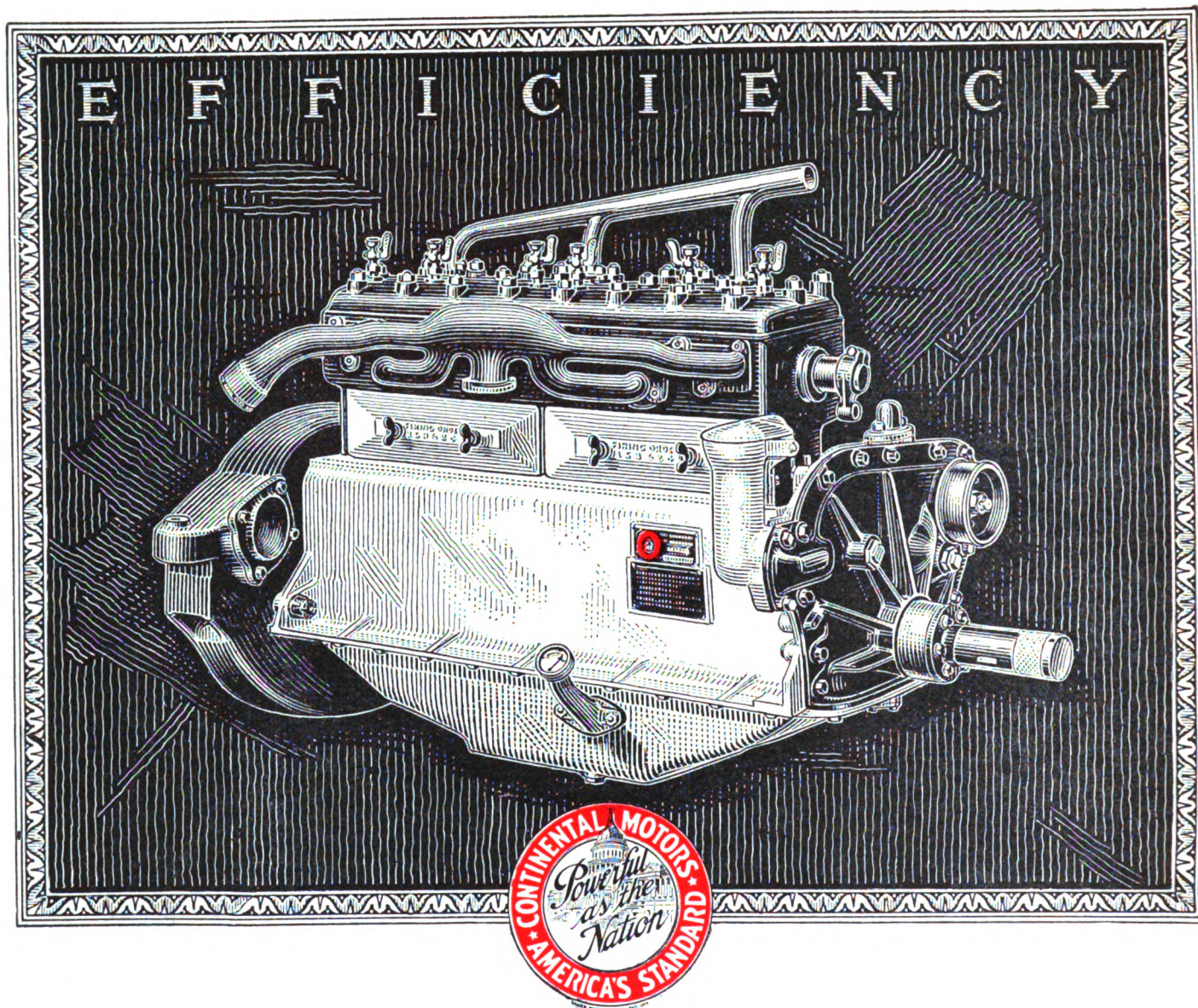
THE high standard of performance of all ATWATER KENT products is attributed to the care and attention given to engineering detail; the absolutely correct design; the accuracy and precision of manufacture.

ATWATER KENT products will last and properly perform their mechanical function for years—in fact long after the car of which they are an essential part has outlived its usefulness.

ATWATER KENT MFG. COMPANY

*Philadelphia*





In the great Continental plants, EFFICIENCY greets the observer on every hand. It is seen in mechanical operations where simplicity has supplanted duplication and it is revealed in the clock-work routing and progress of motors under construction. ¶ These examples, however, are but manifestations of the wonderful co-ordination of effort that the industry calls Continental EFFICIENCY—co-ordination of effort

internally in every phase of motor building and co-ordination externally in hand and glove co-operation with the entire transportation world. ¶ It is only natural, therefore, that the product of this great organization, in its smooth-running precision of operation, should possess that rare degree of motor EFFICIENCY that always has been associated with—the Continental Red Seal.

## CONTINENTAL MOTORS CORPORATION

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Largest Exclusive Motor Manufacturers in the World

# Continental Motors

STANDARD POWER FOR TRUCKS, AUTOMOBILES AND TRACTORS



# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, SEPTEMBER 15, 1921

No. 11

## Stability as Related to Present Price Trends

Price cuts have a psychological effect upon the mind of the buying public. Stability, viewed as a moving state of balance, can be achieved on a sound economic basis. A discussion of fundamentals.

By Norman G. Shidle

**S**IMILAR effects do not always grow out of similar causes. This is especially true of the recent price flurries in the automobile industry. The general reduction in prices which followed Ford's initial cut some months ago was a logical fall from wartime values. It was a logical step in the general deflation—a step taken on a sound basis of practical economics. The causes for a general reduction of prices at that time were clear and the same causes affected the entire industry in common.

The present situation is more complex. There is no common cause for price reductions. Despite the fact that reductions have been widespread during the last two weeks, an analysis of the situation indicates a great variety of reasons for the cuts. In almost every case where a reduction has been made, the reason appears to lie in certain individual factors affecting the company concerned. That no common basis is to be found in the present situation is indicated by the fact that cuts have been made both by companies whose sales have been exceptionally good during recent months and also by companies whose sales have not reached satisfactory levels during the same period.

An attempt to analyze and discuss the different reasons for present reductions would be as difficult as it would be useless. The immediate problems which

confront the manufacturers are individual and will be solved on the basis of the peculiar factors involved in each particular case.

There is a definite value, however, in discussing at this time certain fundamentals, the operation of which will determine the progress of the industry in the long run. While forces bearing upon an individual concern at present may necessitate certain temporary measures, an attempt to keep these temporary measures as closely as possible in line with the fundamentals will hasten the return to stability.

Stability in the automobile business during the next few years must be conceived, not as a stationary state, but as a state of constantly changing fixed ratios. The industry must be kept in balance, but not necessarily at a constant level. Stability of prices is essential if sound and permanent buying is to be stimulated, but the term need not be conceived to mean that prices will never change. They must be fixed for a period long enough, however, to restore public confidence in the relative value of the product which it buys.

A price war at this time would be ruinous to the industry. This fact is so obvious that it is hardly necessary to state it, yet its importance is so great that it can well be emphasized. An indiscriminate cutting of prices, based only on

guesswork and the price of competing makes, a level of prices changing every two or three months, would simply throw the buying market into confusion, cause untold financial stress among manufacturers, add heavy burdens in the way of unemployment and reduced wages to thousands of workers, and benefit very few, if any, of those involved.

Stability of prices need have no relation to agreements among manufacturers. It should have none. Price agreements do not have a sound economic basis and cannot therefore form the basis of permanent progress. An agreement as to the basis of prices, however, is a different matter.

It is sound economics to manufacture a product as efficiently as possible, to maintain a certain predetermined quality, to merchandise it as economically as possible, and to sell it at a price which gives a fair profit to the manufacturer and the dealer and a fair value to the buying public. This is easier to say than to do. But since it constitutes the only permanently sound and economic basis for selling prices, an attempt to establish such a basis and operate upon it eventually will be found essential.

Prices of materials vary, of course, and affect costs materially. Wage rates vary, production methods vary, merchandising costs vary and hundreds of other minor variables operate to make difficult an accurate determination of costs at any given time. Especially is this true when there is a falling market. Under any conditions, however, sound cost data are essential as a basis of any business or manufacturing operations. Such data are compiled, more or less accurately, in every manufacturing establishment. Incidentally, there is still progress to be made in cost methods.

In any case, the selling price should bear some definite relation to the production and material cost, taking into consideration, of course, market trends and other variable factors. On such a basis, selling prices should be stabilized for a period of a selling season. The period must be long enough to convince the public that prices have been established upon some sound basis. This cannot be done, however, until prices actually are so adjusted.

Price reductions are a part, of course, of merchandising plans, and like other merchandising plans cannot be permanently successful if guesswork is used in determining them. Prices are in a sense the foundation of the merchandising scheme. It should be recognized that stability is likely to be a far more essential factor than is generally recognized. With a sound basis for prices, as indicated previously, fluctuations would take place only when essentially changed conditions indicated the necessity for change and the fluctuation would be such as to preserve the fixed relation between the various factors in the market.

Last week Harry Tipper wrote, "There is no likelihood of a return to the days of easy selling, but there is every prospect of good business for the man who goes after it, who sees that his product is suitable to the market and that it is valued in accordance with its service." The present price flurry adds to the difficulties of the manufacturer in selling, because he must convince the public of the value of his product. He can hope to do this only when he has actually priced that

product on a sound economic basis.

Some of the price cuts already made have obviously been made on that basis. The reason for others is not so clear. Certainly the general situation indicates that there is an opportunity for a stabilization in the near future, however, as price curves in many raw materials give strong indications of straightening out.

Constantly recurring cycles of price reductions are certain to have an unfavorable effect upon the public mind. If automobile prices continue to vary, when the price curve on raw materials shows a strong tendency to straighten out, the public is likely to come to the conclusion that automobile prices have not been on a sound value basis in the past and that perhaps they are not at present. Such an attitude would result in a "let's-wait-a-while" buying policy.

Last June AUTOMOTIVE INDUSTRIES quoted the sentiment of those present at the annual N. A. C. C. meeting as summing up something like this:

"It is up to the industry to settle the price question right now and end the feeling of uncertainty that exists in the public mind. People do not buy on a falling market and we must stabilize values immediately." This sentiment indicated a very clear understanding on the

part of manufacturers as to the necessities of the situation. The statement applies equally well at the present time. The buying public is composed of individuals very much like the manufacturer himself. Each of these individuals is likely to reason about automobile prices along the same lines as anyone else.

The necessity for stability and the establishment of mutual confidence between the industry and the public and between the various parts of the industry is clear. The failure to recognize a moral obligation in regard to contracts and similar relationships within the industry can never lead to permanent advantage. The recognition of such an obligation has no relation to altruism; it has come to be simply a principle of good business. Mutual confidence can be established only through an attempt at utter fairness all along the line.

One executive within the industry analyzed the situation about like this a few days ago: "Much of the difficulty," he said, "lies in the lack of mutual confidence within the industry. Many purchasing agents are buying for very limited periods ahead because they are uncertain about the price of parts and raw materials. On the other hand, the parts people are afraid to take big contracts and really get into production on them because they are afraid of cancellations. This lack of mutual confidence is costing the industry many dollars every month at the present time."

This has a definite relation to the price question and must be considered as an important factor. Modern industry is composed of a multitude of closely interdependent units and can permanently progress only through a recognition of a moral obligation. The extent to which this is understood and practised will have a large part in determining the facility with which the general readjustments can be made.

In any case, the price future most advantageous to the industry lies in a stabilization, subject to periodic readjustments during the next few years, none of which need disturb the fixed relation of the relative values when made on a sound economic basis of production and material costs.

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**P**RICES must reflect economic value, and adjustments be made on that basis. Stability may be conceived during the next few years as a state in which balance is preserved, although levels may be changed at periods sufficiently far apart to allow fluctuations to depend upon economic trends and production costs.

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# A New Bus Chassis Developed by International Motor Co.

Rubber shock insulating blocks used in place of metal spring shackles, 34 in. wheels, and mounting of body floor directly on frame give much lower center of gravity, while riding qualities with cushion tires are said to equal those with pneumatics and to give lower operating costs.

By Herbert Chase

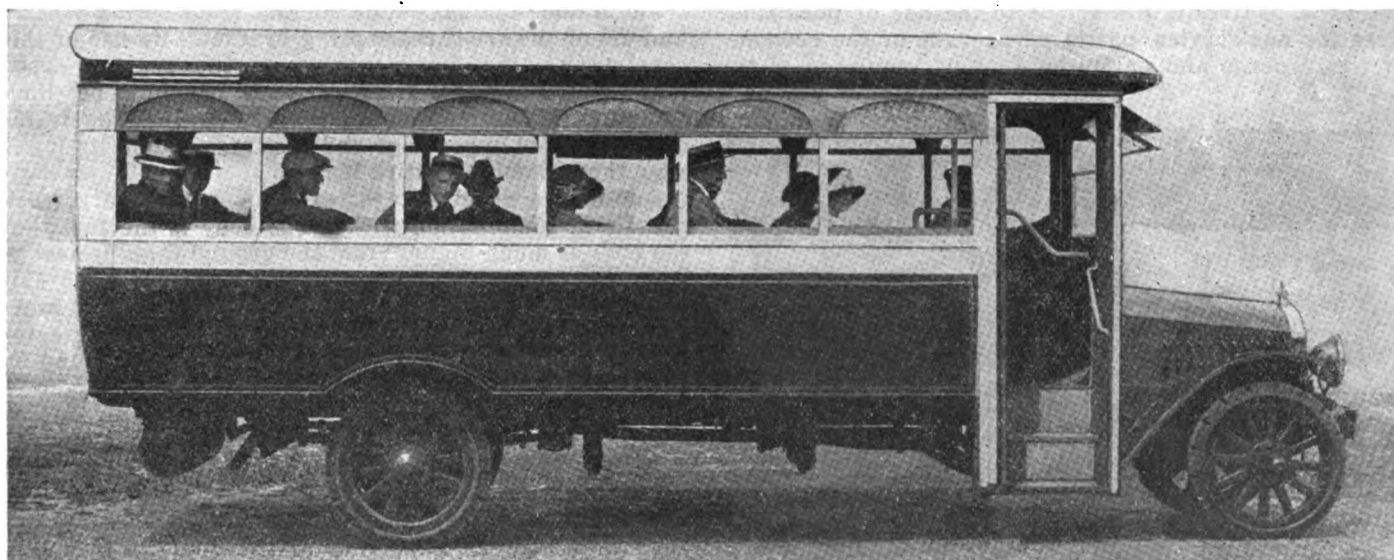
THE International Motor Company, in common with many other truck manufacturers, foresee unusual activity in the bus transportation field, and on this account have undertaken the development of a special bus chassis intended to meet the requirements of this class of work. While the chassis is identical in most respects to the standard 2½-ton Mack AB dual reduction chassis, several new features are incorporated. Of these the newest and most unusual is the use of rubber shock insulating blocks in place of the usual metal spring shackles.

From the accompanying cut it will be seen that blocks of rubber placed under compression in boxes provided for the purpose carry the ends of the springs and thus eliminate metallic contact between the spring and frame members. The rubber blocks are made of especially cured compound similar in some respects to that used in certain grades of solid tires. The boxes used in place of the usual spring brackets are made in two sections. The upper half is riveted to frame in much the same manner as the ordinary spring bracket, while the lower half is bolted to the upper portion. When bolted in place the rubber is placed under a compression about 80 lb. per square inch. The ends of the springs are embedded in the rubber blocks in such a way that the springs can deflect as well as take thrust in the usual manner. In the case of the rear springs the ends of the two upper leaves are carried between two metal liners

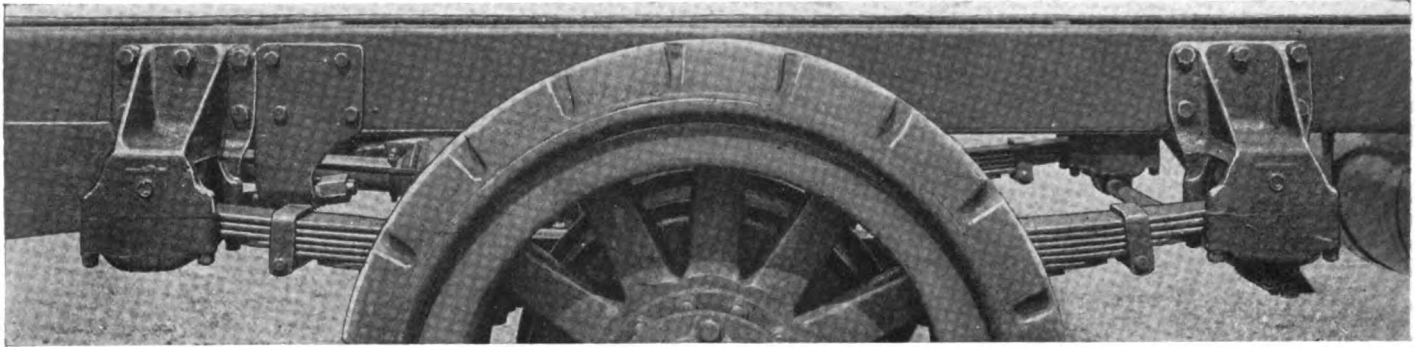
riveted to the ends of the leaves and in contact on their outer surface with the rubber blocks. The liners increase the area of contact with the rubber, thus decreasing any tendency for wear between the two surfaces. The metal liners are omitted in the case of the front springs, since these have much less motion than the rear springs. Hotchkiss drive is employed in the same manner as when spring shackles are used.

Among the advantages claimed for the use of rubber shock insulators are the following:

1. No lubrication required.
2. Upkeep much less, since no grease cups and no grease or oil is required, and no cleaning is necessary.
3. Ability to insulate the frame from many shocks ordinarily transmitted from the springs, and thus improve riding qualities of the vehicle.
4. No friction between surfaces, consequently no wear, looseness or rattle.
5. The rubber tends to compensate for twisting action between spring and frame.
6. Side and end thrust taken without metal-to-metal contact.
7. Less horizontal motion of axle, because springs elongate from middle toward both ends. This makes for better steering and tends to prevent unnecessary brake action.
8. Tends to reduce so-called "crystallization" of the frame, steering gear parts and other members due to vibration transmitted by shackles of the older type. For same reason the tendency of nuts and rivets to loosen is decreased.
9. Increase in the life of the tires.
10. Does away with shackles, spring eyes,



Side view of the new Mack bus chassis. Note relatively low steps and body floor



Rear spring suspension used on new Mack bus chassis, showing brackets containing the rubber shock insulators and the rear truss bracket

bushings, hardened and ground steel shackle pins, grease cups, shackle bolts and nuts. 11. Two or more main leaves of the spring can be made to bear in the rubber, thus giving added strength. 12. Spring construction is simplified and cheapened, since no wrapped eye is required. Cost of assembly and replacement is also less than with spring shackles.

The manufacturers state that the temperature of a spring used in combination with the shock insulator was 20 deg. Fahr. lower than in the case of a spring without shock insulator and using the old type shackle under similar conditions, indicating that frictional losses are decreased. A 20,000-mile test run on a chassis using the rubber insulators is said to have indicated that they will stand up for at least 25,000 miles running. The eight insulators used on each truck can, it is said, be renewed by two men in about one hour at a total cost of less than \$50, while it is necessary, with the ordinary spring shackle, to renew bushings once in 10,000 miles, this job requiring the labor of two men for about 8 hr.

The rubber shock insulators are supplied only on passenger-carrying vehicles and usually with cushion or high profile tires. The bus chassis is equipped with Kelly-Springfield caterpillar No. 23 compound 34 x 5-in. tires front and rear, the rear tires being dual.

The writer was shown numerous records made on a seismograph to determine the relative ease of riding of the shock insulated bus and a similar bus equipped with pneumatic tires. These appeared to indicate that the insulated bus is quite the equal if not superior in riding qualities to the pneumatic equipped job, and the makers so regard it. The International Motor Co. believes the use of solid tires is preferable to the use of pneumatic tires for bus service, partly on account of the economy of tire expense and partly because of avoidance of the

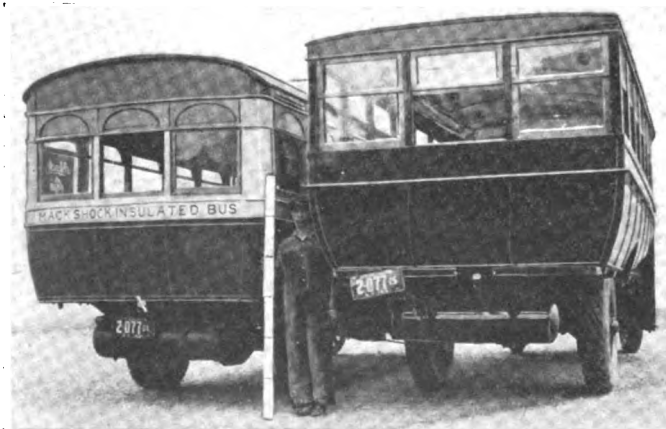
danger which is said to be involved in operating a heavy vehicle at high speed in case a large pneumatic tire blows out. The following figures on the relative cost of operation with solids and pneumatics are given by the International company: "On buses operating 50,000 miles annually five or more sets of pneumatic tires are required per year, costing not less than \$3,200. For a bus equipped with rubber shock insulators three sets of solid tires should cover a year's operation at a cost of approximately \$970—thus producing a net saving of \$2,230 per year, or nearly 4½ cents per mile."

One other feature which materially affects the riding quality of the Mack bus is the use of unusually long rear springs. These measure 60 in. from center to center of the spring brackets.

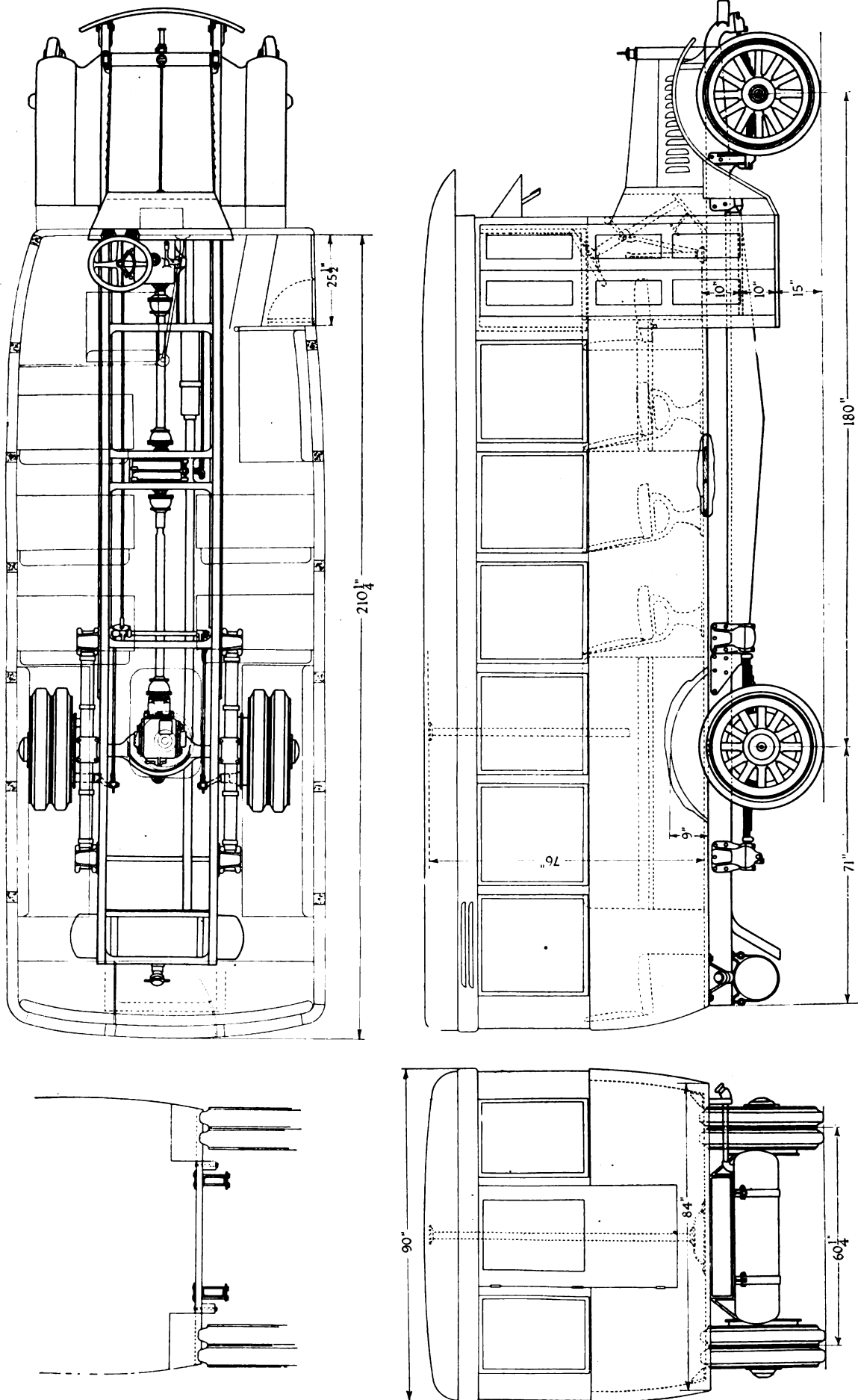
It will be seen from the accompanying drawings of the bus chassis and body that the latter is designed to carry 25 passengers. The cross seat arrangement shown gives a maximum of seating space. In case the bus is used in traffic which requires more standing room, this can be provided by other arrangements of the seats. In order to give the required body space it has been necessary to materially lengthen the frame and wheelbase of the chassis. This, in turn, has made necessary a reinforcement of the frame by means of truss members on each side. A combination wood and metal truss is employed, as shown in the accompanying cut.

The tension member of the truss is a steel rod with a round threaded section at each end, but flattened into oblong section between ends. This flattened section is mortised into the wooden filler member and is tightened by nuts which pass through substantial brackets riveted to the frame at points aft of the rear front-spring bracket and aft of the front rear-spring bracket. By use of this construction the disadvantages of the ordinary open truss, which localizes frame stresses, is said to be eliminated, since the wooden filler bears against the frame channel on its upper edge and the truss rod on its lower edge throughout its entire length.

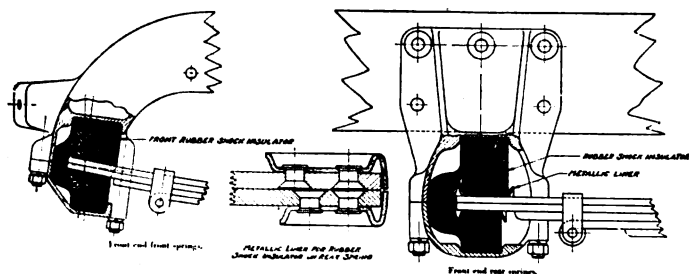
One of the disadvantages of using an ordinary truck chassis in combination with a bus body is the fact that the body is much higher from the ground than desirable, and is consequently more difficult of entrance and exit than a lower body would be. The higher center of gravity detracts from the riding qualities and causes greater tendency for the bus to sway or tip over when rounding curves. For these reasons an effort has been made to lower the bus body in the design of the Mack bus chassis. This has been accomplished by use of a 34-in. instead of a 36-in. wheel, by elimination of the spring shackles and by mounting the floor of the bus body directly on the chassis frame in the manner indicated in the accompanying transverse sectional view of the body. The photograph of the Mack shock insulated bus beside a bus of older design mounted on a higher chassis frame and



View showing comparative platform height of the Mack shock insulated bus and a bus of the same make but earlier design equipped with pneumatic tires



Plan and elevation of the Mack shock insulated bus chassis with body mounted in position. Note dimensions and height of body floor, which is mounted directly on chassis frame; also details of fastening floor to frame.



Sectional views of the front and rear brackets for holding the rubber shock insulators which support the spring ends

equipped with pneumatic tires gives an excellent opportunity to judge of the decrease in height which has been effected. The difference in height to the top of the chassis frame is 7 to 8 in.

Other particulars in which the bus chassis differs from standard Mack AB truck chassis are as follows:

The muffler pipe is extended to the rear of the chassis in order that the exhaust gases may not enter the body in the vicinity of the entrance door. The gasoline tank is located outside of the body in the rear of the chassis, fuel being fed to the carburetor by means of a vacuum system.

The engine is substantially the same as that used in the truck chassis, except for slightly different clearances used on pistons and valves made necessary by the fact that the engine runs at a higher governed speed than in the case of truck applications. The engine is governed to 1425 r.p.m., as against 1275 for the standard truck engine.

The four-speed gearset, dual-reduction rear axle, the front axle, steering gear and other mechanical units are substantially the same as those used in the truck chassis.

The standard bus body is substantially built. All body frame members are of first-quality, thoroughly cured oak with mortise and tenon joints set in white lead and dowelled with oak pins. The floor of the body is of 1¼-in. tongue and grooved maple, with maple wear strips attached. The seats are carried on light, pressed-steel pedestals. Seat cushions are given a tilt aft, are covered with imitation leather and provided with comfortable springs.

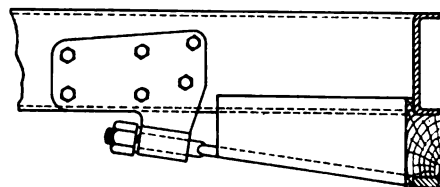
A two-leaf folding door is provided at the front of the right side of the body. It is arranged for operation by the driver from his seat. Three steps, the height of

which is shown in the accompanying drawing, are provided at the entrance. An emergency exit, which can be opened from the inside in case the entrance door is blocked by accident or otherwise, is provided. The windows are equipped with anti-rattlers and have movable lower sashes which drop into the casing beside the seats. Eight electric dome lights are distributed over the ceiling, and a step light, located inside the body, is so arranged as to be lighted automatically when the door opens. A heating system, using exhaust from the engine, is provided. This consists of two lines of guarded pipe running the full length of the body on each side near the floor. A valve controlling the by-pass of exhaust through the heating system is located under the floor near the entrance door. Two front and two rear ventilators with shutters are provided. Advertising racks for standard size advertisements extend along the inside of the body on both sides above the windows.

The bus is, of course, arranged for one-man operation. The driver is protected by a rail, and a sliding curtain placed back of the driver's seat prevents reflection of light on the windshield when driving at night. A mirror placed over the operator's seat is arranged to give him a view of the interior of the bus and, through the rear window, of the road behind.

The length of the body inside at the seat line is 18 ft. and the width at the same point 6 ft. 7 in.

A detail of one truss rod bracket. One end of the truss and a sectional view through truss and frame are also shown

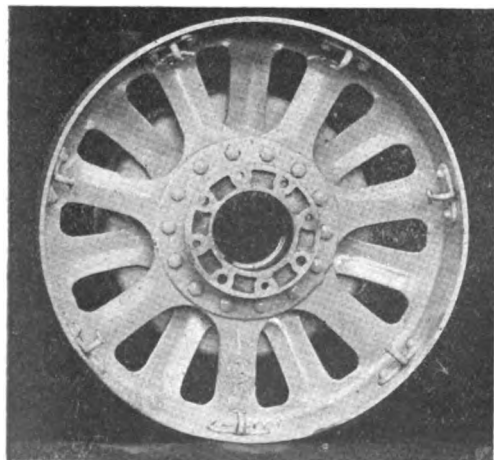


The following additional body equipment is furnished at extra cost. Newbold lighting system, consisting of a special generator with automatic regulator arranged to charge the battery and feed the lighting system at a constant rate irrespective of speed of engine. Electrically lighted roller destination signs. Electric buzzer system with buttons located on window posts. Spring-roller window curtains, spring-edged cushions, ceiling of Agasote or similar material attached to roof bows, and fare register.

The price of the bus chassis with 25-passenger body and standard equipment is \$6,730.

## A Rolled Steel Truck Wheel

**A** ROLLED steel truck wheel in which the rim and spokes are formed in one piece is now being produced



The Bethlehem rolled steel wheel constructed from I-beam by stamping and forming operations.

by one of the large steel manufacturers. The blank from which the wheel is formed is stamped in the first instance from a special rolled I-beam, portions of which form the spaces between spokes being cut away before the forming operation is started. When the wheel has been formed to assume a circular shape, the ends of the flange which then becomes the rim of the wheel are welded together, and the inner spoke ends are bolted to a central hub member, alternate spokes being staggered and bolted to opposite sides of the hub flange. The wheel forms a rigid structure which is said to compare favorably in weight with that of a wood wheel, and to be amply strong to withstand the most severe radial loads and side thrust as well as torsional strains. A rear wheel with brake drum attached is shown in the accompanying cut. Front wheels are identical except for the hub construction and elimination of the brake drum. The chain hooks shown in the cut are cold riveted to the rim of the wheel when desired. The entire wheel is manufactured from the raw stock by the Bethlehem Steel Corporation.

# Producer Gas as a Fuel for Automotive Vehicles

## Part II—Descriptions of Existing Systems

British engineers have developed three gas producer systems intended for use on trucks. A description of these systems and their method of operation is given herewith. 300 lb. of coal will, it is claimed, drive a truck 100 miles, or about the same distance as 20 gal. of gasoline.

By P. M. Heldt

**A**T least three different gas producers for use on motor trucks have been developed in Great Britain. These are described here briefly and illustrated to show the methods employed for overcoming various difficulties. Among these difficulties is that due to the volatile constituents and the carbon dust carried along by the gas, which has already been referred to. Another difficulty with producers arises from the formation of clinkers. In the combustion zone the temperature is so high that the ashes fuse into clinkers, which clog the grate and prevent the entrance of sufficient air.

In the ordinary gas producer as used for stationary work there are four zones within the furnace—namely, the ash zone directly above the grate; the combustion zone, in which combustion of the fuel to carbon dioxide takes place; the reduction zone, in which the carbon dioxide formed in the zone immediately below combines with more carbon to form carbon monoxide, and the distillation zone, in which the volatile constituents of the fuel are driven off.

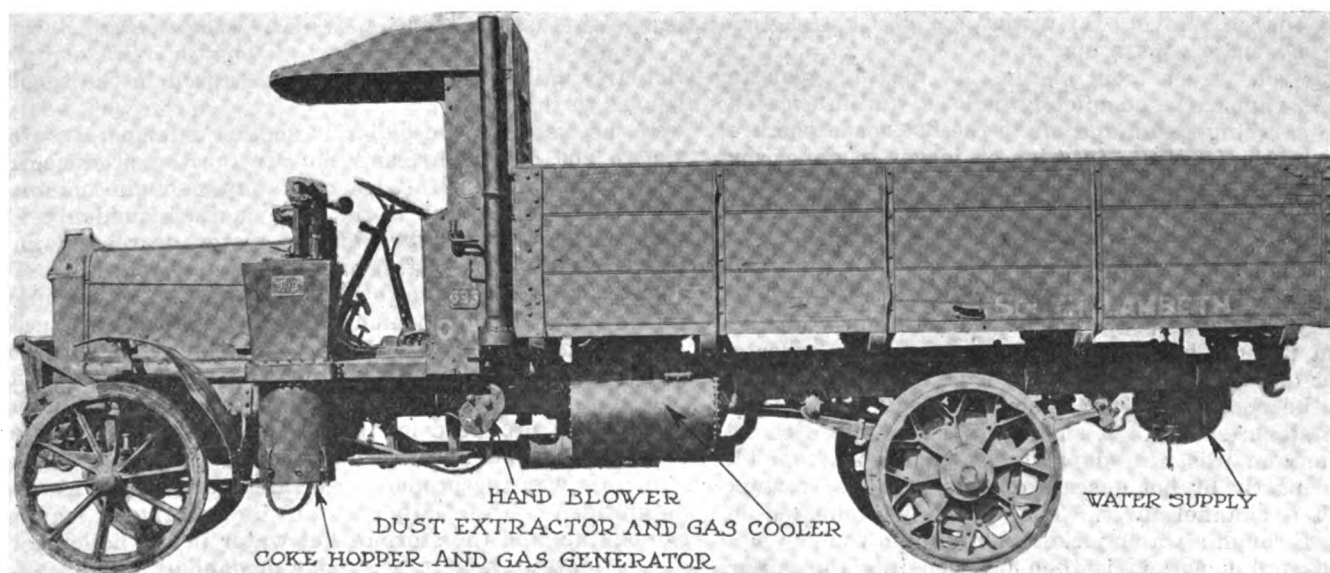
The furnace is lined with refractory material in order to withstand the exceedingly high temperature of the combustion. Fuel is added through a hopper on top,

while air and steam enter at the bottom. All oxygen entering at the bottom combines with carbon in the combustion zone and there is none left to burn the volatile products formed in the distillation zone.

### Smith System

The first of the English producer systems for motor truck use was developed by D. J. Smith, who read a paper on the subject before the Institution of Automobile Engineers some time ago. Most of the following information regarding this system is taken from that paper.

The basic principle of the Smith producer for motor vehicles involves elimination of all zones except the combustion and reduction zones. This has made it possible to greatly lessen the required depth of the producer. The furnace chamber is only 12 in. deep, while the fire itself is about 6 in. deep, this whole depth being incandescent while the producer is in operation. To make it possible to work on this plan it was necessary to feed the fuel continuously in small measured quantities, and to constantly agitate the whole fuel bed so that no holes can burn in it and that all ash may be constantly sifted out. This method of working eliminated trouble from



Truck fitted with Parker gas producer and auxiliary apparatus



volatile constituents, as any fresh fuel added was sifted directly into the incandescent mass of the fuel, and any part not immediately consumed was taken care of by the hot zone above the fire in the producer chamber. It is claimed that clinkering is also eliminated, because the ash is removed as fast as it forms and has no time to fuse. Both the grate and the lining of fire brick are, therefore, kept clean.

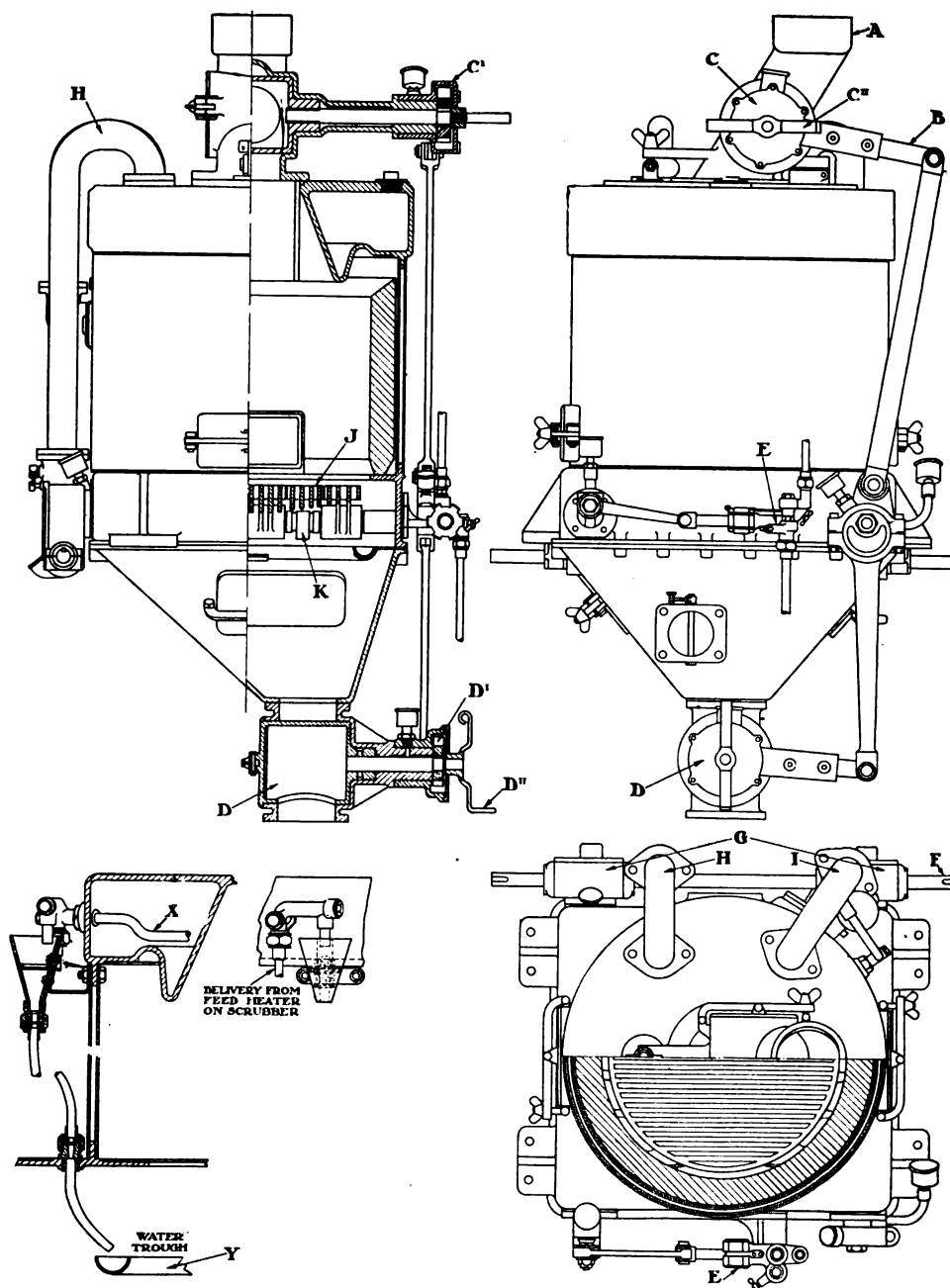
### Mechanically Operated Grate

In the Smith system the feed and grate are operated by the vehicle engine, and the ash discharge is also by mechanical means. This latter feature results in two advantages: It eliminates the necessity for an ash pan sufficiently large to carry the ashes formed during several hours' running, and it also does away with the necessity for stopping the engine to remove the ashes. Sectional and outside views of the Smith producer are shown herewith. It is of upright cylindrical form with a fuel inlet and feeding mechanism on top, the fire-clay-lined combustion chamber in the middle, the grate below it, a substantially conical ash pit below the grate, an ash discharge valve at the bottom and various auxiliary devices on the outside.

Referring to the illustrations, A is the fuel inlet pipe; B, the adjustable fuel feed and ash discharge mechanism; C, the fuel feed valve; C', the friction drive for the feed valve; C'', a handle for independent hand operation of the feed valve; D, ash discharge valve; D', friction drive for ash discharge valve; D'', handle for ash discharge valve; E, water pump; F, main operating gear shaft driven direct from engine; G, driving gear for grate bar camshafts, completely inclosed and lubricated; H, pipe carrying steam and air to the bottom of the fire; I, air supply pipe from interior of jacket to vaporizer; J, grate bars pivoted at one end, alternate sections at alternate ends, and vibrated successively by camshafts.

### Vaporizer

Mr. Smith found that for best results in the way of flexibility the water could not be fed to the fire directly, but had first to be converted into steam. In order to keep the quality of the gas constant he uses the air passing to the combustion chamber as a regulating means for the steam supply. A small boiler was fitted to the producer and was heated partly by radiation from the fire and partly by hot gases from the producer passing through a channel in it. The water is preheated by passing through a water jacket surrounding the gas pipe from the producer and is then pumped into the boiler. The jacket on the gas pipe serves as a cooler, which is a feature of most producer gas installations and is par-



Sectional and detail views of the D. J. Smith producer for motor trucks

ticularly valuable where no water is used in the scrubber, as in this case.

If the water in the boiler is kept at a temperature of 180 to 200 deg. Fahr. and the air for the producer is drawn over its surface, it picks up enough moisture for steady loads, but if the load is then suddenly increased the temperature of the water decreases, and the air, instead of getting more moisture, gets less. To remedy this condition a throttle was fitted to the air inlet to the boiler through which all of the air to the producer had to pass. This throttle was interconnected with the engine throttle in such a manner that as the latter was opened the former closed; the result is that an under-pressure is produced on top of the water in the boiler and steam forms more readily.

In this way the proportion of air and steam is always maintained substantially constant irrespective of load on the engine, and the store of hot water in the boiler acts as a reserve to help meet sudden demands.

In order to make the outfit automatic a good deal of auxiliary apparatus is required. There is, first, the

water feed to the boiler which must be so regulated as to maintain a substantially uniform water level, irrespective of the inclination of the road surface. To this end, in the Smith system the delivery pipe (see detail view) is taken into the center of the boiler, where its level with respect to the water does not vary, and it is made to serve also as an overflow pipe. When the water level exceeds that desired, the water pumped is discharged into an asbestos-filled channel Y in the ash pan, where it is vaporized, and what cannot be absorbed by the asbestos is discharged through the ash valve in the bottom of the pan.

The rate at which fuel and water are consumed in the producer depends not only upon the speed but also upon the load carried by the engine, and to take account of this fact the fuel feed device and the water pump are coupled up with the engine throttle so that their strokes are reduced when the throttle is closed. This is said to have given satisfactory results, although with a fuel like coal, containing lumps of varying size, no absolute regulation of the feed is possible.

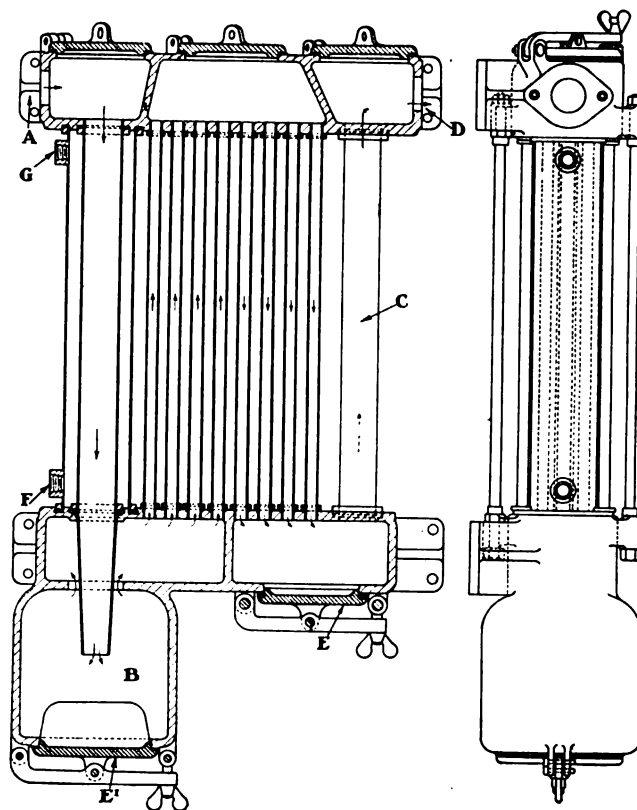
### Dry Scrubber and Cooler

Smith uses a dry scrubber which merely removes particles of dust in the gas as it comes from the producer. A sectional view of this device is shown herewith. The gas enters at A, passes down a pair of large tubes at the left (which are slightly contracted at the bottom so as to increase the velocity) and is then discharged into a settling chamber B, in which most of the dust collects. The gas passes out of the settling chamber through an annular opening around the large tubes, up one series of tubes and down another, both surrounded with water, and finally passes up a pair of large tubes C on the right, containing a filter of conical shape extending the length of the tubes. Additional dust settles in the tubes, headers and filters, and it is claimed that when the gas finally passes out of the scrubber at D it is as free from dust particles as the air ordinarily taken into carbureters. Quick removable doors E and E' are provided where most of the dust settles, and the apparatus can be easily cleaned. This scrubber also forms a feed water heater. The water from the feed pump enters the scrubber near the bottom at F and leaves through the top opening G. The material found in the filter is merely fuel dust, and it is claimed that no trace of tarry matter has ever been found. In this connection it should be noted that only hard coal or coke is used with this system; Mr. Smith anticipates that for engines with inclosed valves some further filtering may be necessary, owing to the very fine valve stem clearances.

The gas, after leaving the scrubber, can be taken through a water seal, the gas pipe from the scrubber dipping from 1 to 1½ in. into water, the level of which is maintained by a float. A small amount of water will then be carried along into the combustion chamber, but not enough to cause trouble. On farm tractors the scrubber should be so placed that it gets the benefit of the radiator fan blast, and an air washer should be fitted. The water seal or air washer should be cleaned out once a day.

### The Parker System

Another system has been invented by J. W. Parker and is being placed on the market by Producer Gas Plants, Ltd. In this system use is made of a dry gas cooler and dust extractor and a wet scrubber. A demonstration of the system, fitted to a 3-ton truck, was recently given to press representatives in London. A vertical section and an elevation partly in section are shown herewith. The upper part of the producer, which is of



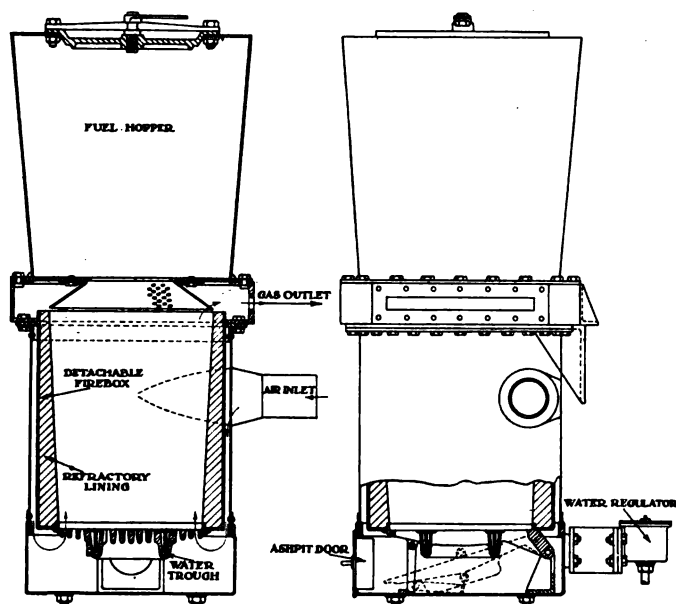
The scrubber designed for use in connection with the Smith producer

square section, forming an inverted truncated pyramid, serves as the fuel hopper and is provided with a cast iron cover held in place by cap screws. Below the hopper is a flat, rectangular gas chamber with a perforated inverted sheet metal funnel which serves to keep the fuel out of the gas main. The firebox is made up of sheet steel, is cylindrical in form and provided with a refractory lining the thickness of which increases toward the bottom. It has a mean internal diameter of 11¼ in. and a depth of 16 in. The firebox is surrounded by an outer jacket of sheet steel which is supported by the same bolts and has the ash pit fastened to it at the bottom. The grate is a single steel casting, pivoted on a cast iron bracket on the bottom of the ash pit, and held in the horizontal position by means of a strut. When it is desired to rake out the fire the ash pit door is opened and the strut pushed back, which permits the grate to be dropped to an inclined position, as indicated in one of the drawings in dotted lines.

### Vaporizer in Grate

Steam for gas generation is produced by means of an annular water trough formed in the grate, into which is placed a loose ring of tee section to prevent it from becoming filled with loose ashes. This simple vaporizer is kept filled with water to a constant level by means of a float. The air for the producer is drawn through the jacket of the furnace, whereby a double object is accomplished, in that the air is preheated and the furnace wall cooled. From the jacket the air passes into the ash pit, thence through the grate and up through the bed of fuel, the gas there formed passing out through the rectangular opening at the side of the gas chamber.

A hand blower is provided for starting the producer. During the early stages of operation a mixture of air and gas is produced in all systems which is unsuitable for use in an engine and which, since it contains a good deal of poisonous carbon monoxide gas, must be carried away so it cannot be inhaled by the attendant. In the



The Parker gas producer designed for use on motor trucks

truck equipped with the Parker system this gas is carried away through a vertical chimney carried up one side of the cab and connected to the gas main between the producer and the cooler. At the bottom of the chimney there is a conical valve by means of which it can be either opened or closed to the gas main.

#### Gas Cooler and Dust Extractor

As already mentioned, an important feature of this system is a gas cooler and dust extractor which works on the dry principle. The upper part of the cooler is cylindrical and is fitted with a number of horizontal tubes, while the lower part is wedge-shaped. The gas enters the cooler centrally on top and first passes through the space between the outer and inner shells. It then changes its direction of motion and passes on into the space through which the tubes pass, and in doing so it deposits out the entrained dust in the lower portion of the cooler. There are plug-closed openings at both ends of this wedge-shaped part through which the accumulated dust can be removed at intervals. Air circulates through the cooling tubes, the cooler being mounted at the side of the truck so that the motion of the latter creates a natural draft through the tubes. Increased air circulation is induced by means of an air ejector connected to the end of the exhaust pipe. The outlet from the cooler is at the top, not very far from the inlet. In the 3-ton truck size the shell has an area of 10.2 sq. ft. and the tubes have an area of 7.3 sq. ft., making the total cooling area 17.5 sq. ft.

#### Wet Scrubber

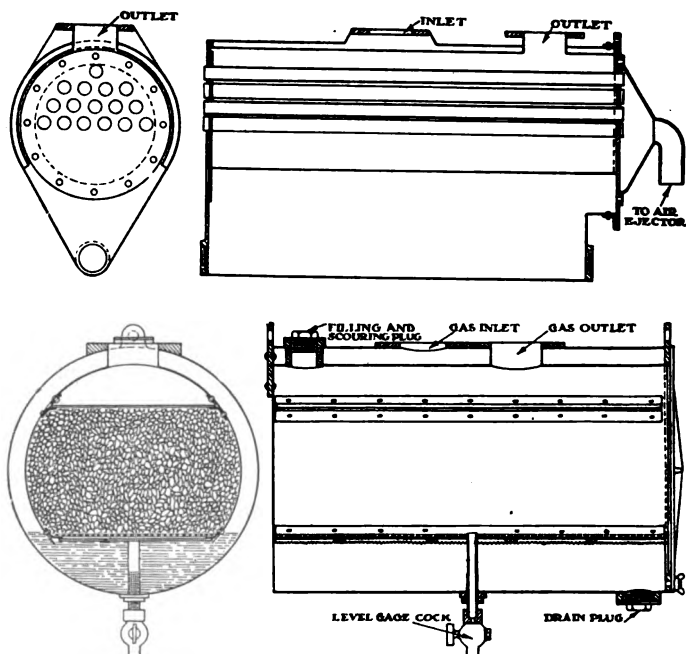
The scrubber is not unlike the cooler in shape, and in practice is mounted on the opposite side of the truck from it. It also has both inner and outer shells, the former extending down about three-fourths the full depth. The edges of the inner shell are serrated, and to them are riveted angle irons which carry the grid plate on which the bed of pebbles is supported. These pebbles have an average diameter of  $\frac{1}{2}$  in. The bed of pebbles was originally made 7 in. deep, but it was found that 4 in. was all that is necessary, and this, of course, permits of a considerable saving in weight. Through an opening on top the scrubber is filled with water to the level of the bottom of the pebble bed, the level being adjusted in the first place by means of a

standpipe and cock, and later maintained automatically by a float. Gas enters the scrubber on top, passes through the space between the inner and outer shells, turns the corner of the serrated edges on the inner shell in the form of bubbles and then passes up between the pebbles which are kept moist by capillary action. Any tarry matter or dust which may have passed the cooler will adhere to the pebbles. From the top of the scrubber the gas passes directly to the engine. The scrubber must be cleaned out each day, and this is conveniently accomplished by inserting a hose into the plug opening provided for the purpose on top, there being a similar opening at the bottom through which the water can run off. The pebbles must occasionally be given a more thorough cleaning, and to this end they are removed from the scrubber. To facilitate this removal they are now placed in a wire basket. When the truck runs on either an up or a down grade, part of the serrated lower edge of the inner shell will be out of the water, and then the gas does not have to bubble through the water. It has been found, however, that this does no harm, as the water retained by the pebbles is sufficient to effect the purification of the gas during these short periods.

In order to be able to adjust the mixture for maximum power, an air valve is mounted on the dashboard where it can be easily reached by the driver. This is the only adjustment required, and it is said that this adjusting valve needs to be attended to only very rarely. The hopper, of course, must be refilled with fuel at intervals. With this system, foundry coke is used as fuel; ordinary gas coke can be used in an emergency but does not give nearly as satisfactory results. The fuel is broken and screened to approximately 1 in. size.

#### Performance Claims

Following are some claims of performance made by the manufacturers of the Parker producer. The fuel consumption for a 3-ton truck is guaranteed not to exceed 300 lbs. for a 100 mile run under full load. About 20 U. S. gal. of gasoline would be required for the same work. The saving in fuel cost can therefore be easily calculated if the prices of gasoline and coke are known. Mention is made by the firm of the possibility of increasing the compression pressure, and thus further



Above, the gas cooler and below, the wet scrubber designed for use in connection with the Parker gas producer

reducing the fuel consumption, but in this connection it must be borne in mind that this would increase the starting difficulty, as the effort required to crank an engine increases substantially with the compression pressure. On the other hand, as the fuel is always in the gaseous state, the engine should pick up its cycle almost immediately.

Water is used in both the producer and scrubber, and the supply must be replenished occasionally, but the consumption is quite small and the attention required by the water supply is not irksome. About 25 gallons is carried, and the former gasoline tank is usually made to serve the purpose. This supply will last for a week's work. The only wearing part of the outfit is the fire box, which lasts about 6 months. Fire boxes are not relined, but new ones are supplied complete, and their installation is said to be a matter of a few minutes. The cost of the renewal is not high.

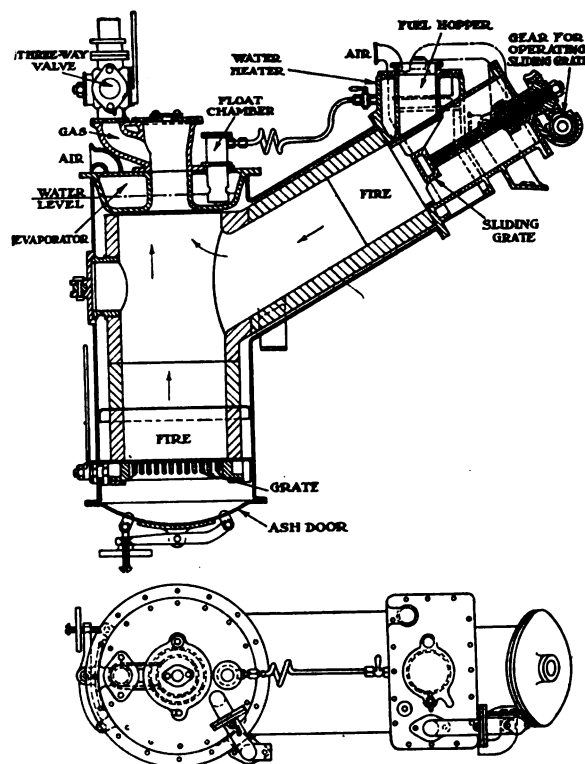
### Stewart System

The ordinary producer as represented by the two systems described is known as the up draught system. In order to more effectively dispose of the volatile constituents, the experiment was tried of inverting the process, drawing the air in at the top of the producer and the gas off at the bottom, this giving what is known as the down draught system. In this case, as additional fuel is fed, the volatile products are drawn into the combustion zone and are consumed along with the fixed carbon of the coke. The difficulty with this system is that eventually the fire descends so low that the air cannot get to it any more on account of the intervening layer of ashes, and the ashes even get close to the gas outlet. A compromise or intermediate system has been developed by John Stewart and described by him in a paper read before the Scottish Section of the Institution of Automobile Engineers. The producer comprises two chambers, one vertical and the other, in direct communication therewith, extending up at an angle. The angle chamber is a down draft chamber and the vertical chamber an up draft chamber. Fuel is added at the outer end of the angle chamber through a hopper. Air is supplied at the same point, also water vapor, the vaporizer being located on top of the vertical chamber. When a fresh charge of fuel is added it falls behind the fire, and as the air must be drawn through this fuel there is always air present when the volatile products are driven off. The result is that the volatile elements burn at once. Even if this should not be the case the volatile products would have to pass through the fire zone, where they could not help being burned, in part to carbon dioxide, which would later be reduced to carbon monoxide.

### Functions of the Two Fire Chambers

In this system the vertical chamber serves the same function as in an ordinary up-draft system, but the fuel in this case is fed through the hopper on top of the angle chamber. This obviates the difficulty (experienced with ordinary up draft producers when adding fuel while running) of the tarry material getting into the gas stream and clogging up engine parts.

For the removal of the ashes there is a grate swung on trunnions, which is operated by a vertical lever at the side. By shaking the grate the ash is transferred to the saucer-shaped ash container at the bottom. At the center of this ash container there is a small hinged door through which the ashes can be dropped out at the end of a day's run. By operating the vertical handle on the grate to and fro through a sufficient angle, the bed of fuel can be consolidated at intervals.



The Stewart gas producer, of the semi-down-draft type, for motor truck application

### Arrangement of Evaporator

At the top of the vertical chamber there is an evaporator in which the water is maintained at a depth of  $1\frac{1}{2}$  in. This evaporator has a sheet copper cover to which the angle fittings for the air inlet and outlet are brazed. Within the air outlet pipe close to the cover is fitted a small throttle valve which is closed during the fanning operation. The gas outlet from the up-draft chamber is arranged centrally. When the producer is started up from cold, fuel can be fed through this gas outlet. There is a three-way valve on the gas outlet and the gas can either be passed to the engine or allowed to escape to the atmosphere. The feed of water to the evaporator is regulated by means of a float valve. Jolting of the vehicle is said to have no influence on the level of the water in the vaporizer. With a constant water level in the evaporator the air passing through will absorb a constant proportion of steam. It has been found, however, that the amount of moisture originally provided for was not sufficient for best results, and provision is now made for an additional drip feed on the air pipe.

The head of the angle chamber is a water-jacketed casting and is extended to form a water preheater, water being fed from this preheater to the evaporator and to the drip feed on the air pipe. This chamber is provided with a sliding grate which pushes the fuel in as required, and by its withdrawal permits additional fuel to fall in, there being a projecting wing which laps the port hole in its forward position. The sliding grate is operated by a worm and wheel carried by the cover of the angle chamber.

All of the producer systems here described are designed for use of only hard coal or coke. Soft coal is generally cheaper and more easily obtained in most localities, but the large proportion of tarry products render it unsuitable for use in automotive gas producers where the weight, space and complication of adequate cleaning apparatus present problems which are not easily solved.

# Gearing Calculations by the Compressive Stress Method

## Part I

The capacity of gears cannot be accurately determined by the bending stress method for bending stresses are not a true measure of wearing qualities. The maximum surface pressure, or compressive stress, must be considered if rate of wear of tooth is to be kept within proper limits.

By Joseph Jandasek\*

**W**ITH the exception of the engine, the gears are the most important part of an automotive vehicle. Designing gears so that they can be economically manufactured and at the same time will withstand long-continued wear is by no means a simple problem, and the designer seldom obtains the results he desires on his first attempt.

To determine the capacity of gears on the basis of bending stresses is more or less guesswork, because the bending stresses are only only an approximate and not a rational measure of wear resistance. In some cases, such as that of helical gearing, this method cannot be used at all. By the bending stress method the resistance of gears to fracture can be calculated; the compressive stress method, on the contrary, permits of determining the capacity of gears from the standpoint of wear; it is accurate and can be applied to any type of gear, because the radii of tooth curvature are always known.

Referring to Fig. 1, a gear can be made either of small width and cut with coarse pitch teeth, or of great width and cut with the finer pitch teeth, the diameter being maintained constant and the bending stresses remaining practically the same. We know, however, that a narrow gear will not stand up to heavy work. It has been proved in practice that in the case of helical spur gears considerations of wear so much outweigh those of mere breaking strength that a gear which is designed to give reasonably long service will carry anywhere from 10 to 20 times the working load without fracture.

In addition to the quality of material and the friction coefficient, the number of teeth and the tooth action are very important factors. The proportion of rolling to sliding motion and the proportions of tooth elements, such as the addenda of the gear and the pinion, also have great influence on the life of the gears; however, in the following discussion the writer will assume that the addenda

and the ratio of rolling to sliding motion have optimum values.

In the case of motor vehicle rear axles, especially those of trucks and tractors, where heavy tangential forces are being transmitted most of the time, the necessary size of

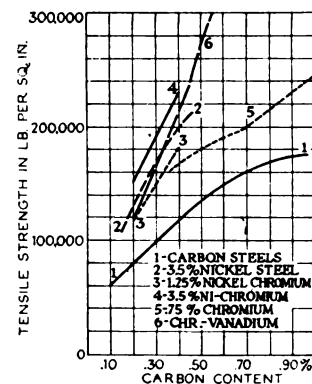


Fig. 2 — Relation between carbon content and tensile strength in steels

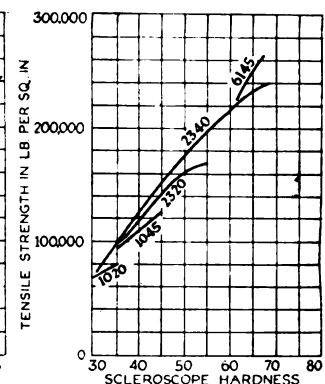


Fig. 3 — Relation between scleroscope hardness and tensile strength in steels

the gears must be determined by a method which gives assurance that the tooth faces will withstand the abrading action due to the rolling and sliding motion for a sufficient length of time. This wearing quality depends on the maximum tooth face pressure; assuming that the quality of material, toughness, proportion of rolling to sliding motion, friction coefficient and tooth action are the same. The allowable tooth face pressure depends, in turn, on the ultimate strength of material, which strength finally bears a definite proportion to the hardness. The designer, therefore, always specifies the hardness number in order to obtain the desired resistance to wear.

That certain materials do not wear away quickly is due to two conditions:

- (a) particles on the surface are not readily displaced;
- (b) particles, though displaced, are not readily removed.

Both these conditions must be present; either one alone is not sufficient. Substances which are really hard do not permit of their particles being readily displaced—hence they wear well. Plastic metals do not permit of their displaced particles being readily removed—hence they, too, may give good wearing surfaces though they are soft and compressed above the ultimate compressive strength. We find a good example in manganese steel, whose good wearing quality appears to be due to the following two

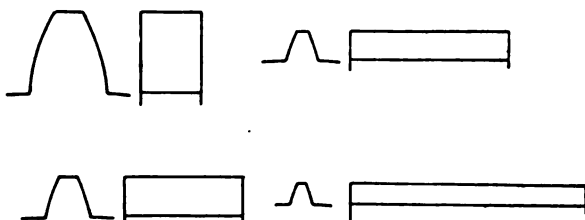


Fig. 1—Teeth of equal strength according to the bending stress method of calculation

\*Engineer, Republic Motor Truck Co., Inc.



causes: (1) the relatively high natural hardness (though less than that of hardened steel); (2) surface particles which are displaced are not ground to powder, the surfaces being merely plastically deformed. Thus the particles are capable of being displaced repeatedly before being ultimately lost. This is the author's explanation of why the gear face does not necessarily show wear even if the surface pressure (in case of shock) sometimes exceeds the ultimate strength of the metal. The particles then are only displaced, but not worn off. The area and depth of metal subjected to this overstrain are exceedingly small. A similar case occurs in ball bearings, where the compressive stresses often are beyond the elastic limit of the material, yet the bearings wear well, because this overstrain is confined to an extremely small surface and a small depth; moreover, the over-compressed material is supported from all sides by surrounding material.

This relation of hardness (in combination with toughness of material) to wearing quality explains the great success of casehardened gears. They possess a very hard and strong case, but contain a soft core of comparatively lower strength. The percentage of carbon contained in the casehardened surface should not be too great, however. A case containing 1.1 per cent of carbon gives a very hard wearing surface suitable for shafts, for instance. For gears which must withstand repeated shocks, this amount of carbon would render them too brittle, and it is advisable not to go higher than 0.90 per cent.

To illustrate the influence of carbon content on the ultimate strength the author has drawn the chart Fig. 2. It shows that the ultimate tensile strength of 0.90 per cent carbon steel, properly heat treated, is about 175,000 lb. per sq. in., while that of nickel-chromium and chromium-vanadium steel is up around 300,000 lb. per sq. in. Fig. 3 shows the influence of carbon content and hardness on the ultimate strength. It is to be noted that Brinell readings taken on casehardened surfaces are not dependable, owing to the soft core under the case, and it is advisable to use the scleroscope reading.

Now, the designer in calculating the bending stresses takes into consideration only the low carbon core, hence the design is sure to provide ample strength, because the case, which is under very high compressive stresses, is also much stronger than the core. The case is similar with cast iron, which possesses only moderate tensile

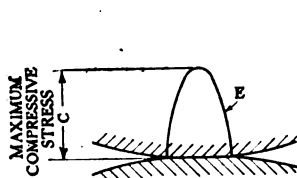


Fig. 4—Curve of compressive pressures at contact between two cylinders pressed together

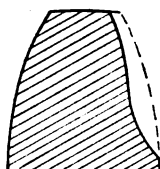


Fig. 17—Showing how wear changes the involute tooth outline to a cycloidal outline

breaking strength (about 40,000 lb. per sq. in.), but a much higher compressive strength (around 110,000 lb. per sq. in.).

Soft steel gears, though the material possesses fairly high tensile strength, are not successful, because their tooth faces wear out in a short time.

The size of gears should be determined from the stresses on the working and wearing surfaces, i. e., the tooth faces. A strong pitch does not help any if the tooth wears out its face. It is the tooth contact surface,

TABLE I

Material of Gear	Speed of Pitch Circle, Ft. Per Min.							
	100	200	300	600	900	1,200	1,800	2,400
Cast Iron.....S	8,000	6,000	4,800	4,000	3,000	2,400	2,000	1,700
Cast Iron.....C	55,000	47,000	42,000	39,000	33,000	30,000	27,000	25,000
Cast Steel.....S	20,000	15,000	12,000	10,000	7,500	6,000	5,000	4,300
Forged Steel.....S	25,000	20,000	16,000	13,000	10,000	7,500	6,300	5,400
Bronze.....S	12,000	9,000	7,000	6,000	4,500	3,600	3,000	2,500

TABLE II

Steel: S.A.E. No.	Tensile Str. Thousands Lb.	Elastic Limit Thousands Lb.	Red. Area Per Cent	Elongation Per Cent
.20 Carbon Steel No. 1020.....	60	35	55	20
.45 Carbon Steel No. 1045.....	120	80	35	13
3.5% Nickel Steel No. 2320.....	130	95	50	16
3.5% Nickel Steel No. 2345.....	190	170	45	12
1.25% Nickel Chromium No. 3120.....	110	80	45	20
1.25% Nickel Chromium No. 3140.....	180	130	40	16
3.5% Nickel Chromium No. 3320.....	150	110	45	20
3.5% Nickel Chromium No. 3340.....	230	170	40	16
Chromium Vanadium No. 6145.....	240	180	35	11

determined by the curvatures of the gear and pinion, and the face of the gears, over which the load is distributed, and the pitch should be made only sufficient to resist fracture. Any larger pitch than that is uneconomical, as there is no gain in power transmitting capacity. Regarding this influence of coarse pitch, it may be said that the deeper case hardening of coarser pitch gears slightly increases the power transmitting capacity of the gears, but this depth can vary only within narrow limits (the writer uses 1/32 in. depth of case for 6 pitch gears, 3/64 in. depth for 4 pitch gears and 1/16 in. depth for 3 pitch gears). Thus the influence of pitch is only small and beyond calculation, at least within limits of gear sizes used on automotive vehicles. It has been the writer's experience that there is no intermediate range of life; the case on the gear teeth either stands up well and the gears are long-lived, or the surfaces wear out quickly and the gears are unsatisfactory.

Thus it is not the amount of wear in a definite time, but the maximum surface pressure which we want to make the basis of our calculation. If we keep the compressive stresses below a certain value the gears will wear well, while if they are allowed to exceed this value the gears will wear out quickly.

Another example in support of this theory is furnished by tempered gears. When calculating same by the bending stress method we soon find that we must use lower bending stress than for casehardened gears, although we know that the tempered steel is considerably stronger than the soft core of the case hardened tooth (see Table II). Another light is thrown on this subject by the sketch Fig. 17. This shows how the involute tooth wears out and changes to cycloidal form simply because in cycloidal gearing the internal curve always contacts with the external one (whereas in involute gears the external curve contacts with an external one) thus securing better contact and producing lower surface stresses. This also explains why noiseless operation is obtained with involute gears only when the gears are newly cut. Even slight wear of the gear teeth causes them to lose their correct shape. Thus we reach the conclusion that it is not the bending stress in the tooth, but the compressive stress on the tooth face that determines the capacity of gears.

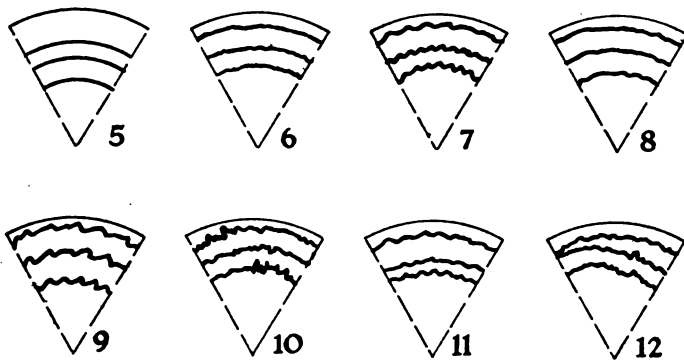
#### Influence of Speed on Strength of Gears

As regards the increment load due to minute accelerations and retardations of the applied tangential force, the writer assumes this to be proportional to the square of the velocity  $V$  and takes:

$$\text{Increment Load} = \left( \frac{V}{1000} \right)^2 \text{ lb. per lb. of } W_0 \text{ (steady load)}$$

Then the total instantaneous load  $W_i$  is

$$W_i = W_0 \left[ 1 + \left( \frac{V}{1000} \right)^2 \right] \text{ lb.} \dots\dots\dots (1)$$



Figs. 5 to 12—Showing how acceleration and retardation of driven gears are caused by irregularity in the shape of the gear

Fig. 5—Rolling action diagram of an absolutely accurate pair of gears made of rigid material

Figs. 6 and 7—Gears made with same cutter on good and badly worn machine respectively

Figs. 8 and 9—Records of gears cut in the same machine with accurate and inaccurate cutters respectively. Fig. 10—Heat-treated gears

Fig. 11—Noisy gears. Fig. 12—Noisy gears inaccurately mounted

(for accurate teeth, high grade workmanship and good material).

This increment load is an instantaneous pressure created by

(1) accelerations and retardations of the applied load and gear mass due to (a) irregularity of tooth outline, (b) variable gear tooth and its surface deflection, (c) wear of teeth;

(2) any acceleration, retardation, deflection and shock resulting in oscillations which at high speed may interfere and may cause the original load to be multiplied several times.

Although no correct equation for the calculation of the influence of speed is known, the writer is inclined to compute the instantaneous load by equation (1) rather than by Barth's addition  $\left(1 + \frac{V}{600}\right)$  for the following reasons:

(a) It can be proved mathematically that the increment load due to irregularity of motion must be proportional to the square of the pitch velocity and cannot be directly proportional to it. No gears are safe at extremely high speeds, hence the increment load must increase faster than the velocity.

(b) The mass or weight of gears subject to acceleration and oscillation increases with the transmitted load  $W_0$ ; the greater the tangential force the heavier the gears required for its transmission.

(c) Finally, the deflection also increases with the load. The quantities which are uncertain are the error in pitch line velocity and magnification of same by oscillation and deflection. These factors must be estimated from experiments and from the results of practice. It would be best to use different allowable stresses  $C$  or  $S$  for each particular speed, which stresses have been proved safe by actual service.

One of the most important and difficult problems in the production of automotive gears in large quantities is to obtain the high degree of accuracy required. A minute departure of the cutter from the theoretical profile, slight wear or an error of setting in the gear cutting machine results in inaccuracy of the theoretical tooth outline. It is therefore important to know not only how much the actual shape of the gear departs from the theoretical one, but also to find out the causes of these errors so they can be remedied, and breakage or extreme wear of the teeth prevented.

The author has prepared a few diagrams to show how acceleration and retardation of the driven gear are caused

by irregularity in the shape of the gear. Fig. 5 (arc of a circle) is a purely theoretical diagram corresponding to an absolutely correct pair of gears. Fig. 6 is a record of another pair of gears produced by a cutter of average accuracy on a machine of the same quality. Fig. 7 represents a record of a pair of gears from the same cutter as used for the gears of Fig. 6, but cut on a worn-out machine. In this way the accuracy of the machine can be tested. Figs. 8 and 9 have been prepared to demonstrate the accuracy of cutters. Both pairs of gears were cut on the same accurate machine, but with different cutters. Fig. 9 illustrates plainly that the shape of cutter was not correct. Fig. 10 illustrates the effect of hardening on the shape of gear teeth; the sharp irregularities are the result of warpage during heat treatment, and in this way badly warped gears can be easily detected. Figs. 11 and 12 are records of two pairs of noisy gears.

The above diagrams show plainly that even accurately manufactured gears possess irregularities in action, causing accelerations and retardations of the driven gear; these accelerations result in noise at high speeds and eventually breakage of the gears at some still higher speed.

Fig. 13 shows how the speed affects the allowable bending stresses according to text books on gearing. This comparison has to be taken as rather of a qualitative than quantitative character; that is, the reader's attention should be directed to the slope of the curves at different speeds. Curve A is a plot of the working stress (bending stress) for cast iron in the Lewis formula (see also Table I). Curve B represents working stresses for steel in the same formula. Curve C shows allowable unit stresses in carbon steel or low carbon alloy steel, casehardened, to be used for motor truck change gears, as given in P. M. Heldt's "The Gasoline Automobile." Curve D represents allowable unit stresses in alloy steel gears, casehardened, when used for passenger car change speed gears, given also in the above mentioned book. In Curve E are shown allowable unit stresses in chrome nickel and chrome vanadium steel gears, hardened all through, as given by the same author. Curves F and G give working stresses calculated from equation (1):

$$\text{instantaneous stress } S_t = S_c / \left[ 1 + \left( \frac{V}{1000} \right)^2 \right]$$

when  $S = 40,000$  lb. per sq. in. and 25,000 lb. per sq. in. respectively. Finally, curve K represents the safe shear-

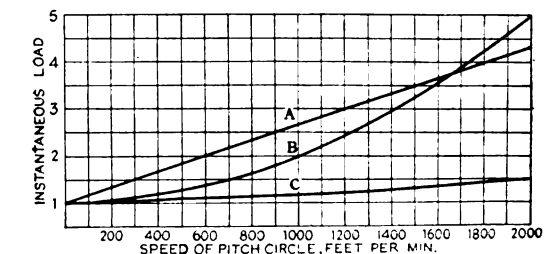
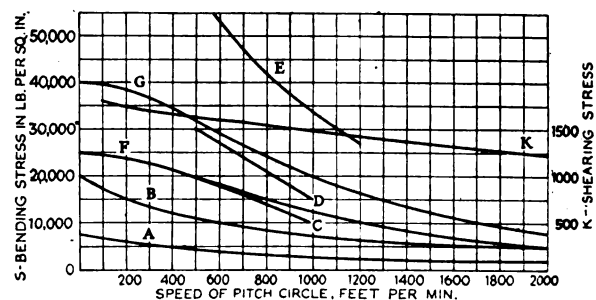


Fig. 13 (Above)—Variation of permissible bending stress in teeth with pitch circle speed according to different authorities

Fig. 14 (Below)—Variation of instantaneous load with pitch line velocity according to various formula

ing stress in lb. per sq. in. for herringbone gears of high carbon forged steel (see also Table III) as used in the equation for the capacity of this type of gearing.

$$W = 0.4 p f k \dots \dots \dots (2)$$

Fig. 14 represents the two equations for increment load. Curve A gives the instantaneous load according to Barth's equation:

$$W_i = W_b \left( 1 + \frac{V}{600} \right) \dots \dots \dots (3)$$

This formula is suitable only for cast and inaccurately cut gears and low speeds. Curve B represents the instantaneous load according to equation (1). Curve C shows the instantaneous load for herringbone gears for high carbon steel. The slow increase of the increment load brings out clearly the advantage of helically cut gears.

#### Capacity of Spur Gears

Starting from the theory of pressure between elastic bodies with curved surfaces we can calculate the load capacity of straight spur gears according to the general equation:

$$W_o = \frac{\sin 2\theta}{0.7} \left[ \frac{1}{e} + \frac{1}{E} \right] \frac{C^2 f r}{1 + \frac{r}{R}} \text{ lb. per sq. in.} \dots \dots \dots (4)$$

(This equation differs slightly from the one derived on page 1405 of AUTOMOTIVE INDUSTRIES for June 17, 1920.) In this equation

$W_o$  = maximum safe tangential force as regards the

pinion is usually made of better steel ( $3\frac{1}{2}$  per cent nickel as compared with carbon steel for the gear).

Inserting the modulus of elasticity  $E$ , whose average value may be taken at  $30 \times 10^6$  lb. per sq. in., in equation (4) we obtain for straight spur gears, steel on steel, with a pressure angle  $\theta = 20$  deg. the capacity:

$$W_o = \frac{C^2}{16.3 \times 10^6} \frac{f r}{1 + \frac{r}{R}} \dots \dots \dots (5)$$

We have, further,

$$2\pi r = np \quad \text{and} \quad \frac{r}{R} = a,$$

hence we get for the capacity,

$$W_o = 10^{-8} C^2 p f \frac{n}{1+a} \text{ lbs. per sq. in.} \dots \dots \dots (6)$$

(for steel spur gears with a pressure angle of 20 deg.), where  $n$  = number of teeth in pinion.

$p$  = circular pitch in inches.

The value of the gear ratio  $a = r/R$  must be added for external and subtracted for internal gears.

From this equation the reader can readily see that the capacity of a pinion depends not only on its own dimensions, but also on those of its mating gear. The case is similar to that of ball bearings whose capacity depends not only on the ball diameter, but also on the size and shape of the races.

TABLE III  
SAFE SHEARING STRESS K FOR HERRINGBONE GEARS

Gear Material	100	200	300	400	500	Velocity In Feet Per Minute	600	800	1000	1200	1500	1800	2100	2400	3000
Brass	600	575	550	525	500	475	425	400	380	360	350	340	325	300	300
Cast Iron	800	750	700	675	650	625	575	525	500	475	450	425	400	375	375
Gun Metal	1000	950	900	850	830	800	750	700	650	600	550	525	500	475	475
Phosphor Bronze	1150	1100	1050	1030	1000	975	925	875	825	775	725	675	650	600	600
Steel Castings	1325	1275	1250	1200	1175	1150	1100	1050	1000	925	875	825	775	700	700
High Carbon Steel Forgings	1800	1750	1700	1650	1630	1600	1550	1500	1450	1350	1275	1200	1125	1050	1050

compressive stress at the pitch diameter, assuming that only one pair of teeth is in mesh at a time:

$\theta$  = pressure angle in degrees.

$e$  and  $E$  = moduli of elasticity of materials in contact: lb. per sq. in.

$C$  = maximum allowable compressive stress on the tooth face at the pitch line in lb. per sq. in. for each particular speed  $V$ .

(In Fig. 4 is shown the distribution of pressure between two cylinders. It is the very maximum and not the average pressure which we are dealing with.)

$f$  = face of gears in contact in in.

$r$  = pitch radius of pinion in in.,  $R$  = pitch radius of gear in in.

$V$  = circumferential speed at the pitch line in ft. per min.

Although the compressive stress  $C$  is the same for the gear as for the pinion, still the pinion will wear more rapidly, provided hardness and toughness are the same, because the teeth of the pinion come into action more frequently. Also, if there occurs any overstrain due to shocks more metal is deformed on the pinion than on the gear, owing to the smaller radius of tooth curvature. However, it is desirable that pinion and gear should wear equally long, so as to avoid the necessity of engaging a new pinion with a partly worn gear, thereby decreasing the life of both. Consequently, to secure equal wear in a pair of unequal gears the pinion should be made harder (from 5 to 10 points scleroscope) than the gear. This applies, in the case of internal gear-driven axles, to the bevel gears, and in the case of double reduction axles to the bevels and spurs. In the case of internal gears the

On the basis of bending stresses the strength of spur gears,

$$W_b = Spfy \text{ lbs. per sq. in.} \dots \dots \dots (7)$$

The strength of a pinion calculated on the basis of bending stresses depends on its own dimensions only and remains the same whether a pinion meshes with a spur gear, a rack or an internal gear of any size.

To simplify matters we may take for the tooth form factor for the Fellows stub tooth system the value

$$y_s = 1.25 \left[ 0.154 - \frac{0.912}{n} \right] \dots \dots \dots (8)$$

(To be continued)

WITH a view of proving that the metal can be safely employed for many purposes which appeared at one time beyond its scope the French Société d'Encouragement recently organized an "aluminum week," during which an exhibition was held at the society's headquarters in the Rue de Rennes, Paris, accompanied by conferences dealing with the various applications of the metal. The exhibition itself covered almost every application, and particularly interesting were aluminum castings of so complicated a character that it would be difficult to obtain equally good results with other metals. So much progress has been made with the welding of aluminum and the production of alloys that it is now capable of being employed for almost every purpose, even where it is subjected to heavy stresses, and the addresses delivered by L. Guillet and others aimed at showing that aluminum has a vast field of utility in electrical engineering as well as in the aviation, motor car and other industries.

# The Influence of Various Fuels on Engine Performance

## Part VII

In this, the concluding article of this series, the author describes the variable compression and other engines employed in conducting the tests and the considerations on which the design of some of these was based. The testing apparatus used is also described and illustrated.

By H. R. Ricardo\*.

IT is well to point out that in the results of tests reported in foregoing instalments of this article in all cases where a result was obtained which did not at first sight appear to fall into line with the deductions formed at the time, check tests were taken progressively throughout the whole series of variables until the particular one had been traced whose influence was exerting itself. Except in a few instances where samples were very difficult to obtain, and only very small quantities were available, all the results quoted in the previous articles were checked again and again, and no figures have been published which have not been checked and repeated to within  $\pm 0.5$  per cent at least two or three times. In order that the reader may have the opportunity to judge for himself as to the accuracy of the readings obtained, and to draw his own conclusions as to the nature and possible influence of such disturbing factors as may remain, and which might affect the

\*From a preliminary report (slightly condensed) on research work conducted by the author for the Asiatic Petroleum Co. and published in the *Automobile Engineer*.

results, it will be well to describe in some detail the apparatus used.

In Figs. 27 and 28 are shown a drawing and a photograph of the variable compression engine. In the design of this engine the following considerations were taken into account.

(1) In view of the prolonged and extensive nature of the tests, not only were durability and reliability regarded as matters of primary importance, but every effort was made to insure mechanical consistency.

(2) Every known expedient was adopted to attain the highest possible thermal efficiency and power output and to insure that all losses, whether thermal or frictional, were reduced to the absolute minimum, and maintained as nearly constant as possible under all conditions.

(3) The engine was designed to run when required at a piston speed in excess of that of existing engines.

(4) Means were provided for varying the compression of the engine over any range from 3.7:1 up to 8:1 while running at full power, and without disturbing any temperature, frictional, mechanical, or other conditions.

(5) The combustion chamber was so designed that its general form and ratio of surface to volume undergo the minimum of alteration when the compression is varied.

(6) Special means were adopted to render the engine as little sensitive to changes in the temperature of the lubricant as possible. Ball bearings are used wherever possible, in order to reduce variation in friction with different oil temperatures, and the water jacketing round the barrel of the cylinder is stagnant, and therefore quickly attains a constant temperature, independent of the temperature of the supply. This insures that the piston friction which is dependent upon the temperature of the oil on the cylinder walls reaches a minimum in the course of a few minutes, and thereafter remains constant. The importance of retaining the same general form of combustion chamber under all conditions of compression cannot be over-estimated. Very misleading results have been obtained when the compression ratio has been varied by fitting different pistons, some with concave, others with convex crowns. In one series of experiments with different compression ratios which the writer examined, and which were obviously carried out with the most scrupulous care, the results were entirely vitiated because the whole character and efficiency of the combustion chamber was completely changed, as between the low compression and the high, with the result that a certain optimum compression ratio was claimed to have been found, after which any further increase in com-

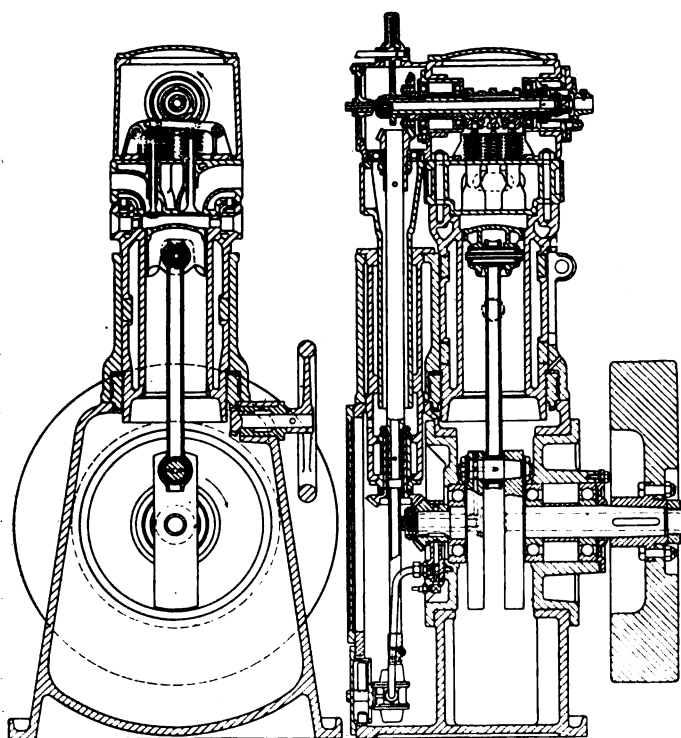


Fig 27—Sectional views of the variable compression engine

pression resulted in loss of power and efficiency. A careful scrutiny of the results showed that at or near the so-called optimum compression ratio the efficiency of the combustion chamber was at a maximum, and that at the higher compressions it fell away very rapidly, and, indeed, became quite exceptionally inefficient.

In the variable compression engine designed for the purpose of these tests the efficiency of the combustion chamber undergoes very little change between the lowest compression ratio and the highest, with the result that the efficiency increases with increase of compression at a perfectly normal rate throughout the whole range.

As will be seen from the sectional drawings, Fig. 27, the compression ratio is varied by raising or lowering the whole cylinder, together with the carbureter, camshaft, and valve gear; by this means the compression ratio can be varied over any range in the course of a few seconds, and without disturbing any of the temperature conditions or any adjustments.

To measure and record the compression ratio in use a micrometer is provided. This is arranged to operate electrical contacts, and controls a pilot lamp which lights up immediately the desired compression is reached, so that the operator can adjust the micrometer screw at his leisure to the compression ratio he requires before making any alteration, and can then see at a glance by the lighting up of the lamp that this compression has been reached.

For the ignition of the charge four spark plugs are fitted equidistant round the circumference of the combustion chamber, each of which is connected to a Remy high tension coil. The low-tension circuit of all the coils is operated by a single Remy contact breaker driven directly from one end of the camshaft. The object of using this arrangement in preference to magnetos was twofold:—

- (1) To insure that the passage of the spark across all four plugs should be absolutely synchronous.
- (2) To insure that the intensity of the spark should be the same at all settings.

In practice it was found that the use of two sparking plugs on opposite sides of the combustion space gave equally good results, and all tests were therefore run under these conditions. To measure accurately both the power and friction losses the engine is direct coupled to a balanced swinging field electric dynamometer, one arm of which carries a dead weight of 40 lb., which is slightly in excess of the maximum torque of the engine—a light open-scale spring balance is used to record the difference in torque between the dead weight and that developed by the engine—this arrangement permits of exceedingly accurate determinations, since a very small variation in torque corresponds with a wide range on the spring balance. The mean torque on the dynamometer arm is in the neighborhood of 35 lb., and the difference can be read off at a glance to within less than one-tenth of a pound. The steadiness of the dynamometer is such that the needle of the spring balance does not vibrate or oscillate through a range of more than  $\pm 0.1$  lb. Generally speaking, all readings of torque can be taken as being accurate to within one-third of one per cent., while the standard of accuracy of the average of several readings is, of course, considerably higher. The load is controlled by varying the field excitation of the dynamometer. For this purpose, two rheostats are provided in the field circuit, one of which gives coarse graduations, and the other, a continuous coil resistance, affords continuous range, and is used for fine adjustments.

The fuel-measuring device consists of two vessels, each consisting of two conical ended chambers connected together at either end by a narrow throat as shown in the general layout of the testing apparatus, Fig. 29. The upper chamber has a capacity of exactly one pint, and the lower of  $\frac{1}{4}$  pint. A gage glass is fitted to each vessel. The

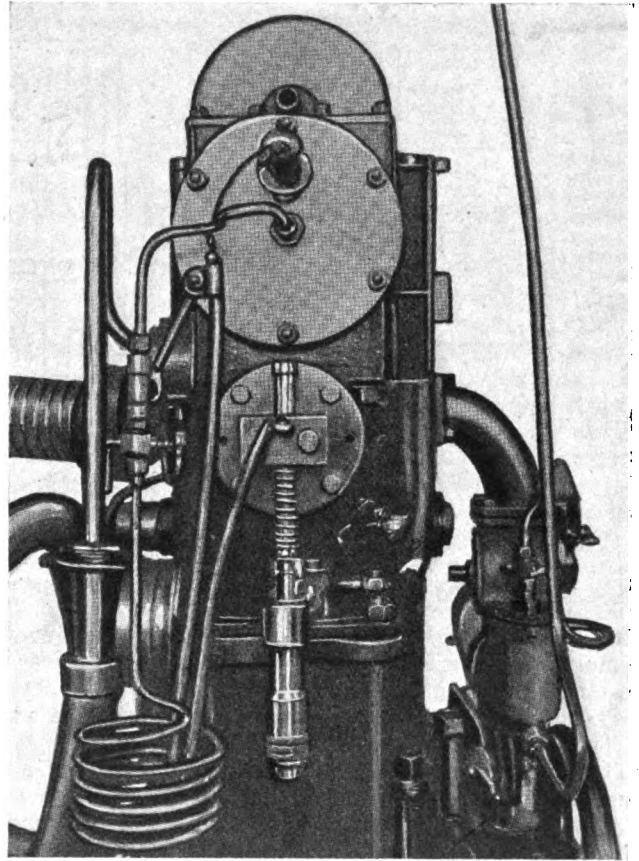


Fig. 28—Variable compression engine showing the micrometer for adjustment of the cylinder to various compression ratios

rate of fall of liquid in the glass is very rapid when passing the narrow throats, so that its passage past the marks can be timed with extreme accuracy. Geared off one end of the camshaft is a revolution counter operated by means of a magnetic clutch, and so arranged that the counter is thrown into operation as the liquid in the gage glass passes the first mark, and is thrown out, and a brake applied to its spindle as the liquid passes the second mark; thus the actual number of revolutions during the consumption of either one pint or one quarter pint of fuel is automatically recorded.

The carbureter is a standard Claudel-Hobson aircraft type, but fitted with a fine adjustment needle valve controlling the jet so that the mixture can be varied between close limits. An electrical heater is fitted in the carbureter air intake passage, and the exact amount of heat supplied can be read off from instruments on the switch-board. A thermometer fitted in an insulated pocket, and projecting into the inlet valve port, is provided to record very approximately the temperature of the working fluid during its entry to the cylinder. From the known amount of heat supplied, and from the measured difference in the temperature of the air before and after its entry to the carbureter, it is possible to determine at least a relative measure of the mean volatility of the fuel used. As has been explained previously, the readings of the thermometer in the induction passage are of relative value only. Owing to the variations in the temperature of the thermometer pocket due to the deposition of liquid fuel upon it this thermometer behaves as a wet bulb instrument, and even the relative values of its readings cannot be relied upon as between fuels of widely different latent heats of evaporation.

From the above details it will be seen that the standard of accuracy obtainable with this particular piece of appa-



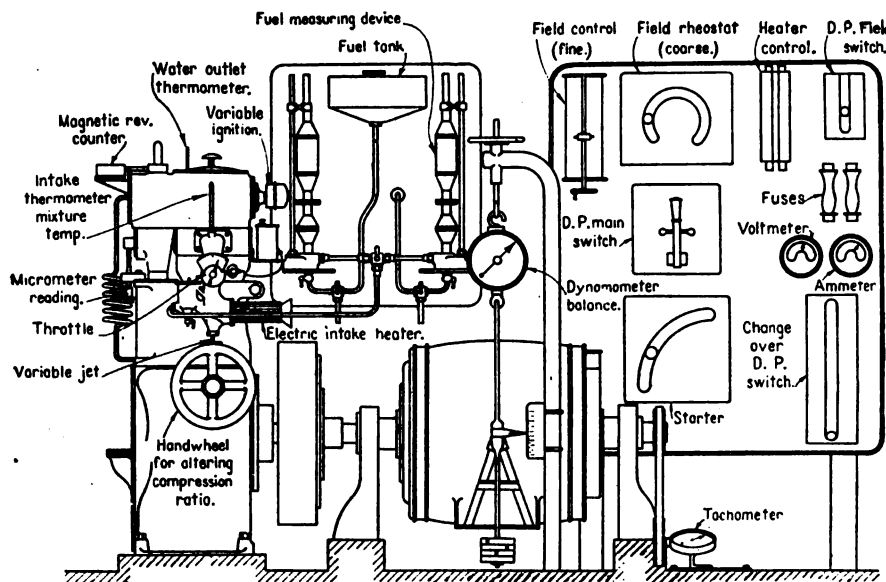


Fig. 29—General (diagrammatic) layout of the testing apparatus

ratus is exceedingly high; its mechanical consistency is exemplified by the fact that many check tests of power and consumption taken on certain fuels, sometimes after a lapse of many months, show extreme variations of less than 0.5 per cent.

This particular engine has been in almost continuous operation for 20 months, running on the average some 10 to 15 hours per week, about 90 per cent of the running being with wide open throttle, and at an average piston speed of 2000 ft. per minute.

### Supercharging Engine

The supercharging engine used in these experiments has also been fully described in a paper read before the Institution of Automobile Engineers, and published just recently in these columns. A brief description of its operation will therefore suffice.

For the purpose of these tests it was employed almost solely for investigating the tendency of fuels to detonate, and in order to make the detonation as severe as possible, a somewhat higher compression ratio was used than formerly, and at the same time the exhaust valve was arranged to open earlier in order to reduce to the minimum the proportion of cooled exhaust gas in the scavenge and supercharge air. From the point of view of investigating detonation it was found to be more sensitive than the variable compression engine, also very accurate readings could be taken in a remarkably short space of time—an important consideration in all experimental work, more especially when dealing with samples of which the quantity was very limited, as was the case with many of the "pure" samples.

This engine has a cylinder of  $4\frac{3}{8}$ -in. bore and  $5\frac{1}{2}$ -in. stroke, and was intended to run normally at a speed of 1500 r.p.m., at which speed all tests for detonation were carried out. The valves are arranged with the inlet directly over the exhaust, both valves being in a side pocket. It is fitted with a crosshead type piston, and for the purposes of these experiments with a fixed compression ratio of 5.18:1.

Supercharging is effected in the following manner:—Advantage is taken of the differential area of the piston and crosshead to pump air, which is drawn into a chamber below the piston through a series of very light bronze flap valves; the air thus entrapped is compressed by the piston to a pressure of about 10 lb. per sq. in., and then delivered through a water-cooled intercooler to the cylinder. The lower end of the cylinder barrel is perforated with a num-

ber of small ports just uncovered by the piston at the bottom of its stroke. The cycle of operations beginning with the induction stroke, is as follows:—

As the piston descends a mixture of fuel and air enters the cylinder through the inlet valve in the usual manner, and at the same time the air in the chamber below the piston is compressed. At about 95 per cent of the downward stroke the ports referred to previously are uncovered by the piston and the air in the crosshead chamber enters the cylinder, after passing on its way through the water-cooled intercooler which removes from it a large proportion of the heat of compression and also of the heat picked up from contact with the underside of the piston. About the same time the main inlet valve to the cylinder is closed and the pressure in the cylinder rises, due to the addition of the supercharge air, from slightly below atmospheric pressure to 5 lb. per sq. in.

above. The additional air entering in this manner does not mix freely with the fuel and air in the cylinder, but forms more or less a layer over the crown of the piston. On the following upward stroke the contents of the cylinder are compressed, and at the same time a fresh supply of air is drawn into the crosshead chamber below the piston. During compression very little mixture between the live charge and the supercharge takes place. On ignition the inflammation of the first portion of the charge causes a local and rapid rise of pressure, and so sets up a fresh disturbance which causes complete or nearly complete admixture of the cylinder contents, but not until the first portion is fully ignited. During the expansion stroke the second charge of air drawn into the crosshead chamber is compressed. Toward the end of this stroke the exhaust valve opens and the bulk of the products of combustion are discharged. Shortly after the opening of the exhaust valve the ports in the cylinder wall are again uncovered by the piston, a second charge of cool compressed air then enters the cylinder, driving before it some of the remaining products of combustion. During the following upward stroke of the piston the contents of the cylinder are discharged through the exhaust valve, leaving only the compression space full of a mixture of exhaust products and air. At the same time a fresh charge of air is drawn into the crosshead chamber in readiness for the supercharge.

From the above brief description it will be seen that the cylinder is alternately scavenged and supercharged by means of the air compressed below the working piston. The additional air provided in this manner per cycle is probably about 40 per cent. The supercharge air can be measured with a fair degree of accuracy and amounts to from 34 to 35 per cent of the total cylinder volume; the amount added due to the scavenging cannot so readily be assessed, but is probably in the neighborhood of 5 per cent.

For controlling or cutting off the supercharge a movable shutter is provided, surrounding the ports in the cylinder wall in such a manner that they can be partially or completely closed. In the latter event the engine runs in every respect as a normal four-cycle engine, and the air in the crosshead chamber is alternately compressed and expanded. The shutter is so arranged that the supercharge can be introduced or cut off instantaneously. In so far as the testing gear is concerned the arrangements are almost precisely similar to those described previously in relation to the variable compression engine, except that the car-

bureter heating is effected by means of a hand-controlled exhaust jacket and there is no magnetically operated revolution recorder. Since, however, the supercharging engine has been employed almost exclusively for investigating the problems relating to detonation these refinements have not been found necessary. In an engine running on this cycle with an excess of air always present in the cylinder the mean effective pressure varies directly as the quantity of fuel admitted up to the point at which the whole of the supercharge air is saturated; moreover, maximum efficiency is maintained over a very wide range of mean pressure. In this respect, therefore, the supercharging engine showed a very marked advantage over the variable compression unit in which the mixture strength for maximum efficiency at each compression ratio had to be searched for in every instance. By increasing the quantity of fuel admitted the mean effective pressure could be raised in direct proportion until a point was suddenly reached at which violent detonation was set up. In the case of every fuel tested which came within the range of this engine, the mean pressure at which detonation suddenly occurred was not only very sharply defined (to within less than 1 lb. per sq. in.), but it was also found to be quite extraordinarily consistent.

This engine was constructed some six years ago for a totally different purpose, but it has proved invaluable for fuel research, and in spite of its age and the very rough usage to which continued detonation experiments must subject any engine it stood up to its work remarkably well for a period of eighteen months. It has not quite so high a standard of mechanical consistency as the variable compression engine, and is rather more sensitive to variations in oil temperature, etc., but, none the less, its performance has varied by less than 1.5 per cent at any time over a period of eighteen months' hard usage.

### Miscellaneous Engines

Apart from the special research engines, samples of many of the fuels were tested in other engines on the test beds. These consisted of two or three experimental engines of various types, permanently fitted up on test beds for general research work and other more or less representative engines built by various makers, undergoing investigation of one sort or another. All these engines, whether permanent or temporary, were direct coupled to swinging field electric dynamometers and fitted with means for recording both the power and economy with a very high degree of accuracy. From a general scientific standpoint the results obtained from a large number of engines of widely different types and sizes proved extraordinarily interesting, but in so far as the fuel problem was concerned they yielded little or no information which could not be obtained more readily and more accurately on the special research engines. Each engine, of course, had its own particular characteristics depending upon the details of its design—in some the distribution was good, in others bad, some had efficient combustion chambers, others the reverse, some detonated even with a very low compression, while others would stand a high compression without trace of detonation on the same fuel. Some had insufficient heating to the carbureters, others excessive. As a result of these individual characteristics, each engine behaved differently, but all of them behaved perfectly rationally, and, once their idiosyncrasies were recognized and allowed for, the results obtained with each sample of fuel could be predicted to within very close limits from the experiments on the research engines. No single case occurred where the behavior of a fuel differed as between that in one of the research engines or any other engine, when the characteristics of the latter were taken into proper consideration.

The experiments, however, on miscellaneous engines were not without value, for they indicated that the results obtained in the special research engines could be relied upon as being applicable to any other type, provided the varying conditions were taken into account, while they afforded generally a useful check. The experiments on standard engines, however, would have been of little or no value by themselves unless run in parallel with those on the special research engines. Without the latter they would have proved misleading in many instances. For example, before any accurate deductions could be drawn as to the behavior of any particular fuel, it was found absolutely essential to determine definitely and accurately the rate of heat input to the carbureter, for upon this depends not only the degree of volatilization, but also the volumetric efficiency, and, therefore, the power output, and also to a considerable extent the tendency of the fuel to detonate. In all ordinary engines the carbureter and induction system receives heat either from the water circulation or from the exhaust pipe. In neither case is it possible either to determine the amount of heat so received or even to keep the amount constant, for readings of temperature either of the gas in the induction pipe or in the carbureter proved utterly unreliable, and were of value only when the rate of heat input also was definitely known. It has been shown previously that the rate of heat input to the carbureter, as opposed to the temperature of the gases, proved to be, in fact, one of the most important of all the controlling factors in the behavior of a fuel.

The variation in the tendency to detonate as between different forms of combustion chamber was especially marked. In the case of gasoline "A," for example, this detonated in the variable compression engine at a compression ratio of 6:1. In the case of several of the other engines it detonated at ratios below 5:1, and in one extreme instance of bad combustion chamber design it actually detonated with a compression ratio of only 4.3:1. This particular engine could not run on any ordinary gasoline on full load without the use of an overrich mixture, and/or a very late ignition timing, so that its fuel consumption on most grades of gasoline was abnormally high, and it could only be run at a reasonable economy on gasolines "A" and "H."

### Substitutes for Engine Bearing Metals

THE aircraft experimental station at Vienna, after extensive tests with a 100-hp. Mercedes airplane engine, stated that aluminum and zinc alloys are not suitable for engine bearings. However, alloys with 13-69.2 per cent of lead, 68.0-7.4 per cent of tin, 13-15.4 per cent of antimony and 6-8 per cent of copper proved satisfactory in endurance tests.

An interesting metallurgical process is covered by German patent No. 317-087. Cleaned wrought iron parts are covered with thin plates of gray cast iron or sprinkled with turnings of gray cast iron and then the thin layer of cast iron is melted down at white heat with the aid of a flux. The wrought iron at this high temperature absorbs some of the carbon of the cast iron surface layer and thus a steel coating is formed.

For engine crankshafts the following alloy steel is recommended by *Stahl und Eisen*:

Carbon, 0.2-0.45 per cent, or 0.2-0.4 per cent.

Manganese, 0.4-0.6 per cent, or 1.5-1.8 per cent.

Silicon, 0.2-0.3 per cent.

Chromium, 1.0-1.3 per cent.

According to carbon content and heat treatment, these steels show an elastic limit of 85,000-142,000 lb. per square inch and have a fibrous fracture.

# A Laboratory for Aircraft Engine Testing

Facilities for tests of both water-cooled and air-cooled engines are fully described. Wind tunnel used for testing engine under conditions approximating those of actual flight is of particular interest.

By Herbert Chase

**A**MONG the best equipped laboratories in the country for aircraft engine testing is that of the Wright Aeronautical Corp., whose plant is devoted exclusively to the manufacture of high-grade aircraft engines. This plant is of thoroughly modern construction, and a considerable portion of one of the four floors of the building is given over to the testing laboratory and a shop for experimental development work. The laboratory equipment is used for routine tests of all of the engines produced by the company, as well as for special research and development work.

The primary units of the equipment are three 400-hp. Sprague electric dynamometers mounted on 14-ft. cast-iron bed plates and equipped with Toledo springless scales for torque measurement. Adjacent to each dynamometer is the panel board with circuit breakers, switches and rheostat controls. Close to this and beside the torque scale is a second control board on which are mounted the spark and throttle levers, oil pressure gage, revolution counter and a magneto grounding switch. The throttle controls are connected to the engine through steel rods and bell cranks supported on brackets between the engine and the dynamometer.

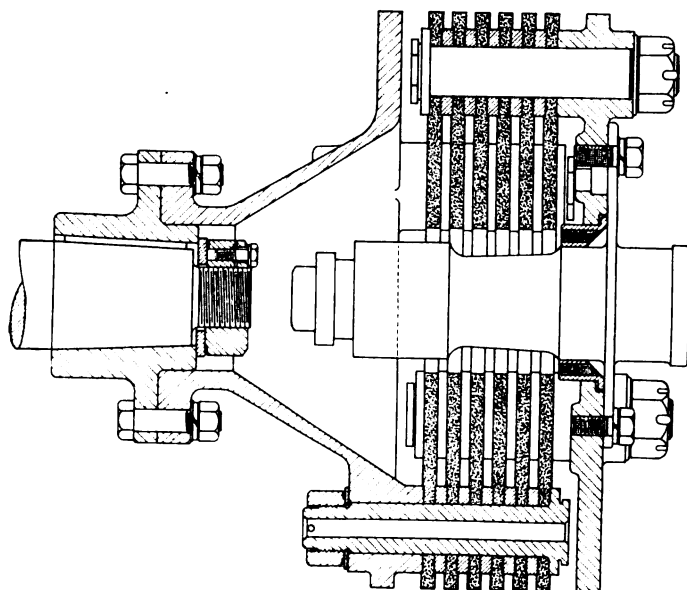
The engine is connected to the dynamometer by means of a substantial fabric disk-type coupling illustrated in one of the cuts herewith. This coupling design was originally developed at McCook Field and is still in use

there. When in use it is incased by a guard of sheet metal.

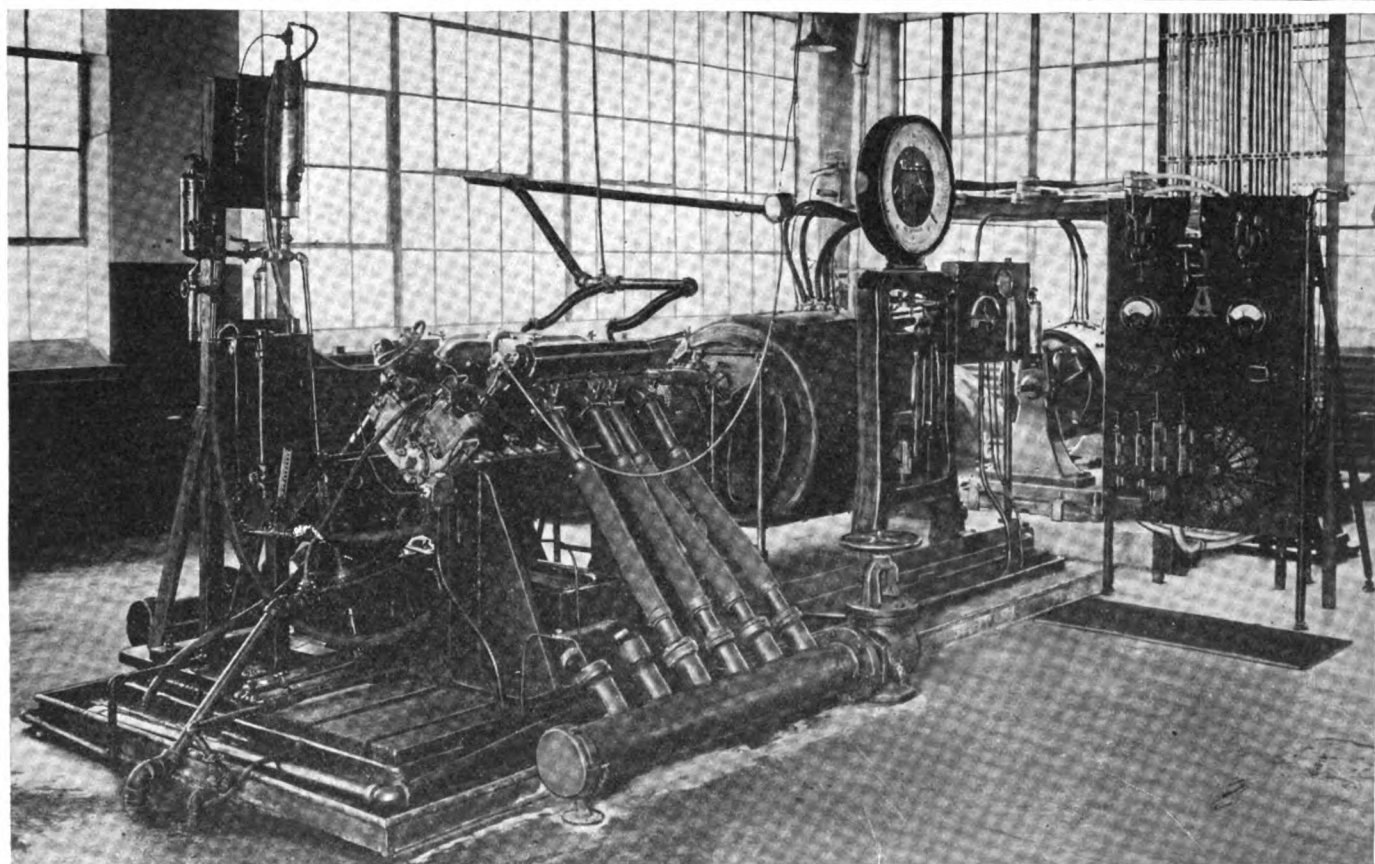
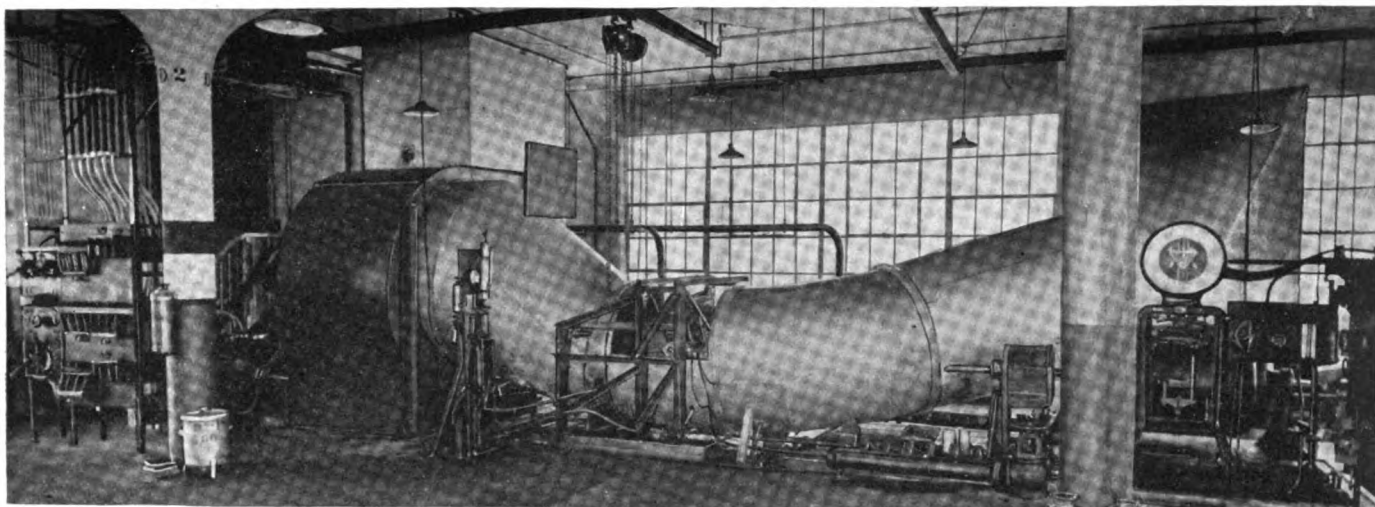
The engine is supported on wooden bearers, which are, in turn, attached to conventional adjustable cast-iron supports bolted to the bed plate. Cooling water is supplied from one or both of two tanks located on an elevated stand slightly above the level of the top of the engine at one end of the laboratory. When engines are under test one of these tanks contains hot water and the other cool water at approximately air temperature. The temperature of the water entering the engine is controlled within the desired limits by valves conveniently arranged for this purpose. Water is discharged from the engine into the hot-water tank. The level in this tank is maintained by a motor-driven centrifugal pump controlled by a float switch. Water taken from the tank by this pump is delivered to spray heads located on the roof of the building, from which it returns by gravity to the cold-water tank and is recirculated through the engine.

Provisions for muffling the exhaust from the engines under test is important because of the fact that the plant is within a short distance of hospitals and dwelling houses. This is accomplished as follows: At each side of the engine base are two large exhaust headers with inlets opposite the individual exhaust pipes of the engine cylinders. Attached to each exhaust pipe is a flanged extension provided with a nipple through which water is fed to the interior of the pipe. These nipples are connected to a cold-water supply main and the water is mixed with the exhaust as the latter leaves the engine. The mixture of water, steam and exhaust gas enters the exhaust header through flexible hose connections and flows by gravity to a settling tank under the floor. In this tank the gas and water separate and the gas, with a certain amount of steam, escapes through a vent pipe carried several feet above the roof of the building. The water level in the exhaust water tank is also maintained by a motor-driven centrifugal pump controlled by a float switch. The pump delivers the water to a cooling tower on the roof, from which it is returned to the cold-water tank in the dynamometer room and used again. Addition of water to the exhaust cools it and causes it to contract. After flowing through the large pipes and the tank, which act as expansion chambers, the exhaust issues into the open air without appreciable noise, while the back pressure of the engine is only 3 in. of water.

The fuel used for all routine engine tests is a mixture containing 20 per cent benzol and 80 per cent aviation gasoline. This fuel is stored in a 20,000-gal. tank buried below ground. From this tank the fuel is pumped to a 30-gal. tank on the outside wall of the laboratory. Thence it passes by gravity through a large filter to small measuring tanks adjacent to each engine.



Sectional view of flexible coupling used between engine and dynamometer



Two views of the Wright Aeronautical Corporation's engine testing laboratory. Above—the wind tunnel used for tests or air cooled engines. Below—one of the testing stands for water cooled engines

Lubricating oil used in the engine is circulated through a copper coil submerged in a tank of water under the engine. The temperature of the water in this tank is controlled by admission of cold water from an external source.

In starting the engine or driving it by means of the dynamometer used as a motor it is necessary to have a supply of direct current, and the same is necessary to excite the fields of the dynamometers. This current is supplied from the generator of a large motor-generator set, the motor of which is driven by alternating current furnished by the local public service company. Should this external supply of current be shut off, as sometimes happens during a thunderstorm, load would instantly be removed from the dynamometer and the engine would race and probably destroy itself and the dynamometer. To prevent this a solenoid actuated by

the field current is so arranged as to short circuit the engine magnetos and thus stop the engine the instant the field circuit is broken. Provision is also made whereby the magnetos are also grounded, if for any reason the circuit breakers blow.

The electrical energy developed by the dynamometers is dissipated in resistance grids placed in a well-ventilated pent house on the roof above the laboratory.

A fourth dynamometer of 75-hp. capacity is used for tests of single-cylinder engines which it is the practice of the company to build and test before constructing engines of the multiple-cylinder type. This dynamometer is provided with auxiliary equipment similar to that used in connection with the larger machines.

One of the unusual features of the laboratory equipment is a wind tunnel designed primarily for tests of radial-cylinder, air-cooled engines, but applicable to

tests of any air-cooled engine. The tunnel is shown in one of the accompanying cuts. Air enters the tunnel through an opening in the wall of the laboratory and passes through a hopper-shaped duct into an elbow. Thence it enters the throat of the tunnel where the engine is placed and, after cooling, the engine is drawn into a large sirocco-type blower, from which it is exhausted through an opening in the roof of the laboratory. The blower is driven by chain from a 150-hp. motor, and is said to be capable of creating an air velocity of about 100 miles per hour past the engine, thus closely approximating flying conditions. The exhaust from the engine is carried out in the air stream.

The engine is completely inclosed during a test, but its performance can be observed through windows pro-

vided for the purpose. Electric lights are arranged in the tunnel so as to illuminate the parts of the engine which need to be watched. In the accompanying photograph a radial-cylinder engine is shown in place, a part of the casing of the tunnel having been removed. The engine is supported on a heavy angle iron frame designed for the purpose. Power output is measured by one of the same 400-hp. dynamometers used for tests of the Wright V-type, water-cooled product. The engine is connected to the dynamometer by a shaft several feet long and a fabric disk coupling. The shaft is supported in two bearings and passes through the wall of the elbow, which forms part of the tunnel, so that the dynamometer and all measuring apparatus are outside the tunnel, and are consequently not affected by the air stream.

## A Departure in Truck Muffler Design

**M**UFFLERS are necessary in automotive apparatus to reduce the noise of the engine exhaust and contribute to the comfort of both the passenger and the innocent bystander. Nevertheless, their use involves initial cost, weight to be carried about, and back pressure in the cylinders. They frequently clog up with carbon deposit and constitute an entirely unsuspected source of engine loss and heating, due to greatly increased back pressure. The "blowing up" of mufflers by muffler explosions is quite common and the muffler constitutes one of the many sources of rattle in the vehicle.

The relative importance of these various factors is not the same for all automotive uses, but no one of them is negligible for any one use. It must be conceded that repairs or replacement after blowing up of the muffler, or the necessity of cleaning out the carbon, or faulty performance due to unsuspected clogging of the muffler, constitute reasonable sources of future sales resistance in any vehicle, and should be avoided if possible.

The following table is possibly representative of the general opinion of automotive engineers regarding the relative importance of the various factors in each field:

### Passenger Cars

**High Priced**—Strength, noise, back pressure, cost, ease of cleaning, weight.

**Low Priced**—Cost, noise, back pressure, strength, weight, ease of cleaning.

### Trucks

**Heavy**—Back pressure, strength, ease of cleaning, noise, cost, weight.

**Light**—Cost, noise, strength, back pressure, weight, ease of cleaning.

**Aeronautic**—Strength, back pressure, weight, wind resistance, noise, cost.

Even after the back pressure has been so reduced as to have no serious effect upon engine power, there is still opportunity to reduce heating of the jacket water and perhaps increase the life of the exhaust valves by still lower back pressure.

In general, quietness and low back pressure are opposing factors, but each must measure up to accepted practice for any given use. Adding strength tends to increase cost and weight. Arrangements for ease of disassembling and cleaning tend to increase cost. Each muffler is an expression of the individual manufacturer's idea of the best that he can produce in the way of compromise among these various factors for any given use.

A radical departure in muffler design is about to be marketed, which is claimed to offer a better compromise for certain uses than seems possible with the conventional type, in that it is said to give a lower back pressure, to weigh less, to be entirely free from clogging troubles and practically indestructible under service conditions.

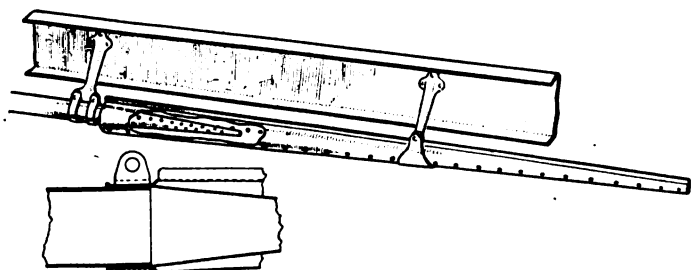
This muffler, known in aviation service as the Curtiss type, has recently been adapted to truck use and is being manufactured by the Powell Pressed Steel Company, under license from the Curtiss Engineering Corporation, and will be marketed as the "Kemble" Muffler.

In its simplest form, as applied to aeronautic work, the Kemble muffler consists of a conical shell with a narrow longitudinal slot which permits the exhaust gas to escape to the atmosphere as rapidly as the narrowing cross section of the cone tends to check the velocity and raise the pressure.

As adapted to truck use, a series of circular holes replaces the longitudinal slot, and a short inner cone is added. The muffling effect is obtained by dividing the total outlet opening into a multitude of much smaller openings, which give correspondingly smaller noises, occurring successively, and so by "stringing out" the exhaust, soften it in much the same fashion as by a continuous longitudinal slot.

The low back pressure and immunity from blowing are due to the fact that the total area of the outlet openings in the cone is approximately equal to cross section of the exhaust pipe.

The inner cone used in truck mufflers checks the velocity of the gas in the outer cone slightly by diverting the direction of flow of the gas, thus increasing the time interval over which the exhaust is strung out in a muffler of given length. This increases the muffling effect without perceptibly increasing the back pressure.



Kemble muffler showing detail of combination support and clamp for fastening muffler to end of exhaust pipe



# A Calorimeter for Determining the Heat of Ignition Sparks

A description of a new form of apparatus developed to determine the heat characteristics of sparks from different types of ignition apparatus is given together with the results of tests made with this equipment.

By H. A. Thornburg and E. B. Weaver\*

**O**WING to the great possibilities of improving the ignition of gases in the cylinders of gasoline engines by studying the properties of secondary electrical discharges and their effect upon combustible gases, the results of research work along this line should be valuable to both the carburetion and ignition engineer.

The exact cause of ignition and flame propagation in a combustible gas by an electrical discharge has not been indisputably determined. A combustible gas can be ignited by heat, percussion or ionization. As an electrical discharge may produce any of the above conditions it is evident that a simple, accurate and brief method of determining any one of the characteristics of the discharge is a large step toward a method of analyzing ignition phenomena.

The Bureau of Standards has done some work toward determining the heat of ignition sparks by means of a calorimeter described in Report No. 56 of The National Advisory Committee for Aeronautics which shows one of their methods as well as some of the results obtained.

The function of an ignition system is to produce a spark with the required characteristics to cause certain and rapid combustion in the engine cylinder at the required time.

The tests run in connection with this investigation were not to prove the superiority of any one ignition system but merely to test the applicability of the spark calorimeter and to determine the general heat characteristics of the sparks from the different types of ignition systems.

The calorimeter used consists of two glass air bulbs encircling a chamber for receiving the heating element or spark gap. Between these bulbs and connected to each is a manometer with release cocks used to equalize the pressure after filling. The spark calorimeter is shown diagrammatically in Fig. 1, while a photographic

\*—Condensed from a thesis submitted in the School of Electrical Engineering, Purdue University.

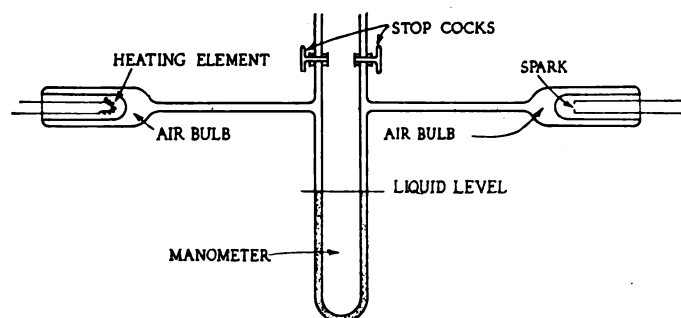


Fig. 1—Diagrammatic view of the spark calorimeter.

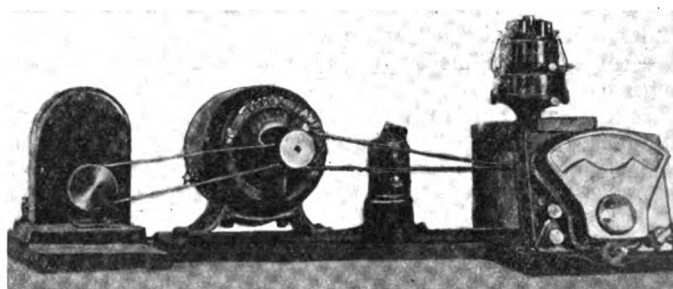
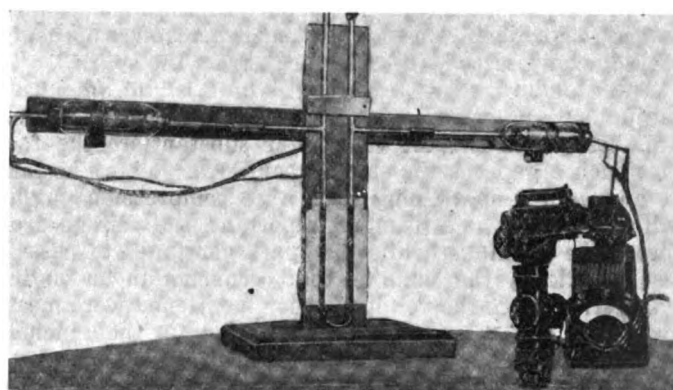


Fig. 2—(Above) view of the calorimeter. Fig. 3—(Below) view of driving apparatus and tachometer.

view of it is shown in Fig. 2. Fig. 3 shows the driving apparatus and electric tachometer.

The heating element and spark gap were placed in their respective chambers, the distributor speed was adjusted to a desired value, and the watt input to the heating element adjusted so that a balance was obtained in the manometer. The speed was then changed to the next value, a new balance obtained in the manometer and the watt input to the heating element again recorded. This procedure was followed for the required number of points, the heating element and spark gap then being interchanged, after which the same tests were repeated.

The energy in one bulb is equal to that in the other when a balance is obtained in the manometer; therefore, the easily measured energy input to the one bulb equals the energy input of the sparks in the other bulb, and the energy of one spark is the input per second divided by the number of sparks per second.

The difference in radiation of heat due to inequality of exposed areas of the air bulbs as well as the possible error due to unequal volumes of air being inclosed in the bulbs are corrected for by interchanging the heating element and spark gap and using the mean of the read-

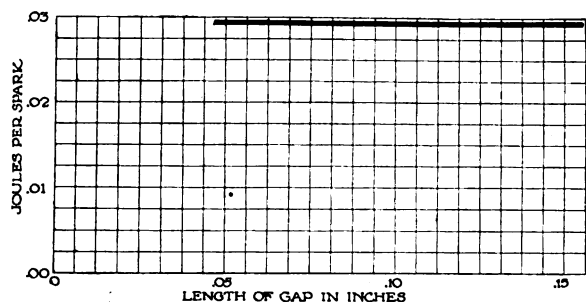


Fig. 4—Curve showing that heat of the spark is not a function of the length of the spark gap

ings. The loss due to conduction through the leads is practically compensated for, as there are the same number of leads entering each bulb.

The passage of the spark through the air caused chemical reactions to take place, such as the formation of oxides of nitrogen, but the heat energy involved is negligible in comparison with the energy from the spark.

The standard spark gap length of 0.10 in. was used throughout the series of tests, because Bureau of Standards tests with a crest volt meter substantiate the fact that such a gap has the same break down voltage as that of an average spark plug in a high compression engine cylinder. What is still more important, the voltage drop across the terminals while the spark continues to pass is also practically the same as that occurring in an engine cylinder. Since the voltages above mentioned were measured with the gap in continuous operation, they include the effect of an accumulated ionization in the chamber, and therefore the fact that the gap is not ventilated is not an objection, but is essential to the measurements, for only under these conditions are the initial and sustaining voltages of the calorimeter the same as those in the average engine cylinder.

The errors encountered by using this apparatus and allowing from 5 to 10 minutes per reading should be well under 5 per cent.

The first test was for the determination of the effect

of the spark gap length upon the heat per spark with the other factors held constant. This test brought out the point that the heat per spark is not a function of the spark gap length within the range used as is shown graphically in Fig. 4.

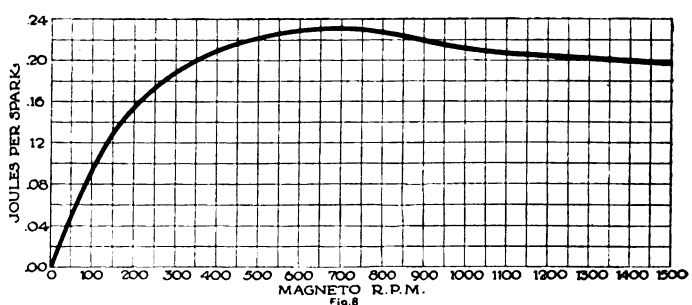
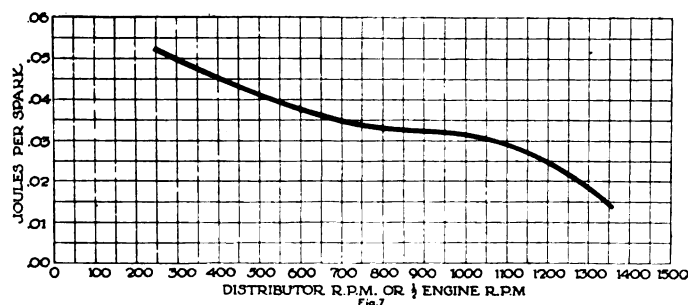
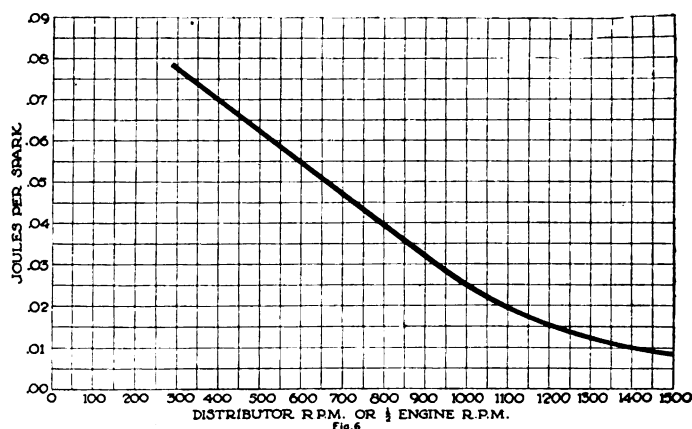
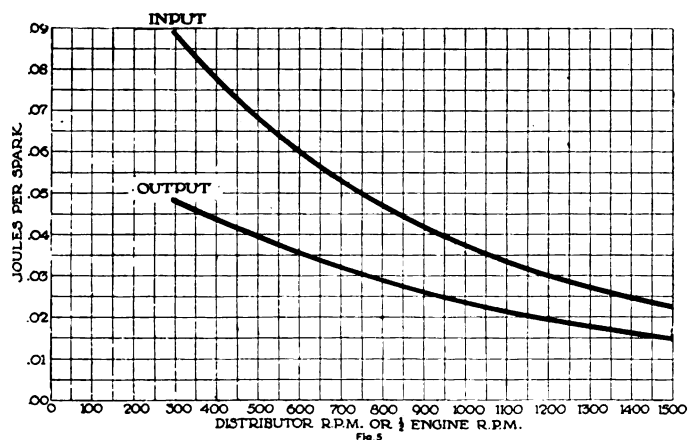
A standard heat test was run, with the spark gap length held constant and the revolutions per minute varied between reasonable engine speeds, on one magneto and three battery ignition systems. The battery ignition heat per spark-speed characteristics were as shown in Figs. 5 to 7 inclusive. The curves all follow the same general law which is the same as that of the input curve, Fig. 6. The curve of Fig. 7 follows this general law to a certain speed and then falls off very rapidly, indicating that the theoretical number of sparks is not entering the spark chamber or, in other words, the ignition apparatus is missing. This introduces a new use for the spark calorimeter, as the slope of the curve indicates misfiring long before it can be detected by other means.

The magneto delivered a greater amount of energy to the spark gap than any of the battery outfits, and the curve of Fig. 8 shows that it had different characteristics. The magneto was operated with the timer fully advanced.

A standard Exide three-cell lead plate storage battery receiving a charge of nine amperes during test was used to supply power to the battery ignition sets during runs.

The authors regard the calorimeter as the best means of measuring the energy output of a high tension ignition system as the instruments ordinarily used in measuring electrical power are not suitable for such high voltages and feeble currents. The instruments for measuring the high voltages are subject to large errors and are cumbersome to handle.

A calorimeter as designed and used in the above work, operated upon a balance principle, with a zero method of obtaining readings, is far superior to the ordinary type as to its adaptability for a spark calorimeter, in that it is very sensitive and the readings may be had at short intervals and continuously from one point to the next with unusual precision.



Curves showing heat per spark in three battery systems (Figs. 5, 6 and 7) and one magneto system, Fig. 8

# Tolerances Allowed in Grinding Splined Shafts

An article discussing the practice employed by a manufacturer in grinding shafts to mate with splined fittings finished in accordance with S.A.E. standard practice. A table of tolerances is included.

CONSIDERABLE variation exists at the present time in regard to manufacturing practice on spline shafts. The Society of Automotive Engineers has standardized spline fittings, but the shafts themselves have not as yet been standardized, with the result that there is no uniformity in conditions as regards fit of these shafts. The tabulation herewith presented has been made up from blueprints provided by the Gear Grinding Machine Co., and is the practice recommended by that concern.

It will be noted that the bearing is solely on the ground surface of the inner diameter of the fitting, while considerable clearance is left at the bottom of the broached hole for the spline. It is an easy operation to grind the bore of the spline fitting. If it is necessary, however, to hold the depth of the broached holes to a small tolerance such as .001 in., the life of the broach is necessarily considerably shortened because it is impossible to regrind the broached cutter and still hold this limit. With the large clearances between the spline and the bottom of the

broached hole, the broach can be reground several times as .009 in. is allowed for wear. Inasmuch as the cost of these broaches ranges from \$75 to \$300, this represents a material saving. Another advantage of the large clear-

PERMANENT FIT							
Nom. Diam.	D'		d'		W'		n
	Max.	Min.	Max.	Min.	Max.	Min.	
1	1.002	.998	.9005	.8995	.2525	.2505	.050
1 1/16	1.0645	1.0605	.9567	.9557	.2675	.2665	.05315
1 1/4	1.127	1.123	1.0130	1.0121	.2825	.2815	.05625
1 3/8	1.1895	1.1855	1.0692	1.0682	.2985	.2975	.0594
1 1/2	1.252	1.248	1.1255	1.1245	.3190	.3180	.0625
1 5/8	1.3145	1.3105	1.1817	1.1807	.3295	.3285	.06565
1 3/4	1.377	1.373	1.2380	1.2370	.3455	.3445	.06875
1 7/8	1.4395	1.4355	1.2942	1.2932	.3605	.3595	.0719
2	1.502	1.498	1.3505	1.3495	.3765	.3755	.075
2 1/8	1.5645	1.5605	1.4067	1.4057	.3925	.3915	.07815
2 1/4	1.627	1.623	1.4630	1.4620	.4075	.4065	.08125
2 3/8	1.6895	1.6855	1.5192	1.5182	.4235	.4225	.0844
2 1/2	1.752	1.748	1.5755	1.5745	.4390	.4380	.0875
2 5/8	1.8145	1.8105	1.6317	1.6307	.4545	.4535	.09065
2 3/4	1.877	1.873	1.6880	1.6870	.4705	.4695	.09375
2 7/8	1.9395	1.9355	1.7442	1.7432	.4855	.4845	.0969
3	2.002	1.998	1.8005	1.7995	.5015	.5005	.100

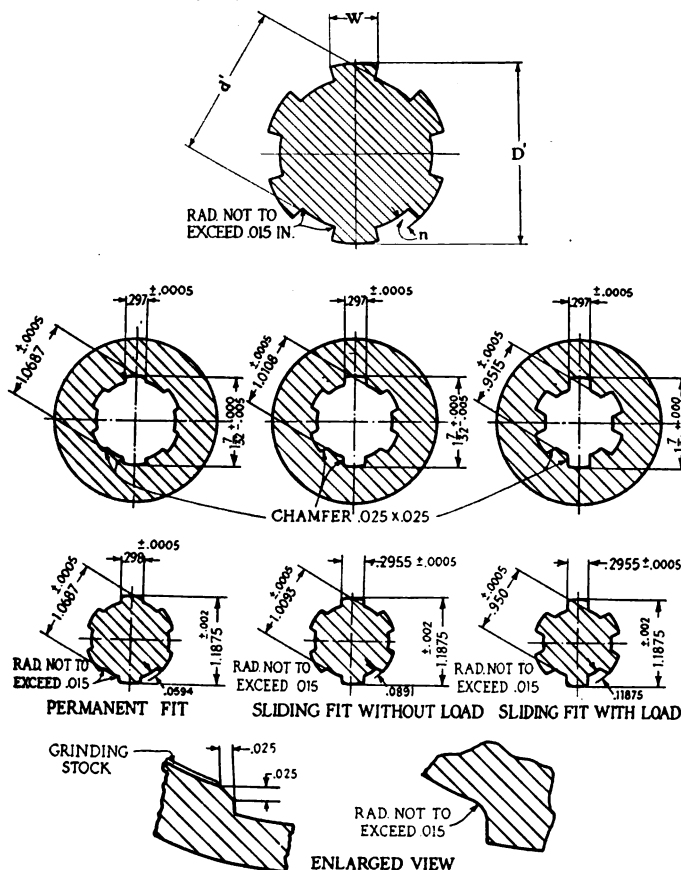
Maximum press fit on keys = + .002  
Minimum press fit on keys = .000  
Maximum press fit on body = + .001  
Minimum press fit on body = - .001  
Maximum clearance in diameter over keys = About .033  
Minimum clearance in diameter over keys = About .025

TO SLIDE WHEN NOT UNDER LOAD							
Nom. Diam.	D'		d'		W'		n
	Max.	Min.	Max.	Min.	Max.	Min.	
1	1.002	.998	.8505	.8495	.2490	.2480	.075
1 1/16	1.0645	1.0605	.9036	.9026	.2650	.2640	.0797
1 1/4	1.127	1.123	.9565	.9555	.2800	.2790	.0845
1 3/8	1.1895	1.1855	1.0098	1.0088	.2960	.2950	.0891
1 1/2	1.252	1.248	1.0630	1.0620	.3115	.3105	.09375
1 5/8	1.3145	1.3105	1.1160	1.1150	.3270	.3260	.09845
1 3/4	1.377	1.373	1.1695	1.1685	.3430	.3420	.103
1 7/8	1.4395	1.4355	1.2223	1.2213	.3580	.3570	.10785
2	1.502	1.498	1.2755	1.2745	.3740	.3730	.1125
2 1/8	1.5645	1.5605	1.3286	1.3276	.3900	.3890	.1172
2 1/4	1.627	1.623	1.3815	1.3805	.4050	.4040	.122
2 3/8	1.6895	1.6855	1.4348	1.4338	.4210	.4200	.1266
2 1/2	1.752	1.748	1.4880	1.4870	.4365	.4355	.13175
2 5/8	1.8145	1.8105	1.5411	1.5401	.4520	.4510	.13695
2 3/4	1.877	1.873	1.5945	1.5935	.4680	.4670	.14205
2 7/8	1.9395	1.9355	1.6473	1.6463	.4830	.4820	.14735
3	2.002	1.998	1.7005	1.6995	.4990	.4980	.150

Maximum freedom on keys = .0025  
Minimum freedom on keys = .0005  
Maximum freedom on body = .0025  
Minimum freedom on body = .0005  
Maximum clearance in diameter over keys = About .033  
Minimum clearance in diameter over keys = About .025

TO SLIDE WHEN UNDER LOAD							
Nom. Diam.	D'		d'		W'		n
	Max.	Min.	Max.	Min.	Max.	Min.	
1	1.002	.998	.8005	.7995	.2490	.2480	.100
1 1/16	1.0645	1.0605	.8505	.8495	.2650	.2640	.10625
1 1/4	1.127	1.123	.9005	.8995	.2800	.2790	.1125
1 3/8	1.1895	1.1855	.9505	.9495	.2960	.2950	.11875
1 1/2	1.252	1.248	1.0005	.9995	.3115	.3105	.125
1 5/8	1.3145	1.3105	1.0505	1.0495	.3270	.3260	.13125
1 3/4	1.377	1.373	1.1005	1.0995	.3430	.3420	.1375
1 7/8	1.4395	1.4355	1.1505	1.1495	.3580	.3570	.14375
2	1.502	1.498	1.2005	1.1995	.3740	.3730	.150
2 1/8	1.5645	1.5605	1.2505	1.2495	.3900	.3890	.15625
2 1/4	1.627	1.623	1.3005	1.2995	.4050	.4040	.1625
2 3/8	1.6895	1.6855	1.3505	1.3495	.4210	.4200	.16875
2 1/2	1.752	1.748	1.4005	1.3995	.4365	.4355	.175
2 5/8	1.8145	1.8105	1.4555	1.4495	.4520	.4510	.18125
2 3/4	1.877	1.873	1.5005	1.4995	.4680	.4670	.1875
2 7/8	1.9395	1.9355	1.5505	1.5495	.4830	.4820	.19375
3	2.002	1.998	1.6005	1.5995	.4990	.4980	.200

Maximum freedom on keys = .0025  
Minimum freedom on keys = .0005  
Maximum freedom on body = .0025  
Minimum freedom on body = .0005  
Maximum clearance in diameter over keys = About .033  
Minimum clearance in diameter over keys = About .025



1—Drawing showing practice adopted by Gear Grinding Machine Co., for Standard 1-3/16 in. six spline shaft.

ance above the spline is the adequate provision for an oil pocket which is of assistance in lubrication. To hold the bottom of the broached hole to the close limits which prevail in some instances is a good example of unnecessary accuracy.

While the accompanying table is not a standard and has not been brought out as such, it is practice recommended by a concern which specializes in the grinding of splined shafts and as such deserves serious attention. It has been suggested that the societies concerned consider the adoption of some such set of tolerances for standardized prac-

tice in connection with the six spline fitting.

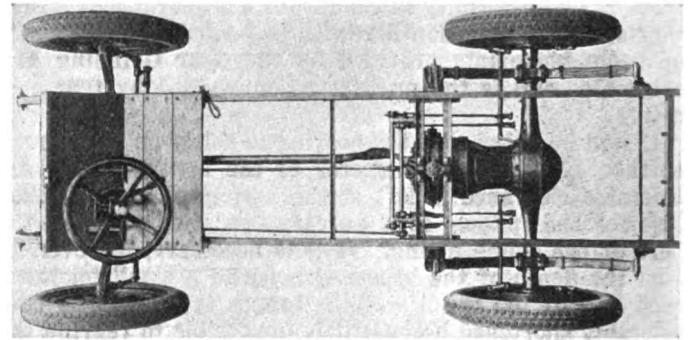
The tabulation herewith in common with the spline fitting standards, has been made up for three different conditions; that is, permanent fit, sliding fit without load and sliding fit with load. The permanent fit is for arbor press assembly, to be used for such parts as clutch spiders and other parts, which have no relative motion between the spline fitting and the shaft. The sliding fit without load is used on such parts as the sliding gear shaft on transmission gearsets, etc. The sliding fit with load is a free fit used in propeller shaft construction, etc.

## Lansden Electric Speed Truck

**T**HE success of the gasoline-propelled type of speed wagon and speed truck has evidently stirred the manufacturers of electric commercial vehicles to emulation, and a speed truck of 1500 lb. capacity is being announced by the Lansden Co., Inc. With an electric vehicle, of course, no such speeds as obtained with modern pneumatic tired gasoline trucks are possible, and the speed of the truck here described is limited to 15 m.p.h. loaded and 16½ m.p.h. empty. This, however, is quite an improvement over the speeds obtained with electric commercial vehicles running on solid rubber tires and is about up to the limit of the speeds permitted in cities.

The chassis without battery weighs 1700 lbs., the body allowance is 700 lbs. and the battery weight is 1385 lbs. in case of a lead battery and 1085 lbs. in case of an Edison battery, making the total weight of the truck in running condition 3685 lbs. with a lead battery and 3385 lbs. with an Edison battery. In connection with the Edison battery, which consists of 60 cells, a 60 volt 40 ampere motor is used, and in connection with the lead battery, of 50 cells, an 85 volt 30 ampere motor. The former runs at 1725 r.p.m. and the latter at 2150 r.p.m. A continuous torque type of controller is fitted, which gives four forward and two reverse speeds. The frame is of rolled

channel steel 3 x 1½ x 3/16 in. The truck is made in two lengths of wheelbase, 90 and 96 in., while the track is the standard 56 in. Thirty-two by 4½ in. pneumatic cord

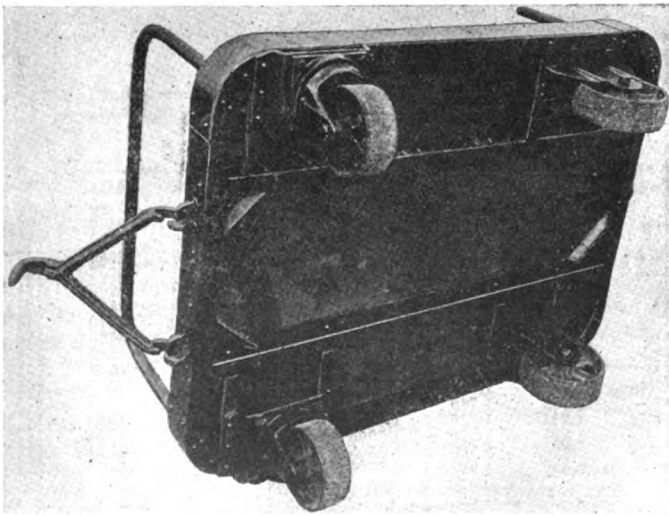


Chassis of Lansden 1500 lb. electric speed truck

tires are used all around. The standard equipment consists of a tail lamp, two dash lamps, horn, hub odometer, Sangamo ampere-hour meter, a kit of tools and 12 ft. of cable with charging plug.

## The Sharon "Brute" Trailer

**T**HE industrial trailer here illustrated, a product of the Sharon Pressed Steel Co., was designed for heavy-duty service with tractors, in warehouses, terminals



Sharon "Brute" trailer. Bottom view showing construction features.

and transfer stations. The frame is made up of 4¾ in. channel sections pressed from ½ in. hot rolled open hearth steel, riveted into one piece, channel section corner pieces pressed to a 6 in. radius, with a hole for a stake pocket. The trailer can be made in any length up to 72 in. and in any width up to 50 in.

Two additional members running lengthwise beneath the floor are 3 in. pressed steel channel, riveted to the end rails and braced laterally to the frame with front and rear pressed steel "V" braces which take the pull of the 5/8 in. steel forged coupler. Either one or two couplers can be supplied.

Rear wheel and front caster supports are 3 in. pressed steel channels riveted to the side rails and longitudinal members of the frame. Rear wheel brackets are pressed from ¼ in. steel with two stiffening ribs on each side. Rear wheels are of malleable iron with six double-web spokes and 3½ in. face, with flexible roller bearings on a 1 in. shaft hardened and ground.

The front casters with ball and roller bearings are bolted to a ½ in. steel plate riveted to the frame. The floor of the trailer is 1½ in. oak, recessed flush in the side and end rails. All frame members are flush on the bottom—thus affording an even support when the trailer is used in connection with a lift truck.

# A Practical Analysis of British India as a Market for American Motor Vehicles

## Part I

In this and a following article is presented a detailed survey of British India as a market for cars and trucks. The author has a wide experience with this field and shows clearly the great potentialities, if proper methods are used. An important contribution to foreign selling data.

By Charles Sumner Turner

SIX months ago our export trade in passenger vehicles with British India abruptly stopped and has since been at a standstill. This condition follows a record year of exports to that market in 1920. There has been and continues some congestion of passenger car stocks in India in trade hands or held for the account of the trade. Considerable inconvenience and some distress attends this condition.

A review of the trade leading up to these conditions and an intimation of some of the causes will form the basis for a detailed and practical discussion of merchandising American cars in a market extremely rich in potential business if conditions are accurately known and proper methods are used. The prevailing depression in American automotive export trade makes this an opportune time to review the past and take therefrom such lessons as may be useful in formulating plans for future business.

Statistical information on American automotive exports for the year 1920 shows marked changes in the relative positions of importance of foreign markets. Certain distant markets are brought into sharp focus, among which British India, by purchasing among other of our automotive products over 12,000 passenger vehicles of a value approximating \$14,000,000, attained second position among our foreign markets for products in this class.

### Interpreting Export Figures

The foregoing figures inadequately evidence the actual benefits that accrued to the American passenger car industry from the British Indian trade, for the reason the several thousand Canadian-made vehicles appearing, directly and indirectly, in the British Indian Government import records, were, as regards the manufacture of their component parts, largely a product of American industry.

The record of our relative exports thus far this year and the prospect for the balance of the year indicate an export trade in passenger cars with British India that shall show a falling off by about 95 per cent of the 1920 year business. Consequently, it is necessary to accord

serious thought to ways and means for the American automotive industry to continue to secure the largest amount and share of the British Indian automotive trade.

The distance of the market from the United States, its peculiar trade conditions, and its past importance as a purchaser of American finished products have caused British India to be known and understood by the general automotive trade very disproportionately to the importance now attained. We have accorded our greatest attention to markets near to us, while several distant markets within themselves present greater sales opportunities than many of the former combined. British India, of such great size, distances and potentialities of material development, is only experiencing the genesis of motor transport.

In the last British Indian pre-war trade year, ending March 31, 1914, the total merchandise imports into India from all countries were approximately \$500,000,000, of which the United Kingdom supplied 65 per cent and the United States supplied 3 per cent, or about \$15,000,000. Of

our exports, mineral oils, iron and steel products comprised considerably more than one-half, and in the balance were included "Motor cars and cycles" of an approximate value \$750,000.

### Importance of Indian Market

In this year 868 American cars, mainly Ford, were imported into India. In the last trade year of British India ending March 31, 1921, the total merchandise imports from all countries reached the record valuation of approximately \$1,125,000,000, of which the United States supplied \$120,000,000, included in which were 10,120 motor cars, valued at \$15,025,000, the valuation of the import trade in American passenger cars for this year approximating the value of all imports from the United States in the last pre-war trade year.

During the 1919-20 year the trading of other automotive exporting countries was effectively renewed in India as is strongly evidenced in the following tabulation of Indian Government import statistics:



Imports of Motor Cars into India  
For fiscal years ending March 31.

From	1920		1921	
	Quantity	Value	Quantity	Value
United Kingdom .....	443	\$1,209,610.00	2,541	\$7,113,304.00
France .....	3	5,705.00	192	483,122.00
Italy .....	17	34,808.00	218	552,344.00
Other countries .....	84	139,274.00	423	862,829.00
	552	\$1,389,497.00	3,374	\$9,011,599.00
Canada .....	20	16,731.00	1,938	2,041,860.00
United States .....	9,353	10,149,010.00	10,120	15,024,529.00
	9,925	\$11,555,138.00	15,432	\$26,077,988.00

The above United States currency valuations have been arrived at by converting official Indian rupee valuations at adopted averages of 44 cents for the 1920 year and 33½ cents for the 1921 year, these being fair averages for the respective periods in considering the exchange movement.

It should be pointed out that the import figures relative to imports from Canada and the United States for the year 1920 are misleading, as will be explained further along.

It is interesting to review some of the incidents of American passenger car trade with British India over the seven year period including the years 1913-14 to 1920-21.

The accompanying graphic chart shows, by heavy solid line, the United States Government statistical record of passenger car exports, by years, from the United States to British India (and Ceylon). The light solid line at the bottom of the chart shows, for the years 1919 to 1921, the same record of monthly exports.

The broken lines show the British Indian Government statistical record of passenger car imports into British India and Burma (not including Ceylon) from the United Kingdom, United States, Canada and other countries. It is desired to point out that the seeming discrepancy in the two records is a matter of method and not of fact, and is due to the statistical method of the British Indian Government, according to which imports are recorded as from the point (by land or sea) merchandise is shipped to India, and not according to the country of origin. Therefore, the apparent excess amount and advanced movement of American passenger car imports into India to what is recorded in the United States Government figures, is explained by cars of Canadian origin being shipped through American seaports to India; further, the charted record of British Indian imports of passenger cars from Canada is not a true index of the number of Canadian cars imported, but can be assumed to show only such cars as were accommodated by steamship tonnage from a Canadian port to India direct. The movement of the Indian rupee exchange value, over the years 1919 to the middle of 1921, is also shown in graphic form.

### The Course of Trade

The chart shows that, in the last pre-war trade year, British India was importing from the United Kingdom twice as many (1670) passenger cars as from the United States (868), the import valuation of the former being five times that of the latter. The predominance of Ford cars makes it reasonable to assume that, as regards other makes of American motor vehicles, the position of such cars in the market was inferior to the position of cars "imported from other countries," namely, Continental Europe (268).

The drop in car imports to the middle of 1915 reflects the realignments and adjustments of trade, which were attended by general depression incident to the first year of

the war. The adverse effect on car imports from all sources was generally the same.

The car import record throughout the balance of 1915 and into 1916 shows a further falling off of United Kingdom trade with the territory due to the diversion of manufactured products of that country to war purposes, while imports of American vehicles continued rapidly increasing, due to demands resulting from the beginnings of an unprecedented prosperity within British India which continued well into the year 1920.

India's staple and manufactured products benefited by the war demands and the general prosperity of her customers removed from the war area, and not only were extraordinary profits made in industry and trade, but new trade routes were defined in the Near East, the Mesopotamian campaign having been largely manned, provisioned, and supplied from Indian industry. Thus British India experienced an industrial rebirth which is viewed with great interest and satisfaction within and without the country. This portends an increased expansion and extension of the indigenous industries of the country and greater independence of outside sources of supply in many lines of manufactured goods.

### The Embargo

In December, 1916, an embargo was placed by the Indian Government on the import of motor cars, with a view to the saving of tonnage and fuel, and thereafter, except for the few months required for vehicles en route to arrive in the market, the importation of cars from any sources whatever was stopped for two years.

At the time the embargo was announced, American passenger cars were rapidly attaining an enviable position in the Indian market. The business resulted largely from demands of the market and was attended by a minimum of solicitation by and expense to the American manufacturers and traders benefiting therefrom.

The lifting of the embargo (in December, 1918) found India enjoying extraordinary prosperity. Shortly a very extraordinary and seemingly insatiable demand for American passenger cars was manifested to the industry in this country. Making due allowance for the incident of the American automotive industry transition from a war to a peace basis and their problems with domestic demands, from an export business viewpoint, the record of passenger car exports from the United States to British India throughout the year 1919 evidences insufficient enterprise in meeting an exceptional opportunity. During this year only 2624 American passenger cars were exported to India. The seemingly discrepant record of British Indian imports is explained by Canadian made vehicles passing through American seaports for shipment to India and such appearing in the records incorrectly as imports from the United States.

The Ford Motor Co. apparently made the most of the opportunity in India by shipping large quantities of cars early. These arrived in the territory at the time of an extraordinary demand and an appreciating exchange value of the local currency. Thus material benefits accrued to the manufacturers, their dealers and the buying public. Furthermore, during this period this company made long strides in developing their merchandising policy in the territory by dictating the segregation of their affairs, by the principal dealers concerned, into distinct corporate concerns dealing exclusively with this firm's product.

### Unsound Selling Methods

In the winter months of 1919-20, American factories began the movement of extraordinary quantities of passenger cars against Indian orders, in many cases considerably deferred in their execution, and the complete story

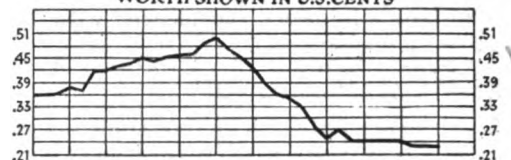
of the incidents and effect of the large shipments to India throughout the year 1920 cannot be told at this time. Some manufacturers, financiers and dealers concerned with the business are continuing to experience inconvenience, and of the latter some are in distress.

As the movement of passenger cars from the United States to India got well under way in 1920, the peak of prosperity in the latter country was passed, but an extraordinary movement of cars continued throughout the year in the face of a precipitant reaction of general trade in the market, effecting renewed trading there by other automotive exporting countries and the rapidly depreciating rupee exchange value, the movement of which, over the nine months' period from March to December, 1920, affected adversely by 100 per cent the rupee cost of an American car in the territory, assuming no change in the factory cost of a car over that period. Dealers, where the precaution to arrange exchange protection had not been exercised, found themselves obliged to pay against arriving stocks of cars up to twice the amount of the local currency as anticipated at the time the orders were placed.

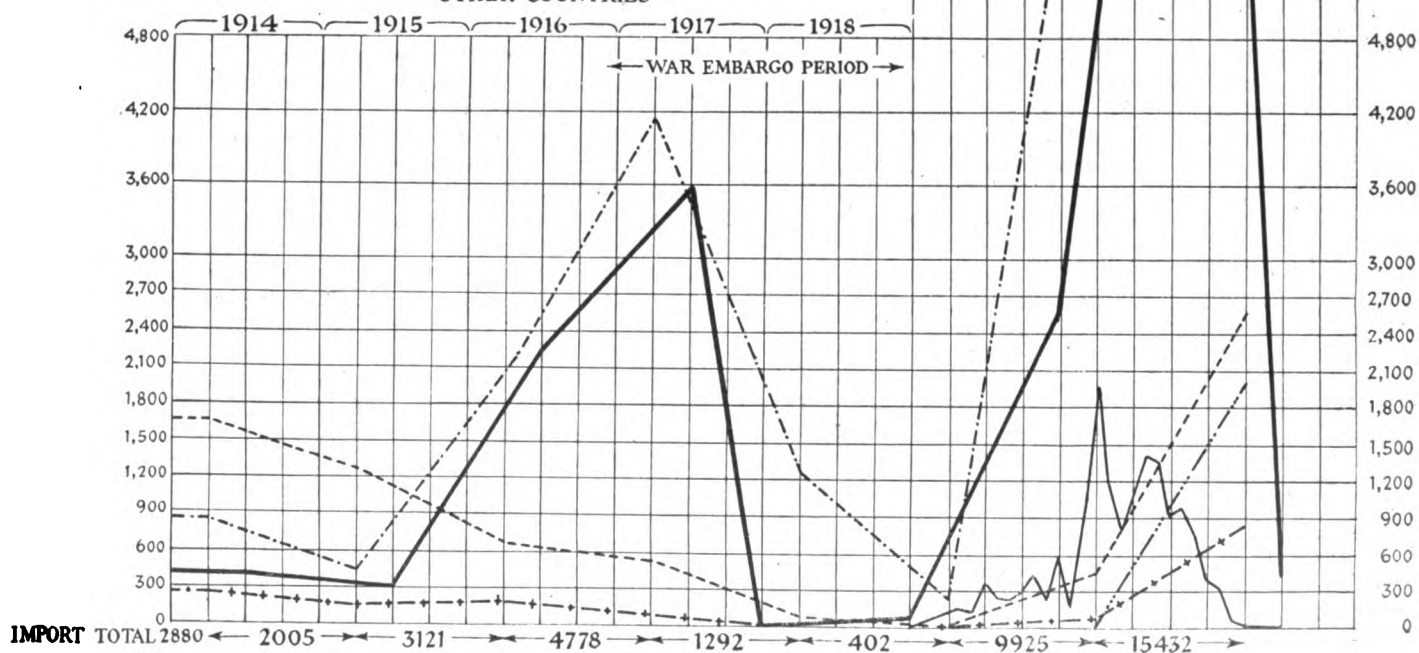
The exchange factor in foreign trade has now become a matter of serious consideration with manufacturers, who in the past may have viewed the subject with indifference. To many this factor appears an obstacle to much foreign trade at present. This is true only to a limited extent. While a trade deterrent, it will gradually appear less as an obstacle as its stability is effected, even if at materially depreciated value, in so far as pertains to trade in requisite merchandise. Renewal of trade will be the greatest contributing factor of exchange recovery, whatever expedients therefor may be devised by governments and financial interests.

India in pre-war days enjoyed a fairly constant exchange value for her currency and, until the middle of 1920, the appreciated value of the currency was advan-

MOVEMENT OF INDIAN RUPEE EXCHANGE VALUE  
WORTH SHOWN IN U.S. CENTS



— PASSENGER CAR EXPORTS FROM UNITED STATES TO INDIA BY YEARS  
 — " " " " " " " " " " MONTHS  
 - - - - - PASSENGER CAR IMPORTS FROM UNITED KINGDOM INTO INDIA  
 - - - - - " " " " " UNITED STATES " "  
 - - - - - " " " " " CANADA " "  
 - - - - - " " " " " OTHER COUNTRIES " "



tageous to purchases by that country from the United States. The present instability of Indian exchange perplexes those heretofore experienced with an approximately fixed or favorable value.

### Meet Obligations Promptly

An element of British Indian trade stands, at this time, discredited by their refusal to promptly meet their obligations in the face of extraordinary trade and economic conditions, and endeavor to justify their attitude by contending that manufacturers shipped late and that authorities bungled exchange. The large majority of American motor cars that went to India having been purchased by, or the purchases having been financed by Anglo-Saxon banks and firms, the foregoing difficulty is reflected lightly on the car manufacturers that supplied the market. Credit facilities, however, for the future must depend upon preciseness in method and a mutual recognition of obligation by buyers and sellers.

The abnormal car exports from the United States in 1920 would, if considered as distributed over a three-year period, have been sub-normal yearly shipments, assuming British Indian imports for the year 1917 to be a fairly accurate index of the buying power of the market at that time in its development. The normal yearly purchase potentialities of the market is probably higher than the example cited.

### Causes of Congestion

The present congestion of passenger cars in trade hands, or held for the account of traders, results from over-ordering, imprudent credit facilities, and deferred shipments by manufacturers. Dealers in many cases undertook on paper more than they possessed the physical and financial facilities to assimilate, except in such ordered manner as their original plans of business proposed. Consequently the radically changed economic conditions in the territory disrupted automotive trade conditions particularly.

Deferred shipments by some American car manufacturers are among the vital causes of the present car congestion and consequent stoppage of business in this line out of British India. The intelligent treatment of an export order requires that a manufacturer regard the distance of the buying market from the factory. Priority of consideration to orders destined for the most distant markets is only common sense, but it has not been common practice. British Indian seaports are, under most favorable conditions of transport, four months distant from a factory in the Detroit district. Normally, a distributor or agent when ordering and arranging financial facilities, must act approximately six months prior to his anticipated receipt of merchandise. American automotive export trade must move to normalcy of volume, value and method. Hereafter intelligent effort must replace the easily available credit facilities that have encouraged much past business, the good will of which is difficult to discern.

Less than a dozen American passenger car manufacturers can rightly claim an intimate knowledge of the British Indian market and its dealer trade. The arrangements and products of these few manufacturers are well advanced along the trade's evolution in the market. Motor trade establishments in India have much to do in the matters of developing organizations physically and financially commensurate with problems and volume of business incidental to a proper merchandising of American automotive products. The burden rests on the American manufacturer to assist intelligently in this evolution.

The important Indian pre-war firms engaged in the automotive trade resulted from trading in English and Continental cars. These firms, and they are not many, are

pre-eminent to-day and control the best agencies. Meanwhile, they undoubtedly have at times the refusal of every interesting agency proposition seeking introduction to the market.

The abnormal business of the recent past has caused many firms and individuals to be attracted by the automotive trade prospects of profit, and the future success thereof manufacturers may assist according to the degree of intelligent co-operation they extend.

Many manufacturers, if they would continue to share in the British Indian automotive trade, must predicate future arrangements on a proper knowledge of that market and its trade, and a useful presentation, therefore, shall appear in a following article.

The present trade depression in India is a reaction from abnormal trade conditions over several years of great prosperity and is consonant with world wide trade depression at this time. The future of British Indian trade, however, was never more interesting than at the present time. Statistical information assigns to British India an important position among the world's markets for our automotive products. Of the markets for motor vehicles where trade is at this time affected adversely, it is expected by those conversant with the market that British India will recover among the first.

The impending visit of the Prince of Wales in November this year shall have a very beneficial effect on the motor trade in India. We have generally little comprehension here in America of the general commotion of population, ceremonies peculiar to the people and the institutions of the country, and the disbursements that shall be an incident of this imperial honor to the British Empire.

When considering future motor trade with the territory, manufacturers will do well to disregard the facility and economy that attended the consummation of the extraordinary business of recent years, and regard thoughtfully the hindrances to our trade actual or in prospect at the present time. Some manufacturers, if they would successfully meet future conditions and perpetuate that goodwill which should attend their past business, must seriously consider capital investment against prospective, if not immediate business.

### Building Permanent Business

At the moment visible signs show American manufacturers to be generally inactive. Advertising of American cars in effective British Indian media is conspicuous by its absence, except Ford advertising. British manufacturers, on the other hand, are very active and are freely advertising their products. They realize there is hard work to be done to regain the trade from which they were eliminated by war conditions.

As stated hereinbefore, the foremost motor trading firms in India owe their beginnings to the agencies for British and Continental cars, and relationships continued for years prior to the war appear to be maintained to the present, as agencies generally continue in the same hands as in pre-war days. The British Indian trade came to America for cars during and after the war and many dealers there, wrongly or rightly, are not particularly happy with all the results that have accrued from the business. American car manufacturers should recognize the fact that, in the competition for trade, the British manufacturer has many psychological and some economic factors in his favor under prevailing conditions. Continental manufacturers enjoy some advantages also.

Statistically, however, India is America's foreign car market of second importance. And an analysis of the potentialities of the market confirm this rank, provided the trade is intelligently and aggressively solicited.

# 1922 a Light Car Year in Great Britain

American lightness is to be blended with European fuel economy in the 1922 British models according to present indications. The day of the expensive car in England appears to be waning. General specifications of the predominating type for 1922 are indicated in this article.

**B**RITISH makers of cars have nearly settled the details of their 1922 season's program, and it is possible at present to surmise the trend, though unsafe to deal with the question except in a general way. It may be definitely stated, however, that 1922 will be a light-car year. And by "light car" is meant a blend of American lightness and roominess with the higher economy of the European type of engine.

A reduction of the horsepower tax, which at present is \$1 per horsepower by formula rating, has been promised. If this reduction is announced soon, it may be assumed safely that the standing rating for 1922 season's cars will be not less than 15 hp. If the power tax be reduced by a third, it will mean that the 15-hp. (usually 15.9) car, now taxed \$15, will pay the reduced rate of \$10. The 15-hp. engine will make a great difference in the light-car outlook. A car will be produced on the lines the public wants; namely, a car with plenty of power and a reasonably large cylinder bore and ample room or girth of body.

The next problem is price. An average all-round, popular-priced car, not exceeding \$2,000, with \$1,500 as the mean rate, is likely to develop. The day of the high-priced, expensive car is waning, if it has not entirely passed away. If the 15-hp. model at the lower taxing rating be the standard, then there is likely to be a trend to six cylinders instead of four. This means a bore not exceeding 64 mm. (2.5 in.) or 78 mm. (3 in.) for a four-cylinder engine.

One of the biggest percentage falls in British car prices is that announced by the Rover company to take effect from September 1. It applies to the 12-hp., four-cylinder model (3 x 5½ in.), the four-passenger car being reduced from \$3,875 to \$3,200. Following on the recent price reductions of Rolls-Royce and Lanchester (each to the extent of \$1,250), the Rover announcement indicates that not only the high-priced among British cars will be subject to big cuts in the general downward trend to be anticipated before the Olympia Show.

To the names of well-known British firms mentioned in AUTOMOTIVE INDUSTRIES of August 18 as planning to produce a light runabout for next year to compete with the highly successful 8-hp., two-cylinder, air-cooled Rover may now be added those of Wolseley and Belsize. The Belsize will have a modified form of the Bradshaw "oil-cooled," two-cylinder engine introduced at last year's motorcycle show at Olympia. Only the aluminum heads of the cylinders and the overhead valves are exposed to an air draught, the cylinder barrels being inclosed in the crankcase and oil cooled by the lubricant therein. The oil sump contains approximately double the quantity of oil carried in a normal engine of this size (3⅜ x 4½ in.) and, like the cylinder heads, is cooled by an air draught induced by the fan on the front end of the crankshaft. The plate clutch is located at the rear end of the gear-set; its driving members run at engine speed as usual, but the driven member is provided

with a brake rotating with the propeller shaft so that gear shifting is said to be greatly facilitated. With one seat wide enough for three adults abreast, the car is planned to sell at about \$1,200.

As a means to price reduction it is quite possible that the Wolseley company's lead with their "10" may be followed largely. In this case the Wolseley company is listing the "10" at a reduced price with a less elaborate finish, without a starter, but at its present price, \$2,400, this model—only a two-seater—is too dear for next season's trade.

General specification will probably be along the following lines:

Engine, a four (or six) en bloc combining the upper part of crankcase, with bore and stroke of 3 x 5 in.

Dynamo and ignition combined.

Vacuum-gravity fuel feed to a direct-bolted carbureter. Gravity cooling.

Pump oiling.

Overhead inclosed valves and inside camshaft, electric starter optional, and a demountable radiator.

Transmission, fabric-faced dry-plate or cone clutch.

Direct-coupled gear box with center gate control, four speeds and reverse gear, fabric disk couplings, spiral-bevel axle.

Short cantilever springs rear, semi-elliptic front, and dual brakes on rear axle.

Gross weight of car, with roomy, four-seater body, not exceeding 22 cwt.

Manufacturing economies will be emphasized and probably after the season's experience it will be decided to continue the design unaltered and cut the price for 1923 season, which will be the year of the great British International Show. If a program on these lines be adhered to and the wheel track be standardized to 4 ft. 8 in. (56 in.), it may happen that 1923 will usher in a renewed activity of British car enterprise in the British overseas market.

Excellent advice to American car makers interested in or prospecting this market would be:

1. Send your chassis here without bodies.
2. Improve your brakes and brake adjustment.
3. Cut your engine bore down to 3 in.
4. Get the power by lengthening stroke (3 x 5 in. is a good rate for Europe).
5. Above all, scrap your demountable rims and substitute hub-bolted wheels.
6. Stick to the wood type, for there will be a reaction here toward the wheel-like wheel (mostly the hollow-metal-spoked type), and the wire wheel will not survive on cheaper cars.

A considerable drop in tire prices may be looked for. With labor costs down, tires at about half present rates, chassis weights pared by 400 to 500 lb. and material markets decontrolled from the trusts and rings, there will be a \$500 saving in the average car's production cost.

# Decreasing Overhead by Increasing Individual Capacity

Better production is really a by-product of better men and better organization. Mechanical equipment cannot overcome all the difficulties of human variation. Overhead charges in many large organizations exceed by half total labor and material charges. The remedy is discussed here.

By Harry Tipper

**T**HERE is a distinct tendency for the average capacity of the individual worker to decrease as the number of workers in the organization increases. Side by side with this tendency there is a constant tendency for the system to grow more rapidly than the amount of business would warrant, so that the opportunity for development in the individual is somewhat less.

There is, of course, a great variation in the actual development of these tendencies in different organizations due to the character of the management and the individual method of organizing. But the tendency is unmistakable and is to be observed in the growth of industrial organizations almost without exception.

The decreased average capacity is due partly to the larger difficulties in selection, requiring the manufacturer to accept workers in much larger quantities than the highly skilled minority, so that the average capacity and skill is decreased within the group as the size of the group grows.

The most important element, however, in the tendency for the individual capacity to decrease is the increased rigidity of the worker's skill, as the size of the organization grows and the number of subdivisions increases.

In small organizations it is necessary that a much larger proportion of the workers possess a capacity sufficiently flexible to permit their use for a number of different items of work. This necessity encourages the adaptability and increases the flexibility of the organization, so that each worker is used much more nearly to his capacity and the balance of the organization is preserved more accurately.

Any manufacturer who will think back to the days when he employed forty or fifty men, including his executives, will realize that most of these men were doing a great many jobs that are now the sole occupations of some specialized subdivision. They were able to accommodate themselves to the varying needs of the organization much more accurately and their capacity for growth was increased because of this adaptability and its effect upon the organization itself.

The large manufacturing concern with its thousands of employees has subdivided its work to such an extent that very few of the workers are skilled in more than one subdivision and frequently not in more than one fraction of the subdivision. They are not capable of adapting themselves to the fluctuating requirements of production within the department to the same extent. They cannot be used to consolidate the work of more than one department to the same degree, so that it is difficult to main-

tain the organization with all the individuals working at capacity and with the personnel balanced to the requirements.

This tendency has a good deal to do with the constant increase in the proportion of expense required for supervision and overhead in the factory costs. Not many years ago after the labor and materials were determined, 50 per cent was frequently sufficient to cover the rest of the costs. In many large factories to-day after the labor and materials have been determined, it is necessary to add 150 per cent in order to cover the fixed charges and the undivided items.

The subdivision and the increasing specialization which always grows with the large increases in the number of people employed in the organization demand a centralized system that has a tendency to enlarge itself more rapidly than the problem would warrant. Perhaps "demand" is not the correct word to use in this case, because the systems employed at present have not justified their existence as necessities in large organizations to the degree in which they have been used.

The past practice has assumed that these centralized systems were necessary with the constant subdivision of the work, and they have grown with great rapidity.

For instance, a man was called recently to the head of a business office to rearrange the work and put it on a better basis. He started in to familiarize himself with the methods employed. Picking up a letter which required an answer giving the customer certain information, he asked what would be done about it. He found that six people handled that letter before it was answered. Yet the same kind of letter was answered every day and the information was available to any of the clerks.

Subdivision of work and the arrangement of the system to agree with the subdivisions, rather than with the necessities, had created such a rigidity that the cost of some of the work was multiplied four or five times.

The examination of many of the factory systems will show a considerable percentage of the same rigid development without regard to the object but with a great deal of attention to the subdivisions and specialized departments. This tendency to a rigid subdivision and system itself still further decreases the average capacity by discouraging adaptability and increasing the difficulty of maximum work and balanced operations.

One of the well-known industrial engineers, in talking of a great industry the other day, claimed that not one of the factories in that industry was balanced so that it could operate full time in all departments and secure



a co-ordinated production. This is partly accounted for by the narrow specialization in the work and the rigidity of the system with their effect upon the natural adaptability of the intellect and flexibility of the skill.

The question is one of management. If it is possible for a hundred people to work together with a fair degree of human efficiency, a reasonable degree of understanding, and a flexible arrangement of production it is possible to get five thousand working together in the same way. True, it takes a great deal more study and analysis, more patience and time and a large consideration of the human side of industrial matters.

Managers of industry must do something, however. Prices have to come down. Competition must be faced. Greater efficiency must be secured. Every manager of industry knows that this cannot be secured out of the mechanical equipment improvement by itself. The 150 per cent of overhead is a good place to do some experimentation and analysis.

It should not be necessary to pay for the capital, accounting, office inspection, supervision, and so forth, more than the total actual production from the labor and material standpoint.

It is not likely that we shall do much along these lines so long as we continue to work under the idea that the product is more important than the man. We must be-

gin to get the idea that the product is the result of a more efficient man. Better production calls for better men and better management. Better production is really a by-product of better men and better organization. Mechanical equipment cannot overcome all the difficulties in human variation and all the wastes arising out of human misunderstanding.

A development of larger groups because of the greater value of the mechanical equipment through the co-operative effort of the larger groups will speedily reach its maximum unless the groups themselves are welded into a more definite organization with a larger distribution of responsibility in the proper proportion.

The machinery of industry is capable of being improved very greatly from a mechanical standpoint even to-day, but the speed of improvement will bear a very much smaller ratio to the total volume, so that the individual improvement in the mechanical appliances will not overcome the increasing cost of human failure.

The co-operation of the individual so that the men represent a high standard of efficiency and a large common measure of understanding, the welding of these small groups into larger groups so that the ideal of the whole establishment is translated into the same ideal standard of operation, are matters of much more importance than the development of the mechanical improvement, and the rewards in production efficiency will be considerably greater.

## Aircraft Engine Development

IN aircraft engines light weight is one of the important features, though it must not be obtained at the expense of reliability. This applies particularly to engines for commercial airplanes. Tests on the block quickly bring to light all weak points in the design of an engine, provided the materials of construction used were properly tested at the factory as to quality and suitability. But such tests give no indication of parts which could be reduced in weight without injury to the performance of the engine as a whole. It is for this reason that the lightening of water-cooled, 'stationary' aircraft engines, which were developed from automobile engines, proceeded rather slowly.

The development of rotary engines proceeded substantially in the opposite direction. In the design of these it seems that it was the practice to adopt what to educated judgment seemed the lightest permissible dimensions and leave it to practical use to develop the weak points, where it was absolutely necessary to strengthen the construction. In almost every case it was so-called notch points, that is, points with sharp corners or changes in section, where fatigue showed first and cracks developed. This method of gaining experience is rapid but painful and expensive, and it can be followed only if sufficient capital is available and eventual success is fully assured.

It is the opinion of Dechamps and Kutzbach, who deal with the subject in their book on Tests, Rating and Experimental Development of Aircraft Engines (Prüfung, Wertung und Weiterentwicklung von Flugmotoren, Vol. VI, Part 1, of the Handbook of Aircraft Engineering, published by Richard Carl Schmidt) that rational calculations of strength, with consideration of the increased stresses at points of abrupt change in section, would have saved many an expensive experience. Even the dreaded critical speeds of shafts or complete assemblies can be calculated in advance with tolerable accuracy, and trouble therefrom avoided.

The book under review is the result of experience gained during the war at the engine testing plant at

Adlershof, Dechamps having been in charge of the organizing work, as general manager, while Kutzbach acted in a scientific advisory capacity. Each of the authors is responsible for a number of the chapters. The following chapter heads give an idea of the scope of the work: Introduction; Testing Equipment; Testing Methods; Results of General Engine Tests; Researches on Changes in Output and Consumption; Contributions Concerning Fuel Feed and Carburetor Development; Contributions Concerning Engine Design; Retrospect and Prospect.

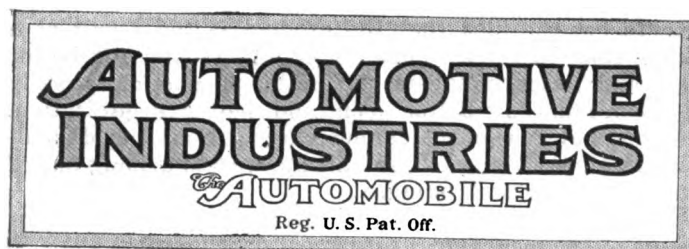
In the chapter on engine design the subject of gear reductions is gone into at considerable length, and a chart is given showing twelve possible designs with three shafts.

## Destination of Italian Exported Vehicles

THE destination of the motor cars and trucks exported from Italy is stated in a recent copy of the United States Commerce report. These figures include trucks for the years 1918, 1919 and 1920. A tabulation of the shipments for five years follows:

Countries of Destination	1911	1914	1918	1919	1920
England .....	939	985	...	144	3,068
Spain .....	32	36	30	159	1,198
Switzerland .....	81	219	8	218	982
Belgium .....	168	17	131	291	608
British India .....	11	48	1	73	568
France .....	295	210	2,673	259	451
Turkey .....	6	36	...	74	363
Argentina .....	378	131	4	5	332
Holland .....	46	41	...	36	233
Egypt .....	5	3	4	35	279
Algeria .....	...	2	...	235	227
Brazil .....	153	35	2	14	214
United States .....	144	217	...	14	209
Portugal .....	5	22	11	160	189
Norway .....	...	16	...	134	172
Denmark .....	...	1	...	74	143
Australia .....	174	157	1	76	142
Greece .....	4	73	19	89	106
Germany .....	24	389	...	...	...
Austria-Hungary .....	84	103	...	...	96
Rumania .....	108	69	...	...	...
Russia .....	65	156	...	...	...
All other countries .....	195	325	54	457	1,689
Total .....	2,918	3,291	2,938	2,547	11,320

\*German Austria.



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## Decreasing Overhead Costs

CONSIDERABLE time has been spent during recent years in devising systems of factory control and operation. Strenuous efforts have been made to so perfect methods of personnel control that the possibility of human error is reduced to a minimum. These attempts have aimed to remove from the individual the necessity for assuming responsibility; to lay out rules and regulations to cover every possible variation in practice so that under every condition the individual will have a rule by which to guide his actions.

The ultimate development of such a tendency would be to centralize responsibility so narrowly as to make the mass of workers mere machines. The result of such a process means a greatly increased overhead expense, a system of checks and regulations that becomes unwieldy and an enormous increase in the total manufacturing expense.

In proportion as individual responsibility is decreased the cost of supervision increases. It is not an easy task to develop men so that they are capable of assuming a larger degree of responsibility, but

efforts along this line pay better ultimately than those in the other direction. A careful study of the human element and an attempt to develop the capabilities of the individual to the highest degree is likely to be a large factor in the reduction of overhead costs in large organizations.

## Front Wheel Drive

RECENTLY there has been renewed activity in connection with front wheel drives for passenger cars. Various advantages are claimed for this drive, and its advocates hold it superior to the rear wheel drive now in almost universal use.

In the past the front wheel drive has met with a certain measure of success in connection with commercial vehicles. We need only mention the Latil front drive truck manufactured in France for a great many years, and the Christie front drive which has been exploited on a small scale in this country. In the great majority of the applications the fact that the front drive construction leaves the rear part entirely free of mechanism and permits of placing the body very close to the ground has been of particular value and really the reason for the selection of a front-driven truck or fore carriage. The rear axle, which is a plain or dead axle, may be cranked down between the wheels and the body brought within a foot or less of the ground. Such trucks have been used for the transportation of horses, for instance; and motor fore carriages have also been used for converting horse-drawn fire equipment.

The possibility of placing the body lower down would also exist in front-driven passenger cars, but it is doubtful whether its advantage would be rated very highly. If the rear axle were cranked and the body made sufficiently narrow to go between the crank arms, certainly not more than two persons would be accommodated on the rear seat. Such low seating would, of course, add to the stability of the car at high speed, but, on the other hand, it would bring the passengers closer to the dust of the road, and from this standpoint would be objectionable.

As a rule it is not the possibility of lowering the body that is urged as the main advantage of the front drive as applied to passenger cars. The claim is made that the transmission of power is more efficient in a front than in a rear drive, as the car is pulled along the road instead of being pushed; also that there is less tendency to skid. It is conceivable that under certain conditions power can be applied to greater advantage to the front than to the rear wheels. For instance, if the front wheels are located in a depression in the road, with rear drive there is a tendency to force the wheels into the far bank of the depression, whereas with front drive the wheels have a tendency to climb the far bank. A cross ditch or depression which would stall a rear driven car would therefore not necessarily halt a front drive machine.

It has also been argued that a front wheel-driven car is more efficient in turning corners. This claim is open to doubt, however. In turning a corner, with a properly laid out steering gear, both the front and the rear wheels move in circles around the same axis.

The front wheel tracks have a greater radius, however, than the rear wheel tracks, and with the same gear reduction to the front and rear wheels in cars which are similar except that one has a front drive and the other a rear drive, the front driven one would be able to exert the maximum driving effort on curves. The engine geared to the front wheels, however, would have to turn a greater number of times to complete a certain turn and would therefore do more work if the power output was the same in both cases. The front drive is therefore not really more efficient in this case but it gives the engine a bigger mechanical advantage, which corresponds to a lower gear.

Whatever advantages are offered by the front wheel drive are more than balanced by the complication of driving connections to wheels which have to swing around a vertical axis in steering. Most of the universal joints employed for this purpose introduce a periodic variation in the speed relation of the driving and driven parts, which at high speeds results in heavy strains on the connected parts. It is, moreover, a rather difficult problem to find room for both the engine and transmission in the limited space above the front axle; if the transmission were placed either above or below the engine instead of in line therewith, it would necessitate an additional gearset which would have to carry the engine power at all times, and this would involve power losses probably as great as the gains due to the various causes pointed out.

## The Day of Bus Transportation at Hand

**T**HERE are evidences that we shall shortly see a rapid growth in bus transportation in many parts of the country, and some truck manufacturers are preparing to meet this demand by the design of chassis especially adapted for this service. A description of one such chassis appears in this issue of *AUTOMOTIVE INDUSTRIES* and other articles dealing with various phases of bus transportation will appear from time to time in these columns.

It is important that car and truck builders who expect to enter and remain in this particular branch of automotive activity study the situation with a view to learning the fundamental facts which determine the difference between a successful and an unsuccessful product. It is hardly to be expected that an ordinary truck chassis equipped with a bus body, but devised with little thought for the comfort and safety of the passengers, can hope to compete very long with a vehicle especially designed for bus service. Nevertheless many units of the truck and the bus can be identical or very similar in character.

There may always be a certain percentage of improvised buses or so-called "jitneys" in service, but the public will soon recognize the difference between a comfortable and safe vehicle under competent and responsible operation on a regular schedule and one which is the reverse. Much harm can and has already been done by the latter type in creating prejudice which must be faced and overcome by intelligent education fostered by the manufacturer who is prepared to build and market a thoroughly creditable product.

It is certain that the bus must be made as safe as it is possible to construct it. It should be made comfortable to ride in and easy to enter and alight from. It should be economical to operate, especially as regards fuel consumption and tires, and upkeep cost should be minimized. No vehicle should be sold knowingly for service in which it cannot be expected to operate at a profit with ample allowance for depreciation, for experience gained in uneconomical operation reacts to the disadvantage of the manufacturer.

The sales possibilities in this field have not yet been examined to any great extent. In fact, the potential use of motor bus transportation still constitutes an entirely uncharted field. Efforts to develop in this direction will be of benefit to the truck industry.

These are some of the essentials to be considered by companies which contemplate entering the bus field. There is evidently an opportunity for the manufacturer who is willing to study and analyze these and other factors upon which to build a business and a reputation. Without such an analysis, however, the possibilities of success are minimized.

## Use of Cradle Type of Fan Dynamometers

**F**AN dynamometers have been used in the automotive industry to some extent, but their usefulness has been limited by the fact that the results obtained depend on the atmospheric temperature and pressure as well as on the proximity of walls. Consequently it is impossible to give a simple formula by which to determine the output of the engine from them. This disadvantage of the fan dynamometer was overcome by aircraft engineers, who mounted the engine on a cradle and provided the crankshaft with either a propeller or a club, so that the torque reaction could be measured exactly as in the case of an electric dynamometer. No calibration curve of the fan is then needed. Both the speed and the torque are measured directly and their product is a measure of the horsepower delivered to the fan.

It would seem that this principle could be used to advantage also in automobile engine shops. At any rate, if fan dynamometers are installed, it is desirable to make them of the cradle type so that accurate measurements can be made with them under all conditions. The electric dynamometer has the advantage over the fan dynamometer that the relation between rotary speed and torque can be changed at will while the engine is running, which is not possible with the fan dynamometer, unless the fan be enclosed in a casing with a variable opening at the inlet or discharge. With a dynamometer having adjustable aluminum blades the load can be changed while the engine is at rest. In many respects the fan dynamometer of the cradle type would seem to be the equal of the electric cradle dynamometer, and the disposal of the energy absorbed requires no auxiliary apparatus. The cost of construction should be in favor of the fan dynamometer, especially in the case of small machines. On the other hand, the electric type is much more quiet in operation, and can be used to crank the engine or to drive it when it is desired to measure the friction hp. or to run the engine in.

# Good Business Conquers Pessimism

## August Sales 70% of Same Month 1920

**Prospects Are September Will Be  
on Par with August—Optimism  
Prevalent**

NEW YORK, Sept. 14—Pessimism which has been apparent in Wall Street for some time in reference to the automotive industry is not justified by actual conditions and has not been since March. August sales, exclusive of Ford, were 70 per cent of sales for August last year and were 2 per cent in excess of July. Business for July was 7 per cent better than in June. Ford sales for this period were larger than ever before in the history of the company.

Prospects are that with Ford, Dodge, Buick and Studebaker as leaders, sales in September will be on a par with those for August. In comparison with other years mid-summer sales of passenger cars were almost unprecedentedly large in relation to the earlier months.

### Trucks Improving

While the commercial vehicle branch of the industry is still at low ebb it is gradually improving and there has been apparent in the last few weeks a considerably increased demand for light delivery trucks.

Not only was the vehicle manufacturing end of the business better in August than in July but the same was true of parts and accessory manufacturers. July for them was slightly better than June and August slightly better than July. New orders and releases already received for this month indicate that there will be no falling off. Gradual reduction in tire production may be expected as the touring season comes to an end.

Purchasers of automobiles are being given the benefit of lower manufacturing costs resulting from wage reductions, greater labor efficiency and lower cost of materials. Keener competition also is a factor in price cuts on cars and trucks.

### Retailers Hopeful

Retailers and distributors are hopeful, however, that whatever price adjustments remain to be made will be put into effect at once for they believe price stabilization is necessary before there can be stabilization of sales.

In some sections dealers expect the belief of prospects that there will be further price cuts may interfere somewhat with September sales. There is general expectation that after this month

business will gradually taper off until the show season in January but this is a perennial condition. There is in prospect an unusually heavy demand for enclosed models of passenger cars. The large number of new models which will be brought out this fall by makers of popular lines also are expected to stimulate sales. These two factors will prevent anything in the nature of a disastrous slump.

## Wilmer, New Goodyear Head in California

SAN FRANCISCO, CAL., Sept. 12—E. G. Wilmer has succeeded to the presidency of the Goodyear Tire and Rubber Co. of California, and its subsidiary, the Goodyear Textile Mills Co. The board of directors of the Goodyear Textile Mills Co., on Sept. 3, accepted the resignations of F. A. Seiberling, S. A. Steer, and C. N. Turner, and elected Wilmer, G. M. Stadelman and P. W. Litchfield to fill the vacancies. The new board, in turn, elected Wilmer to succeed Seiberling as president, and declared the quarterly dividend of 1¼ per cent on the preferred stock of the company, payable Oct. 1. Dividends in arrears, it was announced, will be paid when the company's financial situation permits. Following his election as president, Wilmer issued the following statement:

**Assets \$6,000,000**

"After giving due effect to an adequate write-down of inventories, as of March 1, 1921, and offsetting the profits accruing from operations subsequent to March 1, there is an existing deficit as of July 31, of approximately \$2,400,000. On the basis of the current costs of operation, made possible by the write-downs of inventories, the company has conducted its operations from March 1 to July 31 at an average profit of approximately \$200,000 per month, available for interest and reduction of deficit. The cash and current positions are most gratifying. On July 31, current assets approximated \$6,000,000 and current liabilities \$625,000, while the company's cash balance was approximately \$1,000,000."

### NELSON FILES PETITION

DETROIT, Sept. 8—The E. A. Nelson Automobile Co. has filed a voluntary petition in bankruptcy. The liabilities are given as \$122,207 including unsecured claims of \$119,559. The nominal assets are listed at \$501,013 but \$432,000 of this amount is credited to patents, copyrights, trade-marks and development work. Cash on hand amounts to \$25. The E. A. Nelson Automobile Co. took over the bankrupt E. A. Nelson Motor Car Co. on March 23, 1920.

## Fordson Production Is Now 26,000 a Month

**200,000th Machine Built at River  
Rouge Plant—Officials  
Thoroughly Pleased**

DETROIT, Sept. 12—Production of Fordson tractors at the River Rouge plant from March 1 to Aug. 1 totaled 26,000, a showing which the company feels thoroughly satisfied with in view of existing business conditions. In August the 200,000th Fordson was built and will be kept at the plant as an emblem of the growth of the tractor business since its inception.

Despite adverse foreign trade conditions, the company notes that many tractors have been shipped to Canada, South America and other foreign lands, 700 going to Canada alone. A large increase in Fordson business in Europe is being cultivated in view of the improved trade and business conditions there.

Of the Fordsons distributed in the United States in the past five months, Ohio has been the largest buyer, more than 3000 going there. Pennsylvania came second with a sale of 2800 machines. New York State farmers took over 2300 and Michigan and Wisconsin were about even for fourth, each taking about 1800. Indiana came next in the order of distribution and New Jersey seventh. Virginia, Illinois, Massachusetts, Minnesota, California, Washington, Tennessee, Connecticut and Oregon were among the leading States.

## Price Reductions Aid Car Sales in Columbus

COLUMBUS, Sept. 12—With the reduction in prices of the Ford, Overland, Oldsmobile, Chevrolet and several other makes, trade in passenger cars in Columbus has been stimulated. All of the dealers who handled the makes on which reductions were made reported a marked increase in demand with business much better than was anticipated.

Other lines have been selling fairly well and dealers report a fair business. When present unsettled business conditions are considered business is better than might be expected.

The unemployment situation in Columbus has improved to a certain extent recently and this has the effect of instilling optimism into the dealers and salesmen. The feeling in industrial circles is improved to a large degree and orders are not quite so hard to land as formerly. Prospects for the future are considered fairly good and dealers in passenger cars believe that the fall months will show a considerable volume of business.

# \$48,000 Damages in Perlman Case

## Munger Victorious in Long Litigation

### Similar Suits Pending Against Firestone and Goodrich Rubber Companies

NEW YORK, Sept. 12—The Federal Court of Appeals for the second circuit has handed down a decision granting \$48,000 damages to Louis D. F. Munger in his patent litigation against the Perlman Rim Co. which has been in the courts several years. After the validity of the Munger patent had been sustained in the higher Federal courts the master who heard the evidence decided that Munger was entitled to \$72,000 damages. The defendant then appealed on this point and the Circuit Court of Appeals cut the amount of damages to \$48,000.

#### Other Suits Pending

Munger has similar suits pending against the Firestone Tire & Rubber Co. and the Goodrich Rubber Co. They were filed several years ago but have been held in abeyance pending the result of the suit against the Perlman Rim Co. Now that damages have been assessed in the original action the other suits will be pressed, according to W. A. Redding, attorney for the plaintiff.

The Munger patent expired on Dec. 5, 1916, but suits for infringement can be filed up to Dec. 5, 1922. Damages for the use of the patent which it is alleged has been infringed can be assessed, however, only for a period of five years prior to the filing of the suits. It was said to-day at the offices of Redding that no suits would be started against automobile manufacturers and that no litigation is contemplated beyond that which is now pending.

#### Years in the Courts

The affairs of the Perlman Rim Co. have been in the courts for years and constitute one of the most dramatic and romantic chapters in the line of litigation connected with the automotive industry. Munger came into the case several years after the Perlman Rim Co. had established the validity of the patent covering the collapsible rims in question. The validity of the patent had been sustained in a suit brought against the Standard Welding Co. by Louis Perlman, and all Munger had to do was to establish his ownership of the patent.

Louis H. Perlman was the first to sue for infringement of the rim which now bears his name. The action was brought against the Standard Welding

Co. and was successful. Judgment was obtained against the company for a very large sum and the plant was closed. Not enough rims were being manufactured to meet the demand and W. C. Durant organized a company of which Perlman was president to go into production. This was known as the Perlman Rim Co. The company took title to the patent and also took over the Standard Welding plant under the judgment which had been obtained.

When the United Motors Corp. was formed by Durant it took over the Perlman Rim Co., giving two shares of United Motors stock for one share of Perlman Rim.

When the assets of the Perlman Rim Co. were taken over by United Motors it is understood they assumed all the obligations of the company which they absorbed, and the same was true of United Motors when it was taken over by the General Motors Corp. If this contention by the attorneys for Munger is correct, the General Motors Corp. will be responsible for his judgment.

After his success in the original suit, Perlman brought action for infringement against the Firestone Tire & Rubber Co. This suit was withdrawn, however, before presentation of the evidence had been completed.

#### Munger Had Patents

At the time the Perlman patent was sustained, Munger had in his possession a collection of patents, and he alleged that one of them covered the Perlman rim. He sued for infringement and before the case came to trial the Perlman action against the Firestone company blew up. Several years had elapsed after Munger obtained his patent before he filed suit against Perlman. When his case went to trial, Munger was asked to explain why he never had manufactured under his patent. He asserted that he had made numerous efforts to do so and had formed several companies but that all of them had failed because of lack of capital.

While the trial was under way, a Philadelphia junkman bought all the assets of the latest of the Munger companies, and the Perlman attorneys contended that the purchase included the rim patent. They went to the junk dealer and obtained an assignment of the patent from him.

When this assignment was presented to the court, Munger produced a contract he had made under which the patent was to be assigned to his company provided a certain amount of capital was invested in it. He showed that this capital was not forthcoming and that failure of his company resulted. For that reason his contention that the patent was not included in the purchase of the junkman was sustained and he won his suit for infringement.

## Workers Benefit by Ford Price Cuts

### Hundreds of Unemployed Will Work in Parts Plants Now Speeding Up

DETROIT, Sept. 12—Reduced prices in Ford cars and trucks followed a series of negotiations between the company and the companies supplying it with parts, by which new price arrangements were made in practically all cases and orders placed ahead for several months' supply.

Under the stimulus of this business all of these parts suppliers are now operating on an increased schedule, giving work to many men who have been listed among the unemployed for months, and in some cases overtime is being indulged in until the pressure of business is brought to a point where it can be met by regular daily operations.

Many departments of the Ford company which had run ahead of the assembly branches in the latter part of August are now resuming full time operation. Assembly has been at maximum speed since April, but despite this some of the factory departments have from time to time run ahead of actual car production, necessitating temporary layoffs.

In a great many of the factories here orders for some time past have actually warranted an increase in production, but this has been steadily countermanded in an effort to hold operations to a steady day-to-day basis. Under the pressure of continued orders, however, several of these factories are adding daily to their employee organization and are preparing to go into increased production.

## D. L. Morgan Succeeds Batchelder in A.A.A.

NEW YORK CITY, Sept. 12—D. L. Morgan, business man of New Haven, Conn., was to-day appointed chairman of the executive board of the American Automobile Assn., succeeding Amos G. Batchelder, who held the position for many years and who was killed in an airplane accident in Maryland last May.

Morgan will devote his entire time to the work and will be located in the headquarters in Washington, D. C. He has been closely associated with motor affairs for eight years. For six years he was with the Lackawanna Motor Club, Scranton, Pa., and for the past two years, while living in New Haven, has organized the Automobile Club of New Haven. In business he has been associated with Bradley-Smith Co., confectionery manufacturers.



## Revenue Bill Study Taken Up by N.A.C.C.

### Tax Committee Gives Close Consideration to Sections Affecting the Industry

NEW YORK, Sept. 12—The tax committee of the National Automobile Chamber of Commerce is giving close consideration to three sections of the revenue bill now before the finance committee of the Senate to which little attention has been paid previously by the automotive industry.

One of these relates to the manufacturers' excise tax. When the law was first put into effect in 1917 it was construed to cover not only sales at wholesale but retail sales made through factory branches. Remedial legislation was enacted in 1918 to relieve wholesalers of the payment of a retail tax, but this paragraph of the law was omitted in the present House bill, and unless an amendment is made by the Senate, the situation will revert to that which prevailed in 1917.

Another section of the law which would add materially to the bookkeeping burdens of manufacturers provides that every employer must make a report on every employee, whose rate of pay per hour would provide an annual income in excess of \$1,000. This would make necessary a report on all kinds of casual labor and would materially increase bookkeeping costs.

The third section to which exception is taken is that relating to the excise tax on tires and automobiles. Although the framers of the measure declare that no change is intended, the phraseology is somewhat different and it is held that new phraseology must always be interpreted and that in consequence it might lead to misunderstanding and inconvenience.

These questions will be taken up with the finance committee if a hearing can be obtained. Letters on the subject now are being sent to individual Senators.

### TEMPLAR CARS DOWN

CLEVELAND, Sept. 12—Another cut in prices of \$400 is announced by the Templar Motors Co. The open models have been reduced from \$2,385 to \$1,985 and the closed models from \$3,185 to \$2,785. The open cars now cost \$900 less than on June 30 and the closed cars \$1,000 less.

### MOON CUTS THIRD TIME

ST. LOUIS, Sept. 12—The Moon Motor Car Co. announces its third price reduction, effective immediately. The prices now are \$600 lower than last fall. They are based on 1914 labor, material and overhead costs. The open models have been cut \$200 to \$1,785 and the closed models \$200 to \$2,785.

### ONE HORSE TO 372 MOTOR CARS AT CONNECTICUT POINT COUNT SHOWS

HARTFORD, CONN., Sept. 12—A count of vehicles made by the State Highway Department for the National Highway Assn. shows, among other things, the remarkable decrease of horse-drawn vehicles. Figures announced to-day, taken at a point in Thompsonville, between this city and Springfield, on the State highway built to meet interstate motor traffic, include 28,039 passenger automobiles, 2395 motor trucks, 334 motorcycles and 83 horse-drawn vehicles, for a certain period of time. This is about one horse to 372 motors.

The count made was one of many initiated by the national association to secure information for use in road building. The men making it noted the character of the trucks, direction of travel, size of tires, freight, and weight on axles. The work was done with the least inconvenience possible to drivers.

Notice was issued before it started to explain that the inspectors were not stopping vehicles to look for liquor nor were questions asked for any ulterior motive.

## Hendee Motorcycle Prices Reduced 22½%

SPRINGFIELD, MASS., Sept. 12—The Hendee Mfg. Co. announces a reduction of 22½ per cent in the prices on 11 lines of motorcycles. They are effective immediately. The company is bringing out a new machine called the "Indian Chief" which will sell for \$435. The report of the company for the fiscal year ended Aug. 31 shows that more than \$900,000 of bank loans were paid off during the year and that current liabilities aggregate only \$200,000 contrasted with about \$4,000,000 of current assets.

### VIM TRUCKS DOWN

NEW YORK, Sept. 12—The Standard Steel Car Co., which now owns the Vim truck, has announced the following new prices:

Model	Old Prices	New Prices
Vim 29.....	\$1,355	\$1,050
Vim 30.....	1,550	1,175
Vim 31.....	2,475	1,975

### BELL TRUCKS DROP

OTTUMWA, IOWA, Sept. 12—A general reduction in the prices of Bell trucks, effective at once, has been announced by the Bell Truck Sales Corp., sales division of the Iowa Motor Truck Co. The prices follow:

	New Prices	Old Prices
Model M 1 ton.....	\$1,495	\$1,650
Model E 1½ ton.....	2,100	2,250
Model O 2½ ton.....	2,550	2,750

## Cleveland Makers Report Increases

### Federal Survey Also Shows Greater Demand for Cars Since August 15

CLEVELAND, Sept. 12—Statements by various local makers of automobiles to the effect that the demand has increased gradually since August 15 is borne out by a report of the committee on labor relations of the Chamber of Commerce, on the employment condition in Cleveland. This report was prepared for the United States Department of Labor.

The survey shows that industrial conditions in this city have improved over July, while the retail merchants' board of the Chamber of Commerce has learned that retail buying is on the increase in practically all lines. The retail automobile trade is taking the lead, however, and the large cuts made in the prices is said to be responsible.

The survey of employment disclosed that there has been an increase of 1.5 per cent in the number of employees in August. The concerns covered in the survey number 99, and they are representative of all industries.

Automobile makers reported an increase in employees on Aug. 31 of 2.9 per cent over the last day of July. Iron and steel products are moving more freely in this district, and as a result there was an increase of 3 per cent in employees; food and kindred products show an increase of 7.9 per cent; paper and printing 3.9 per cent; textiles and their products 2.2 per cent; chemicals and allied products 3.9 per cent. The following industries reported losses as indicated: Lumber and its manufacture 6.3 per cent; metals and metal products other than iron and steel 2.4 per cent, and miscellaneous 1.5 per cent.

Railroads in this section are hauling more freight than they have in months. All the trunk lines are putting back trains that were taken off the schedules months ago.

### WICHITA TRACTOR CUT

WICHITA FALLS, TEXAS, Sept. 12—Wichita Motors Co. has announced a price cut of \$500 on the Wichita tractor, Model T. It will now sell for \$2,000.

### MAURITIUS A GOOD MARKET

LONDON, Sept. 3 (By Mail)—The 400,000 people in Mauritius are very well off and the motor vehicle is becoming more essential to them every day. For tilling the ground only very strong tractors can be used as the soil, though extremely fertile, is very stony. There is some talk of electrifying the island's railroads, but in an island 36 miles by 24 the motor truck is obviously the best means of transport.

## Insurance Risks Greater in Cities

### Some Few Companies Escape Losses by First Investigating the Owners

NEW YORK, Sept. 12—Discussing the automobile situation, which "continues to be the chief source of worry to the officers of many of the fire insurance companies," the New York Journal of Commerce says:

"Here and there is found a company which is not doing any serious worrying. These are mostly institutions which have not sought a large volume, but have applied to the automobile business the same methods they used in underwriting other classes. Realizing that the hazard was in the owner rather than in the car, they have investigated the owners through the "Fire Record," mercantile agencies and various reporting agencies and have kept off their books a considerable business which is now presumably causing sorrow to some of their competitors. They are having more than a normal loss ratio, but they have not to blame themselves for want of care.

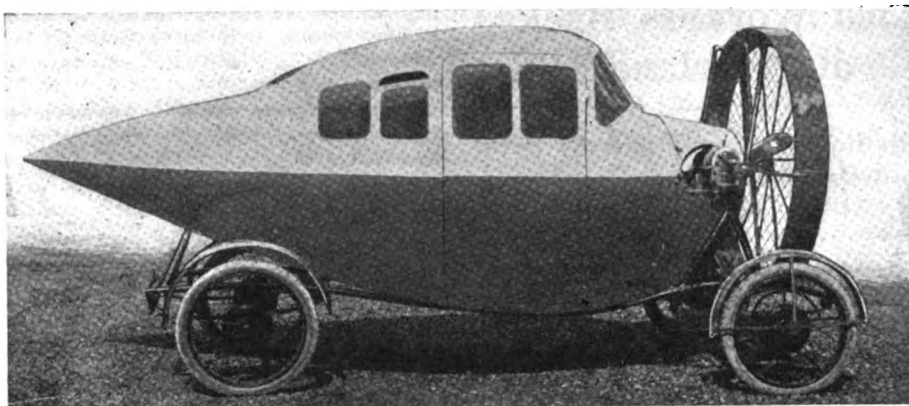
"One noteworthy feature of the automobile situation is the fact that it is so much worse in large cities than in the country and smaller places. After making due allowance for the greater prevalence of crime in large cities, there is still ground for the belief that the better experience in the smaller places is due in part at least to the fact that the agents who underwrite the business know the assured, while in the large cities the underwriter as a rule knows only the broker who presents the risk.

"A wide difference of opinion exists as to the value of inspections on assured. One official says that his company has had excellent results from the Retail Credit Co.'s investigations. An officer of another company says it has secured more satisfactory results through other agencies. Still another company uses the mercantile agencies first because their reports cost less, and then the Retail Credit Co. later, if necessary. That the system of getting reports on owners of cars is growing is evidenced by the expansion of this branch of the business of the Retail Credit Co. Vice-president Walter C. Hill of that company writes:

"It is only within the last few months that fire insurance companies have been making anything like regular or systematic use of inspection information. During that time we have opened with nearly a hundred fire companies accounts for investigating automobile fire risks. This includes practically all the big companies. We have never handled any line of reporting in which there is such a large per cent of unfavorable reports. One company has us make a review of all their auto fire business in Kansas City and found it necessary to cancel 17 per cent of the risks on their books. Similar reviews have been made in other communities with approximately the same results."

### DRAGON UNDER INQUIRY

CHICAGO, Sept. 12—Alleged misuse of the United States mails and violations of the State blue sky laws by the Dragon Motors Corp., a concern capitalized at \$1,000,000 are being investigated by Federal and State authorities.



### Newest Car on French Roads

A "windwagon" of recent French construction. The La Traction Aérienne is a closed machine seating two persons in tandem and is equipped with a two cylinder aircooled engine of 3.5 by 4.7 in. cylinder dimensions. Vehicles of this type are permitted on French roads provided the propeller diameter does not exceed the maximum width of the vehicle and the propeller is properly protected. The machine weighs 520 lbs.

### Willard Now Making All-Rubber Batteries

CLEVELAND, Sept. 12—No wood enters into the construction of the new all-rubber battery now being manufactured by the Willard Storage Battery Co. The plate assemblies are contained in compartments which are formed by rubber dividing walls which are integral with the molded rubber case. Thread rubber insulation is used. The sizes in which this new battery is being produced and the retail list prices are as follows:

6-volt, 11 plate.....	\$47.30
6-volt, 13 plate.....	53.90
12-volt, 7 plate.....	61.95
Ford size.....	35.00

The price on the Ford size of the new battery is the same as for the thread rubber battery for Fords with wooden case.

### INTRODUCE "VAUGHN" CAR

GREENSBORO, N. C., Sept. 12—The American-Southern Motors Corp. is officially introducing its new model, the Vaughn, to the public at the "Made in Carolinas" Exposition this week. The new car has been put to rigid tests the past few months, and the manufacturers are greatly pleased with the showing made. Hiram M. Browne is designer of the new car and he has just given it a 3000-mile drive, having no trouble on the trip. Actual running time was 98 hr. 20 min., an average of 31.58 miles an hour. Gasoline consumption was 13 3/4 miles per gallon of fuel consumed, weight carried 4950 lb. This car will be presented in two models, a sporting touring car and racing roadster. Another type of the Vaughn will be a family car, presented in three models.

### N. I. V. A. TRACTOR SHOW

CHICAGO, Sept. 12—Offices have been opened in the headquarters here of the National Implement and Vehicle Assn. to take up the preliminary work in connection with the seventh national tractor show and educational exposition which will be held on the Minnesota State Fair Grounds at Minneapolis Jan. 30-Feb. 4.

### Stockholders Finish Immel Reorganization

COLUMBUS, OHIO, Sept. 12—The reorganization of the Immel Co. of Columbus has been completed by the committee of stockholders, which bought up the plant and all materials recently at receiver's sale. Recently the Buckeye Body Co. of Columbus was chartered under the laws of Ohio with an authorized capital of \$1,000,000.

The incorporators are A. G. Gilmour, J. W. Dinsmore, F. E. Kocher, G. P. Hinkle and Willard Miller. The incorporators are members of the stockholders' committee with the exception of the last named who is an attorney. The board of directors consists of J. W. Dinsmore, F. E. Kocher, G. P. Hinkle, A. G. Gilmour, V. W. Moss, J. G. Goeller and C. W. McFarland. J. W. Dinsmore is president, F. E. Kocher vice-president, and G. P. Hinkle secretary-treasurer. The company will soon start active operations at the plant, and a contract with the Velie company will likely be revived.

### RICE ADDRESSES M. A. M. A.

DETROIT, Sept. 14—H. H. Rice, president of the Cadillac Motor Car Co. and treasurer of the National Automobile Chamber of Commerce, will discuss business conditions in the automotive industry and prospects for the future at the meeting to-day of the credit convention of the Motor and Accessory Mfrs. Assn. Theodore H. Price, editor and publisher of Commerce and Finance, will address the convention to-morrow on the subject, "Why I Have Faith in the Automotive Industry."

### NEW FORD DEALERS IN MEXICO

HOUSTON, TEX., Sept. 12—The Ford Motor Co. of this city has signed up the Robertson Motor Co. of Mexico City as its third dealer in the Federal district of Mexico. New dealers also have been placed in Guadalajara, Zacatecas, San Geronimo, Saltillo and Torreon.

## 2500 Workers Back at Overland Plant

### On Road to Conditions of 1916, President Willys Says in Statement

TOLEDO, Sept. 12—More than 2500 men were put back to work this week by the Willys-Overland Co., at the local plant and 2000 were recalled at the Willys-Morrow plant at Elmira, N. Y. The latter plant makes parts for the Overland automobiles. John N. Willys announced here this week that production would be doubled and more men put back to work.

In the last month reductions have been made in the working forces as the selling activities of the company slackened but with the third price reduction announced last Saturday in effect sales boomed so that a reaction was necessary at the plants.

"I am devoting practically all of my time to Overland in field sales work among the dealers," said Willys, who was in the city this week for a conference with Walter P. Chrysler, executive vice-president and divisional sales manager.

"We have a very satisfied lot of dealers. Personally I believe we are on the road back to conditions as they existed in 1916. Willys-Knight sales have shown a greater increase by three times than have Overland sales."

The first three days following the announcement of the price cuts brought in sales of 3,100 cars and the fourth day before noon 435 orders were booked.

Willys said he was especially pleased with the progress at the factory and the management of Vice-President Charles B. Wilson.

The agricultural fields are looked to for a great buying increase this fall. The harvesting of crops and the lower prices for automobiles will give great impetus to the farm sales, is the opinion of the Willys leaders.

Toledo sales have shown a large increase during the week, according to Leroy Peed, manager of the Willys-Overland, Inc., here.

"We feel that we can make a new record this fall," he said.

L. J. McCracken, who recently established a sales record for Overlands at Bridgeport, Conn., will assume management of retail sales for Toledo, succeeding Lewis P. Kinsey, on Oct. 1. Kinsey, who has been long identified with Overland, is leaving the motor field.

McCracken was formerly in the New York sales office of Willys-Overland.

With the development of new sales policies and the pick-up in sales the last week more activity is reflected in the automotive subsidiary plants here including the Electric Auto-Lite Corp., Tillotson Carburetor Co., Mather Spring Co.

The movement of Willys engineering forces to Toledo has been completed. W. S. Fisher, who has charge of design-

ing Knight motors at the Elyria plant, is now located with his assistants here under E. H. Belden, chief engineer for the company.

The entire sales situation was reviewed at a conference here this week attended by Willys, Chrysler, Charles LeRoux, Minneapolis, northwestern division manager; Walter Wright, southern division manager; R. H. Butler, central division manager; and W. L. Colt, New York, eastern division manager.

## O. T. Pearson Becomes N.A.C.C. Staff Member

NEW YORK, Sept. 12—O. T. Pearson has been added to the staff of the educational department of the National Automobile Chamber of Commerce to develop work in economic research. He was a graduate of the University of Michigan and did graduate work at Carnegie Institute of Technology.

Pearson has had a wide experience in research work and his addition to the staff of the N. A. C. C. will permit branching out along new lines. A bulletin will be issued regularly summarizing general business conditions in relation to the automotive industry. This is designed to supplement the work of factory sales departments in economic investigation. The bulletin will be of general interest to the industry and especially to the smaller companies which cannot afford to conduct such a department for themselves.

## Portage Stockholders Arrange Stock Issue

BARBERTON, OHIO, Sept. 12—Stockholders of the Portage Rubber Co. have made plans for reorganization and refinancing under new management by the issuing of \$1,000,000 in first mortgage sinking fund bonds. Present stockholders will be given first chance to purchase these bonds which will bear 8 per cent interest. The present common stock which has no par value with be withdrawn and new common issued. Creditors of the company and those with which it has fabric commitments will be asked to accept the mortgage bonds. It is expected that E. A. Tinsman, former manager, will be elected vice-president and general manager.

## Change Date of Meeting for Service Managers

NEW YORK, Sept. 12—The convention of factory service managers to be held under the auspices of the National Automobile Chamber of Commerce will be held Nov. 15 and 16 instead of Nov. 22, as tentatively planned, as this latter date comes too close to Thanksgiving Day. A questionnaire has been sent to members asking for suggestions as to subjects to be taken up at the convention and it is probable that arrangements will be made to conduct those delegates who are interested through local factories and service stations.

## Trade Conditions Better in Canada

### A. I. C. Convention Shows Industry Has Demonstrated Stability—Future Is Assured

TORONTO, Sept. 9—At the annual meeting of the Automotive Industries of Canada (the N. A. C. C. of the Dominion) was held in Toronto, reports showed that conditions had been better than anticipated, that the products of the industry had enjoyed a better sustained demand than those of many other industries, thereby demonstrating their stability and the fact that the service they gave was needed and that conditions were bettering and the future assured were the outstanding general opinions expressed. The following excerpts from the "Annual Review" are of interest:

"Statistical data supplied by members of our association show that during the year 1920 a total of 97,868 motor vehicles were manufactured by ten companies belonging to the Automotive Industries of Canada. These companies had a capital investment of more than \$43,000,000 and their production values totaled \$93,880,864. The figures for the entire industry showed a total of 21,940 employees at the busiest season, a total of \$23,826,240 paid in salaries and wages, a capital investment of \$87,158,869 and a production value of \$157,120,337 for the year 1920.

"In addition there were in 1920 a total of 5522 automobile dealers with 43,094 employees to whom \$56,022,200 was paid in wages. The total capital invested by dealers was placed at \$44,176,000.

"The number of persons dependent on the automotive industries is shown in the chart as 87,760 and the number of dependents on the retail trade 194,464, a grand total of 282,224 dependents on the manufacture and sale of motor vehicles in Canada."

(These figures do not include service or gasoline stations, garages or repair depots. Were these included it is estimated that the total would be swelled to approximately half a million dependents.)

The 1920 board was re-elected with the exception of W. A. Eden of the Dominion Rubber System, who succeeded R. E. Jamieson of the same corporation. R. S. McLaughlin, president, General Motors of Canada, Ltd., was re-elected president and W. T. Sampson, general manager, Gananoque Spring and Axle Co., Ltd., vice-president.

## SUNDRIES FIRM BANKRUPT

NEW YORK, Sept. 12—Schedules in bankruptcy have been filed by the Automobile Sundries Co., Inc., of this city. Liabilities are listed at \$80,026 and assets at \$60,789. The principal creditor is the Champion Spark Plug Co., which has a claim for \$29,506.

## New Firm Will Sell Reimported Trucks

**Slough Trading Company Formed  
to Dispose of 1,000—Only 70  
Sold**

NEW YORK, Sept. 12—The Slough Trading Corp. of America has been organized as representative in the United States of the Slough Trading Corp., Ltd., of England to dispose of approximately 1000 former American army trucks purchased of the allied governments and sent here for re-sale. W. O. Crabtree, who has been well known in New York for several years as truck dealer, is general manager of the corporation which is seeking dealer representation throughout the United States.

The trucks include Mack, Pierce-Arrow, White, Packard and Riker and range in capacity from 3½ to 5 tons. They will be sold as reconditioned vehicles at approximately one-half the list price of similar new trucks.

The Slough Trading Corp. of America succeeds previous representation of the British company. It will handle only the distribution of trucks, selling through local dealers in New York as elsewhere.

Speaking of the project, Crabtree stated his opinion that the truck business in the United States cannot be put on a sound basis until these reimported trucks, which the entire business community knows are here and will be sold sometime, have been disposed of. Up to date less than 70 of the Slough reimportations have been sold and Crabtree feels that uncertainty will prevail in the truck market until the balance of the 1000 vehicles are put in the hands of users.

Crabtree makes no claim that the trucks are "as good as new," stating frankly that some have been operated and others have suffered sufficient deterioration in shipment and storage to necessitate reconditioning.

## Ford Plans Car Shops Along His D., T. & I. Road

SPRINGFIELD, OHIO, Sept. 12—After an inspection of the local property of the Detroit, Toledo & Ironton Railroad by Henry Ford, its owner, he said he plans eventually to locate car shops at convenient points along the road so that rolling stock can be repaired without keeping it out of service for long periods. He added that he expects to develop a new type of freight engine to be used on the road.

Intimation that Ford contemplates entering the river shipping business was seen in his statement "that the Ohio River is navigable the year round and business can be handled to and from the South by water. The use of water transportation is coming back and will be developed more thoroughly in the future."

Ford has been asked to purchase the

defunct Missouri & North Arkansas Railroad when it is sold at public auction next month. The road is 364 miles long and extends from Joplin, Mo., to Helena, Ark., passing through a heavily timbered country containing large deposits of manganese. Ford has not indicated whether or not he will bid for the property.

## Canada Gets Gasoline Supply from Roumania

WASHINGTON, Sept. 12—Gasoline is being brought from Europe to Canada and arrangements are likely to be made for a continuous supply from Roumania, according to a report received from Consul Felix S. S. Johnson, Kingston, Can. This gasoline is being sold at service stations in Montreal at a price of one cent per gallon less than the prevailing retail price, and arrangements are said to be under way for a continuous supply by tank ships from the same source. Establishment of this trade with Roumania will in a measure offset the indebtedness of that country to Canada as the result of war loans.

It will be somewhat unique for Canada to obtain her supplies of gasoline from Europe as many interesting points are involved, such, for example, as the quality of the product, the consul states, in view of the existing Canadian tariff which seeks to bar out high grade gasoline as a protective measure and also as to the effect on prices in Canada of such importations.

## Car and Cycle Clubs Plan British Race

LONDON, Aug. 31 (By Mail)—The Junior Car Club, which was founded in 1912 as the Cycle Car Club, will conduct a 200 mile race on the Brooklands track, Oct. 22. It will be open only to members of the club, but will be held under the rules of the Royal Automobile Club. The race is divided into two classes for motor propelled vehicles. The first class will be for cars under 67.2 cu. in. and class two for cars between 68 cu. in. and under 91.5 cu. in. The race will be the first of its kind ever held in England. Fifty-one cars have been entered, representing 27 makes, of which 13 are in class one.

## Steel Treating Men Will Witness Races

INDIANAPOLIS, Sept. 13—The Indianapolis Motor Speedway Co. has offered the use of the speedway track for the entertainment of delegates and members at the convention of the American Society for Steel Treating on Sept. 21. A 100 mile race has been planned and a two mile match contest between two cars owned by Arthur Chevrolet will be features of the day. Drivers who will take part in the races are Jimmie Murphy, who won the French Grand Prix; Howdy Wilcox, Roscoe Sarles, Benny Hill and Eddie Hearne.

## Duplex Truck on 50% Production Basis

**Company Expects Soon to Run at  
Capacity—Sales Have Been  
Good**

DETROIT, Sept. 12—Operations at the Duplex Truck Co. factory, Lansing, have increased to a 50 per cent basis through the development by the company of the possibilities of its 1½ to 2 ton chassis for passenger bus service in meeting transportation problems in many parts of the country.

Though not confining itself to the production of this one chassis exclusively, the company is going after this business aggressively and declares that with present prospective business taking form it will soon be back to practically 100 per cent operation.

The business is sought out by its investigators in the field operating under the vocational sales plan. Where an opportunity for bus transportation is reported the dealer in that territory is asked to investigate further. If conditions are regarded as favorable for actual bus trial, one or more are put into service and the possibilities of the proposed line tested out. Where the institution of a line follows trial the sale is made through the territory dealer.

Recent business developed by the company includes the sale of 16 additional buses to a fleet of 14 which has been operating in Washington, D. C. A line is operated between Elkhart and South Bend, Ind. Trial buses are in operation in a number of cities with excellent prospects of developing permanent lines.

## Champion Porcelain Company Organized

TOLEDO, Sept. 12—The Champion Porcelain Co. has been organized here by the Champion Spark Plug Co. to take over the business of the Jeffery DeWitt Co. of Detroit. The new corporation is capitalized at \$750,000 under the laws of Michigan.

For many years the Champion Spark Plug Co. held an interest in the Detroit concern which manufactured insulators exclusively for Champion. Recently a deal was consummated whereby the Toledo company gained complete ownership of the Jeffery firm. The Champion Porcelain Co. is a subsidiary of the spark plug company. Dr. J. A. Jeffery is president of the new corporation and is known as a leading ceramic engineer.

## LOUIS F. KAUFMAN DIES

INDIANAPOLIS, Sept. 13—Louis F. Kaufman, 67 years old and for several years manager of the service department of the Midwest Engine Co. of this city, died at his home here following an illness of many months. Surviving him are a widow, one son and a brother.

## Durant of Canada to Make Own Tires

**In Fact Every Part Used Will Be  
Manufactured at Leaside  
Factory**

NEW YORK, Sept. 12—Preparations are being made for the incorporation of Durant Motors of Canada, Ltd., for which a plant at Leaside, near Toronto, was purchased last week by W. C. Durant. Plans for the Canadian company have not been completely developed but they have been so far formulated that it can be said they are of great importance from the viewpoint of the Durant enterprise.

The plant which has been purchased was erected by the American Government for a munitions plant. It was completed almost simultaneously with the armistice and never was occupied. The site includes 18 acres and plans already have been made for the erection back of the present building of a three story assembly plant 600 feet long and 130 feet wide. The building which has been purchased will be used for the manufacture of motors, axles and differentials. There also will be erected a woodworking plant for the construction of bodies. It also has been learned that the Durant interests will manufacture in Canada the tires which will be used on the car made there. In fact every part used will be made in Canada including the electrical equipment.

While no official information is obtainable at Durant headquarters, the natural inference is that if all the parts which go into the Canadian car, including tires, are to be made by Durant, the same procedure ultimately will be followed in this country. The Canadian plant will be put in operation next March with a capacity of 100 cars a day. Durant four will sell in Canada for \$1,280 f.o.b. Toronto. The price in the United States is \$890.

The Durant four already is in production at the Long Island City plant and a few already have been turned over to purchasers. Production will be increased steadily.

Marked progress is being made in redesigning the Sheridan which will be known as the Durant six. The body lines will be similar to those of the Durant four.

## Anglo-American Motor Settles on Plant Site

TRENTON, ONT., Sept. 12—The board of directors of Anglo-American Motors, Ltd., has finally closed with the town of Trenton for a site for its plant, where it will build the "La Marne" car. This means a boost for industry in Trenton, as the factory will be a large one, employing several hundred men. The company will manufacture two types of automobiles—a four and an eight cylinder model, both with closed bodies. The car will be Canadian-built throughout,

and the manufacturers claim that the price will be less than any car of the same size and quality now being made in Canada.

They propose to sell the small four cylinder car for \$975, and the eight for \$3,000. If this can be done, the car should have a huge sale when it is put on the market. Construction work on the new plant will be started in the course of the next few weeks, and the machinery will be installed as the work progresses. The head office of the Anglo-American Motors is in Toronto.

## Rural Buying Gains in Indiana District

INDIANAPOLIS, IND., Sept. 12—The Indiana farmer is buying trucks. He also is buying tractors. And with some other folks he is buying passenger cars. And this is in face of the very discouraging stories circulating about Indiana crops in general, and despite the particular story that the Indiana farmer will have to buy potatoes for his own use and at a rather high figure. Exhibitors at the Indiana State fair last week, after the first three days, were trying to outboast one another on the amount of automotive equipment sold. Boiled down to even 25 per cent of their face figures, these boasts indicate something of a record run of business for the fall motor show, the twenty-third annual event staged by the Indianapolis Automobile Trade Assn.

Departing from the old "still" exhibits, the tractors and some of the trucks gave power demonstrations, control and flexibility trials. And the answer was found in the difference between the interest of the small "lookers" in the still show inside, and the "questioners" in the close packed groups at the motion show under tents and in the open.

## California Has Heavy Registration Total

INDIANAPOLIS, IND., Sept. 12—The registration of motor vehicles from Jan. 1 to Sept. 1 was 42,053 more than was registered with the Secretary of State all last year, H. D. McClelland, superintendent of the automobile division in the State office, has announced. The eight months' registration of passenger cars was said to be 35,622 more than the entire 1920 registration of such cars. The truck registration in the eight months exceeded the entire 1920 truck registration by 6,431.

## FEDERAL TRUSTEE NAMED

WESTFIELD, MASS., Sept. 12.—Loring P. Lane of this city has been appointed trustee in the estate of the Federal Corp., local manufacturers of automobile accessories, as a result of the first hearing of the corporation's creditors before Referee Charles W. Bosworth in bankruptcy court at Springfield. The liabilities of the corporation are listed at \$282,908.27 and the assets are placed at \$62,544.08.

## Cadillac Back on 20,000 a Year Basis

**Production Schedule Now Represents Practically 100 Per Cent of Capacity**

DETROIT, Sept. 10—Cadillac Motor Car Co. has resumed production on a schedule as great as that of last year, it was announced at a convention of Cadillac's 100 distributors at the factory this week. In 1920 annual production was on a basis of 20,000, representing practically 100 per cent capacity.

"Indications from all parts of the country," said H. H. Rice, president and general manager, addressing the convention, "show generally improved conditions affecting the purchase of motor cars. Business men can look for a more receptive mood from the buying public from now on. We believe the bottom has been reached and that real recovery is actually in progress almost everywhere."

The distributors were taken on an inspection trip through the new plant and were much impressed with the company's preparation for better business. In their remarks it was indicated that complete confidence dominated the sales organization of the market awaiting the Cadillac fall offerings.

## Parker Motors Leases Montreal Plant Space

MONTREAL, CAN., Sept. 12—The Parker Motor Car Co., capitalized at \$10,000,000, has leased factory space sufficient to provide for the assembly on a considerable scale of its car which will be called the Royal Six. It is understood operations will be started the last of this month. The company has completed negotiations with the Canadian Motor & Machine Co., Ltd., at Quebec whereby it will take over the plant of the latter company to establish a distribution and service center for eastern Canada. Small units eventually will be manufactured in the Quebec plant.

## W. A. Paterson, Pioneer of Industry, Dies at 83

FLINT, MICH., Sept. 12—Through the death of William A. Paterson the automotive industry has lost one of its pioneers. He was the founder of the W. A. Paterson Co., manufacturer of carriages since 1869 and manufacturer of the Paterson automobile since 1908. Paterson was born in Fergus, Ont., in 1838. He came to Flint in 1869. The carriage business was discontinued in 1910, two years after his advent in the automotive field. Affiliated in the company with him were W. C. Paterson and W. R. Hubbard. Business will be continued along existing lines and no action will be taken at present in regard to a successor to him as president of the company.



## 1922 Cadillac Will Have Many Changes

### Improvements in Body, Chassis and Powerplant—New Model in Production

DETROIT, Sept. 15—Changes in body, chassis and powerplant are incorporated in the 1922 Cadillac. Refinements throughout have been designed to produce a lower car of better riding qualities, enhanced appearance, increased efficiency in performance, particularly in cold weather, and superior appointments in both the closed and open bodies. The price remains unchanged. The factory is already in production on the new model and shipments have commenced.

#### Lower Appearance

Probably the most striking difference between the new cars and the old is the lower appearance, which is secured by the use of smaller wheels using 33 by 5 in. cord tires, and by the use of the longer wheelbase for some of the body types. All Cadillacs are now mounted on the same 132 in. wheelbase chassis. Former models varied the wheelbase with the body, using considerably shorter lengths for some of the open cars. A higher radiator, larger hood, and new design head lamps are provided.

Some mechanical changes of considerable importance are incorporated. Probably the most noteworthy of these is a new carbureter designed for better economy. It has a 2-in. intake and employs a thermostatically controlled spring on the auxiliary air valve, which is designed to provide temperature compensation in the regulation of the mixture. The action of the throttle pump is also controlled by thermostat to provide a richer mixture for acceleration when the engine is cold. Both these improvements are claimed to be helpful in reducing the warming-up period.

The oiling system has been simplified by doing away with the camshaft bearing feed pipe and allowing the oil to circulate through the center of the hollow shaft. This gives a cleaner design and takes care of not only the camshaft bearings but also the front end driving chains and the air pump for the gasoline system. Lubrication of the chassis is improved by the installation of piston type grease cups capable of introducing lubricant under 400 lb. per sq. in. pressure and thus keeps a constant supply of lubricant in contact with the bearing. No lubrication is now required on the bushings for the clutch and brake pedal shafts, and a number of other points where the installation of bronze bushings with graphite inserts has been found practicable.

#### Changes for Comfort

Most of the remaining chassis changes are of a more detailed nature and do not so materially affect the performance of

the car, but rather its period of useful life and comfort. A choice of gear ratios is now provided. The standard ratios are 4.50 to 1 and 4.90 to 1, but if desired there is also a 4.15 to 1 which can be secured on the phaeton or roadster.

Other detail changes on chassis include such conveniences as drain cocks on the bottom of each water pump accessible from above the frame, by means of long shaft connections. One particularly noteworthy point is that the road clearance has not been decreased although the car is lower. This has been accomplished by decreasing the size of the rear axle gear housing, which is the low point of the chassis.

In the bodywork and fittings there are a great many important refinements which result in better appearance and more comfort. The steering wheel, for instance, is now made of selected walnut, including the spokes. The horn button also is of the same wood and the tilting feature, which is no longer regarded necessary, has been eliminated. The long spark and throttle levers have been replaced by a more compact arrangement which eliminates the sector and brings these control features closer in to the steering column. Only the finger grips of the new levers are exposed.

#### Instrument Board

The new instrument board is distinguished by its beauty of design and brings together all of the dash equipment in one assembly. All the devices on the instrument board are retained by thumb nuts to facilitate removal. The pedal pads are duralumin forgings and consequently non-rusting. To keep the clean design desired in the front compartment, the pedal adjustments have been discontinued.

There is a transmission lock fitted by the same key as the switch lock and the tire lock. The ventilator is larger and more easily operated; the windshield frame has been strengthened and a leather covered visor is used on the enclosed cars. The phaeton and five-passenger sedan are provided with trunk racks which fit between the tire carrier and body.

#### Design Remains Same

The fundamental specifications of the Cadillac and the basic features of the design remain the same as in the past with the changes noted herewith. The eight-cylinder V engine, which is now in its seventh year of manufacture with modifications made from time to time, is continued. The bodies supplied are ten in number and are listed with their prices herewith:

Phaeton .....	\$3790
Roadster .....	3790
Touring car .....	3940
Two passenger coupe .....	4540
Victoria .....	4540
5-passenger coupe .....	4690
Sedan .....	4950
Suburban .....	5190
Limousine .....	5290
Imperial limousine .....	5390

## Plan to Reorganize P. O. Transportation

### Postmaster Hays Intends to Increase Efficiency by Use of Motor Trucks

WASHINGTON, Sept. 14—Reorganization of the motor transportation system in the Post Office Department has been authorized by Postmaster General Hays. He has designated Ralph H. Matthiessen, president of the Motor Haulage Co. of New York City, as a special assistant in charge of the Bureau of Motor Vehicle Transportation, which will be established. It is the purpose of the Postmaster General to increase the efficiency of deliveries by motor trucks and to reduce the cost of transportation.

#### Conference Planned

Matthiessen will confer with the automotive experts in the employ of the postal service and with manufacturers supplying trucks and cars to the government; he will reorganize the repair shops and expand their facilities through employing expert mechanics and garagemen. It is the intention of the Postmaster General to install a cost accounting system in order to determine the cost of operating the motor vehicle service. The latest labor-saving devices will be installed in the post office garages in the various cities.

#### In 271 Cities Now

There are now 271 cities in which Government-owned motor vehicles are operated, maintaining over 3600 motor vehicles. Its operating expenses annually amount to about \$15,000,000. There are nearly 5000 supervisory officials, clerks, chauffeurs, mechanics, etc., employed in this class of service. There are used for these trucks about 25,000 tires each year.

The motor vehicle service extends only to mail service within cities, such as collection and delivery of mail and transportation of mail from one point to another within cities. Rural carriers and contractors on star routes in rural territory operate their own motor vehicles.

#### Hays Explains

Hays said: "The Post Office Department began operating its own machines on a small scale with the establishment of the parcel post. Its great expansion has been made possible through the large number of motor trucks received from the War Department.

"The growth of this motor service occurred under abnormal conditions, such as produced by the war, and the tremendous growth of parcel post. Each large city built it up as a separate unit with a minimum of uniformity. Some few cities have splendid organizations and efficient service; many have been inferior and wasteful, due to lack of more uniform supervision."

## Mexican Business Growing Steadily

**Reports Reaching New York Say  
Conditions There Are Excep-  
tionally Good**

NEW YORK, Sept. 12—The automotive business in Mexico, with Ford as the leader who is opening up additional sales districts and pushing business in the older automotive centers of the southern republic, is extraordinarily good, to judge from all reports reaching New York. The Ford assembly plant at Houston, Tex., which handles all Ford business to that country, has just completed additional large shipments to both Mexico City and Tampico. The latter point is the center of the oil territory, and is booming again after the recent settlement of the oil export troubles.

These new shipments, made early this month, consisted of a trainload of Ford cars and trucks, consisting of 340 vehicles, to the Cia. Universal de Automoviles, S.A., in the Mexican capital, and a boat load of 100 cars and trucks to the Mayfield Auto Co., S.A. The shipment to Mexico City was handled as a special train and was subjected to no delay.

Owing to the freight rate charges, the Houston plant has effected new loading arrangements and completed touring cars were packed eighteen to a forty-foot car. This was three more than the previous loading. Fifty of the Model T chassis were likewise loaded into a single car, fifteen more than previously had been the case. The shipment to Tampico consisted of completed cars, equipped with Martin-Parry bodies, and were loaded under their own power.

Further comment upon the present situation in Mexico is contained in a letter from the Mexico City manager of one of the larger New York companies. Under date of Aug. 31, writing from the capital, he states "the automobile industry is not suffering in any way from lack of business just at present but rather from inability to secure enough cars."

Mexico was the chief buyer of American-made cars and trucks of all foreign countries during July, and reports from the exporters here indicate a continuation of the movement through August.

## Must Endorse Notes of Financing Firms

WASHINGTON, Sept. 12—Under a ruling issued by the Federal Reserve Board to-day, notes issued by a company engaged in financing the business of manufacturers are not eligible as commercial paper unless made or indorsed by a party to the commercial transaction out of which it arises. This decision covers any manufacturer who, desiring money for use in business for the purpose of paying for or carrying goods, enters into an agreement with the financ-

ing company that in exchange for a promissory note he will place the company in funds to meet the note at maturity and in the meantime pledges his merchandise to the company as security for his undertaking. The company then executes a note to its own treasurer, who indorses it in blank and delivers it to the manufacturer.

The question upon which the Federal Reserve Board was asked to rule is whether these notes are eligible for rediscount by Federal Reserve banks from the member banks which have discounted the notes for the company's customers. After giving the matter careful consideration the board ruled that these unindorsed notes could not be eligible.

"In the board's judgment, the spirit of the express requirement that paper to be eligible must arise out of a commercial transaction is not complied with in the cases where the sole party liable upon the paper is the person who has obligated himself for the accommodation of the party to the commercial transaction, even though the accommodating party is adequately secured and has a specific contract requiring the party to the commercial transaction to provide funds to meet the paper at maturity."

## N.A.C.C. Insurance Board and Underwriters Meet

NEW YORK, Sept. 12—The insurance committee of the National Automobile Chamber of Commerce and a committee representing the Automobile Underwriters Conference held a joint session here to-day to consider the evils which have grown up in automobile insurance. The N. A. C. C. committee presented to the underwriters additional facts in relation to its contention that the moral hazard has been ignored by the underwriters and that in countless cases cars have been insured for more than their value. There is evidence that the underwriters are beginning to recognize the validity of the N. A. C. C. contentions and that there is a gradual trend toward placing more emphasis on the character of the applicant for insurance.

## Mercer Refinancing Has Been Completed

NEW YORK, Sept. 12—Reorganization of the Mercer Motors Co. has been completed by the private sale of \$2,000,000 in 7 per cent, 4 year notes, and \$500,000 in 20 year first mortgage bonds. In addition, 100,000 shares of voting trust certificates have been disposed of, making 200,000 shares of these certificates outstanding. The corporation's balance sheet shows current assets of \$2,265,767 and current liabilities of only \$334,107. Since there are no sinking fund provisions attached to the notes and bonds the company will not be called upon to pay off any of this debt for at least four years.

## Shippers Protective League Is Organized

**Will Supply Armed Guards for  
Motor Trucks Running Be-  
tween Cities**

NEW YORK, Sept. 12—In order to insure against theft of goods carried by trucks in inter-city haulage, a prominent firm of underwriters in this city, Farjeon Ballin & Co., has taken steps to safeguard the load so carried.

This firm has organized an association called the Shippers Protective League, which supplies armed guards for trucks running between cities. The insurance company has also inserted a clause in its theft insurance policy stipulating that the trucks on which goods are insured shall travel in a convoy and shall be accompanied by the armed guards.

### Want States Aid

Finally, through various merchants' associations, this company is endeavoring to enlist the co-operation of the State constabularies in patrolling the roads where thefts have occurred and where thefts may be expected, such as the direct roads between New York and Philadelphia and between New York and Boston.

### Losses Bring Action

This move is a direct result of the tremendous losses suffered by insurance companies in recent months through the theft of goods so carried. In one week two different trucks were held up by armed bandits and their cargoes, valued at \$40,000 in each case, were stolen. Many insurance companies, when the risk involved in such policies became apparent, either charged prohibitive premiums or refused to include the theft and pilferage item in writing insurance on truck cargoes.

## Plan Factory Branch for Anderson in East

ROCK HILL, S. C., Sept. 12—The Anderson Motor Car Co. has decided to open a metropolitan factory department in New York with every facility to aid its Northern distributors and dealers. The headquarters in New York will be in charge of Charles B. Shanks, vice-president of the company, who took charge of the sales division on July 1.

The plans of the company comprehend maintaining in New York a stock of cars for the needs of the New England States, New York, New Jersey, Delaware, Pennsylvania and Ohio. A complete parts stock for all present and past models will be kept on hand and service men from the factory will be stationed in New York.

The New York factory branch is expected to bring about a healthy increase in sales and will employ a large number of workers.

## Cotton Boom Proves Tonic to Industry

### Atlanta Distributors Say It Will Bring Return of Normal Conditions

ATLANTA, GA., Sept. 14—The tremendous boom in cotton prices during the early part of September has proven one of the best tonics for the automotive industry throughout the South and will, it is the consensus among the Atlanta distributors, serve to rapidly bring the industry back to its normal status if the cotton prices now existent hold to that point for any length of time. In actual money volume the increase of more than \$40 per bale during the early part of the month means something like \$300,000,000 on this year's crop alone, to say nothing of the millions of bales of last year's crop that are still being held on southern farms and in the warehouses. With one of the shortest cotton crops in history there is little prospect of prices lessening for several months, while there is every indication that the staple will likely reach 25 cents per pound before the end of September.

This increase in cotton prices not only materially elevates rural buying power so far as the automotive industry is concerned, but it has its very favorable effect on every line of commerce and industry throughout the entire South, primarily the retail business. It therefore increases the buying power of commerce and industry at the same time and this, it is the opinion of the various distributors, will have the effect of materially stimulating the truck and commercial motor car business.

Automotive sales during August—and this was before cotton began its big advance—were better in this section that they have been in many months; and now with cotton having reached a substantial price September business in the automotive field will undoubtedly surpass the volume of any single month in more than a year. Already the advance is stimulating sales among the smaller dealers in the communities that depend mainly on rural trade, and marked improvement also is noted in the larger centers.

### Seek Co-operation of Bureau and Trade

NEW YORK, Sept. 12—Plans for effective co-operation between the motor vehicle industry and the newly created automotive division of the Bureau of Foreign and Domestic Commerce have been discussed by Gordan Lee, chief of the division and William I. Irvine, automotive trade commissioner with George F. Bauer, foreign trade secretary of the National Automobile Chamber of Commerce.

Means are being provided for the prompt preparation and distribution among manufacturers of specific data

bearing upon foreign automotive markets. With constantly changing conditions this service will fill a long felt want and enable manufacturers to conduct sales campaigns more effectively and opportunely.

### Plan Intensive Studies

It is planned that the activities of the new division will cover the more rapid distribution of monthly trade statistics, the preparation of reports based upon data received from the 600 agents of the Bureau of Foreign and Domestic Commerce, intensive studies of overseas markets and co-operation with manufacturers for the betterment not only of foreign trade but of domestic trade as well.

Just as soon as the division is organized fully, Irvine plans to get in direct touch with the export departments of the motor vehicle manufacturers to get their viewpoint of the nature of the information required of overseas automotive markets. This information will serve as a guide for the series of surveys which he will undertake in all automotive selling markets.

## Bull-Madison Assets Go to Bondholders

INDIANAPOLIS, IND., Sept. 12—Final disposition of the assets of the Bull Tractor-Madison Motors Corp., of Anderson, bankrupt, has been made by Harry C. Sheridan, referee in bankruptcy, in a ruling that Charles H. Jocknus of New York and John F. Green of St. Louis are entitled as bondholders to the proceeds from the sale of the property of the corporation. Hearing on the claims of the bondholders and of general creditors have been completed before the referee. The amount of the fund that has been held in the Union Trust Co. by Fred C. Dickson, trustee in bankruptcy, is \$120,000, practically all of which was claimed by Jocknus and Green.

The referee heard the claim of J. W. Sandsbury and the National Exchange Bank, of Anderson, that they were entitled to part of the fund through implied contracts, even though Jocknus and Green were conceded to be bona fide bondholders. Their claim was for about \$20,000. The Citizens Savings and Trust Co. and Wilbur M. Baldwin, trustees, of Cleveland, claimed \$6,400. The referee decided that the claims of the bondholders superseded the claims of those creditors whose claims he ruled, were general creditors' claims.

Bankruptcy proceedings were filed against the Bull Tractor-Madison Motors Corp., with property in Anderson and Minneapolis, Minn., in July, 1920. The trustee in bankruptcy sold the assets of the corporation in November to Goldstein Brothers of Philadelphia. The plants of the corporation have not been operated during the time of the litigation. Settlement of the title to the funds held by the trustee in bankruptcy, closes the case, except for formal orders, to be made by the referee.

## Steady Sales of Cars in Latin America

### Automotive Business in Pernam- buco Grows Despite Com- mercial Depression

PERNAMBUCO, BRAZIL, Aug. 9 (By mail)—Despite the fact that Pernambuco has suffered from the commercial depression, as have other Latin-American cities, there has been a steady sale of automobiles here, particularly of two makes that have been well introduced. It is believed that there are at least 100 more cars and trucks in the State of Pernambuco than there were last December.

The registrations here this month were 633 automobiles, 173 trucks and 15 motorcycles, a gain of 46 trucks and 7 motorcycles since December. An apparent decrease in the number of passenger cars is not correct, as their registry is frequently delayed and the complete number is rarely registered before the end of the year. In the States of Pernambuco, Alagoas, Parahyba do Norte and Rio Grande do Norte, the total is believed to be 1310, consisting of 160 trucks and 1150 cars.

### Depend upon Trucks

It is rumored that some of the big construction companies now engaged on irrigation dams in the drouth-stricken regions of Northeastern Brazil will depend to a certain extent upon trucks for transportation of construction materials from the railhead to the site of the dams. If this is true, it will imply the importation of a considerable number of trucks and probably some passenger cars. These vehicles probably will be used in the State of Ceara.

## New Models Lacking at Indiana Plants

INDIANAPOLIS, IND., Sept. 12—Present indications here lead to the belief that new models of Indianapolis made cars the coming year will be singularly lacking. Indianapolis manufacturers seem to be getting away from the new model idea to some extent, most of the effort being spent on improving present models. So far as can be learned not a new model is scheduled for this year except the new sedan of the H. C. S. Motor Car Co., announcement of which has already been made. Some of the plants are planning slight body changes although they are not ready to make known what the changes will be, yet it is certain they will be so slight as to make virtually no difference.

The September business, judging from factory sales, will be better than August with most of the plants. The Lafayette Motors Co. is putting out an average of five cars a day and officials of the company state that at the present time the plant is 100 cars behind orders, with the general outlook very promising.

## America in Strong Position in Europe

### Returned Automotive Representative Says Americans Do Not Have to Fear Competition

NEW YORK, Sept. 12—American automotive manufacturers have little to fear from European competition in the foreign markets of the world, provided the Americans go out energetically to hold and to develop further the markets that already have been opened for them. This was the statement made by C. H. Jerosch after returning from a trip to England, Holland, Belgium, France, Spain and Portugal, in the interest of the automotive lines on which he handles the foreign sales.

#### Have Inside Track

"The American manufacturers are in a strong position to go after business on a post-war basis," he said. "It is true that every kind of anti-American propaganda is being spread and this must be countered by our manufacturers. Also, the European manufacturers have an extensive propaganda under way in regard to their own products. But their cars and trucks are not comparable to those of this country; manufacture is conducted along different methods, and practically nothing in Europe can compete with our medium and lower-priced cars. The higher-priced cars have more direct competition but this can be overcome by those makers who will go into the foreign field with an honest and careful merchandising policy."

Jerosch believes that Spain is the most attractive country for the automotive exporter on the Continent. This excepts England, which, of course, has developed the automobile much farther. Spain is a rich country whose economic condition is such that exchange should right itself and whose automotive development has no more than begun. The automobile dealer in that country is generally of the younger type, ready and quick and appreciative of better merchandising methods. Road building is beginning, service stations and garages are becoming more numerous and a start has been made in the distribution of automotive fuel along the lines in use in this country. The Spanish tariff situation in regard to cars has been generally misunderstood, not only among exporters here but as well among the dealers there. It is not the stumbling block that is believed and, in fact, favors American imports over those from other countries.

#### Educational Work

Further educational work in regard to service is needed in Spain, as it is in all parts of Europe. Likewise, the Spanish automotive trade is being built up along the American lines, although in this the start only has been made. A large body of dealers already has been formed there and, while there has been much to com-

plain about regarding the treatment received from many American exporters and manufacturers, the proper kind of representatives can more than overcome these drawbacks.

#### Spain Will Compete

Spain will complete its post-war adjustment much quicker than most of the other European countries, as it has no great war debt and exchange will better whenever the demand returns for Spanish products. The result will be further large sales for those American manufacturers who will go after this business in an intelligent and conscientious way.

Jerosch also was enthusiastic about the sales possibilities in Europe of the light car, with small cylindrical capacity. Europe is turning to such vehicles because of horsepower taxation in several countries and because of fuel economy.

### Texas Dealers Show October 8th to 22nd

DALLAS, TEXAS, Sept. 12—Forty different makes of automobiles, a dozen different brands of trucks and a variety of automobile accessories, tires, etc., will be displayed at the annual automobile show of the Dallas Automobile Trades Association held in connection with the State fair of Texas here Oct. 8 to 22.

The forty different makes of automobiles means probably more than 150 cars will be on display while it is certain that a score of trucks and trailers will be exhibited. Every space in the big exhibition room at the fair grounds has been taken and many of the dealers here and out of town were not accommodated. In connection with the automobile show some of the leading men in the industry in America will be in attendance. Many of the exhibitors, through Dallas distributors, will bring special built cars for the show, it was said. These will be shown the retailers who are supplied through the Dallas distributors.

#### Expect 1,000,000 to Attend

In as much as the attendance at the fair will be more than a million the dealers of Dallas are expecting a wonderful improvement in the trade in this section as a result of the show. They expect to close many deals during the show at the show rooms and more of them at their down town places of business where expert salesmen and demonstrators will be at the beck and call of the men in charge of the displays.

Dealers are attempting to hurry up shipments of cars to be disposed of during the show. Some of the retailers of Dallas expect three hundred new cars to be disposed of as a direct result of the show and as many more to go before the first of December. The dealers will keep an index list of all prospects obtained at the show and keep everlastingly after them after the show until they own some kind of automobile. The show is expected to result in sales improvement throughout the territory.

## Radical Insurance Changes in Chicago

### New Rule Insures Cars Only Up to 90% of Total Value for One Year

CHICAGO, Sept. 12—Radical changes in its method of writing automobile insurance have been announced by the Firemen's Fund Insurance Co. Agents are being advised of a revision in the acceptance limits on automobiles and a change in the general conditions under which such insurance may be written.

Within recent months the fire feature in automobile insurance has come to the front with unusual force and theft risks are no longer considered the source of only loss. Losses from both causes are no longer confined to large cities but are spreading through the rural districts in such number as to cause alarm.

Under the new rules cars will be insured for not more than 90 per cent of their list price, irrespective of freight, war tax and the ordinary equipment. Second-hand cars will carry not more than 80 per cent of their purchase price; full particulars must be furnished on all mortgaged second-hand cars. Used cars in the hands of the original owners will be insured for a percentage of the list price after allowing for depreciation according to the rule printed in the rate sheet.

No cars are to be insured for a period longer than one year and authorization must be secured before dealers' lines and finance company's business is written. New policies are to be declined on cars more than three years old, except under special authorization, while there is a long list of exceptions of cars manufactured before 1920.

Agents are required to decline insurance on cars unless they are personally acquainted with the applicant and his financial standing, and if there is any question as to his ability to own and maintain a car the company is to be given the benefit of the doubt.

## Chevrolet Introduces Organization Journal

DETROIT, Sept. 12—Chevrolet Motor Co. has issued an organization paper, the Chevrolet Sales Speedster, which will be issued twice monthly "in the interests and for the inspiration of all who cooperate in the sale of Chevrolet transportation." The paper is practically dedicated to the proposition that the Chevrolet Model 490, as the second lowest priced car on the market, is entitled to be the second largest owned car on the market.

The paper is directed toward improving the merchandising efforts of Chevrolet dealers. In the first issue dated Sept. 1 leading articles are headed: "Talk Quality First Then Price," and "A Famous Model Improved."

## Manufacturers' Tax Favored by Hanch

Spokesman for N. A. C. C. Testifies in Washington—Wants Repeal of Excise Levies

WASHINGTON, Sept. 14—C. C. Hanch, executive vice-president United States Automotive Corporation and chairman tax committee National Automobile Chamber of Commerce, put the automobile industry on record as in favor of a manufacturers' tax and repeal of all war taxes in testifying before the Senate Finance Committee. It was his contention that the continuation of iniquitous taxes as contemplated in the House bill and proposals of the Treasury Department for internal revenue revision would result in "the perpetuation in this country of a sick prosperity."

As the discussion before the subcommittee of the majority members of the Senate Finance Committee was in behalf of all manufacturing interests, the spokesman for the automotive industry did not deal specifically with so-called "stigma taxes," as the excise taxes on automobiles are known. In substance, the committee representing various groups of manufacturers approved of the revised Smoot taxation plan which will be submitted to the Senate as a separate measure next week. The manufacturers' tax contemplated in the Smoot bill calls for a rate of 3 per cent, though there is a possibility that it may be reduced slightly.

Every speaker insisted that the abolition of war taxes was essential to the economic recovery of the nation. The committee was informed that manufacturers had taken a long step in voluntarily accepting a new burden in the form of a manufacturers' tax. It would mean increased expense in bookkeeping and auditing. It was only fair, they said, that the discriminatory taxes imposed during war conditions should be lifted and production allowed to regain normal status without tax restrictions. This factor is particularly important to the automotive trade at this time, when manufacturers are cutting prices. The war tax item appears as a big item in the final cost of a car.

The manufacturers' tax was defined as an assessment on all finished commodities sold or leased by manufacturers, producers or importers and it would be paid direct by the manufacturer, producer or importer. It was explained that it is not a sales tax as it does not bear on the retailers' sales and would be assessed at point of manufacture only, and consequently prevent pyramiding.

The manufacturers expect general public support for the program on the grounds that it is comparatively simple, bears on all manufacturers uniformly, is not so difficult of collection as many taxes which it would supplant and is a substitute for the existing "nuisance taxes." The program would involve the repeal of all levies not classed as indi-

### HAWAIIAN HORSE AND MULE GIVE WAY TO MOTOR CAR AND TRUCK

SEATTLE, WASH., Sept. 12—The day of the horse has ended in Hawaii, and, as in other parts of the world, his place has been taken by the motor car. Thousands of pleasure cars, trucks and tractors are now in service in the islands and the automobile is in a decidedly flourishing condition.

On the large sugar and pineapple plantations the mule and the horse have about disappeared and this work is now being done almost exclusively by tractors and motor-driven plows.

When the delegates to the press congress of the world come to the territory in October for a two weeks' session they will find that splendid automobile roads lead to every point of interest in the islands, even up to within a few yards of the active volcano of Kilauea on the island of Hawaii. The territory is spending millions yearly on its roads and one of the largest road building programs in its history is being carried out, for which the advent of the automobile is largely responsible.

vidual or corporation income taxes, inheritance taxes and special taxes on tobacco, narcotics and oleomargarine. Senator Smoot's program provides for revenue from a new customs tariff measure, but this was not mentioned by the manufacturers. Excess profits taxes were discussed in a broad manner and nothing was said of their effect on automotive trade.

Hanch also spoke for the National Automobile Dealers Assn., Motor and Accessory Assn. and Rubber Assn. of America.

### NEW ROADS IN CAROLINA

RALEIGH, N. C., Sept. 15—The North Carolina State Highway Commission has completed, or has under contract and construction, 1,012.64 miles of road, at a cost of \$14,600,753.12, according to recent figures issued by the commission. Three hundred and fifteen miles of this work already has been completed and the remainder will be completed during the next fiscal year of the commission. The cost of the work already completed is \$4,040,184.

### HUPP MOTORS REPORT

NEW YORK, Sept. 15—The general balance sheet of the Hupp Motors Co. as of June 30, 1921, shows cash on hand of \$647,709 as compared with \$1,026,048 on the same date last year. Inventories valued at cost were \$3,156,141 as against \$3,791,368. Accounts payable aggregated \$1,828,453 against \$1,838,110 last year while the profit and loss surplus was \$4,831,768 as compared with \$4,002,344 the previous year.

## Reductions Bring 50% Ford Increase

First Week Shows Heavy Orders  
—100,000 Capacity Assured  
for Fall

DETROIT, Sept. 15—The Ford Motor Co. to-day reports an increase of 50 per cent in orders during the first week following their newest price reductions Sept. 2.

Orders had fallen off in August, due to late summer influences, and some slight stocking has been experienced in the company's 35 branches throughout the country. All of this stock was cleared out in this first week and deliveries are already running behind, especially on enclosed types.

The factory reports orders piling up to an extent that will practically insure capacity production on the present 100,000 monthly basis during September and October.

## Texas Service Men Plan Organization

DALLAS, TEX., Sept. 13—For the purpose of a closer co-operation and deriving more benefits and with a view of systematizing the business in Dallas for the purpose of giving the customers the greatest possible benefits for the least money, the automobile service station men of Dallas are forming an organization. The organization will eventually include every service man in the city and when this is completed the automotive business in Dallas will be about the best organized industry in the State. Every line of the business will have organizations of its own and representatives from these organizations will make up the automobile club proper, or rather the automobile dealers association.

Officers of the service men's organization are: N. H. Billing, Overland Co., chairman, and J. R. Stoorza, Franklin Co., secretary.

The service men have already held two meetings and at the next meeting they expect to complete the organization and elect officers for the year. It will then begin holding regular meetings for the purpose of discussing matters of interest to the service men and planning ways to render the customers more efficient service.

### SERB TRADE FAIR

LONDON, Aug. 31 (*By Mail*)—A report has just been issued by the British Department of Overseas Trade on the economic resources and industrial conditions of the Serb-Croat-Slovene Kingdom. It drives home the fact that in this as well as in other Balkan countries salvation must come through transport. Considerable improvement has been shown since the war, but much still remains to be done.



## METAL MARKETS

**D**EMAND from the automotive industries, which not so very long ago formed the steel industry's sole sustenance, is coming in temporarily for somewhat less attention because of the more diversified inquiry. The market is broadening, but not so much in point of the tonnages involved in individual transactions as in the greater variety of the industries showing an interest in offerings. On the basis of the post-armistice experiences of the steel market, economists will some day lay it down as a law that the first phase of a cycle embracing steel market activity consists of buying by the automotive industries and, as the momentum of this buying increases, it tends to bring out till then latent demand from other industries. An unbiased survey of the steel market in the last few months reveals clearly that the automotive industries have once again furnished the tow by which steel producers were enabled to extricate themselves from the rut of utter inertia. Operations have not yet assumed normally large proportions but, in contrast with the depression of a few months ago, they are impressive. Moreover, they are accompanied by a symptom that has been in evidence on previous occasions, when automotive buying had lifted the steel industry out of the mire, a hardening of the market for the kinds of steel products which automotive manufacturers are especially interested in. There have been no advance so far. In fact, none is imminent. The undertone, however, is decidedly steadier, if not stronger. Price increases noted within the last few days on wire and wire products were rather in the nature of corrections than advances. In the general price upheaval several items were cut out of proportion to others and readjustment of these was a foregone conclusion. Lest steel buyers fall into the error, common in Wall Street, of interpreting every diminishment of the Corporation's unfilled tonnage as an indication of untoward conditions in the steel industry, it may be emphasized that the decline in the Corporation's unfilled tonnage on August 31 was chiefly due to heavier shipments in August made possible by improved production conditions and, moreover, resulting in a large measure from eagerness to obtain cash for as much steel in course of production as possible. Production all along the line is slowly but steadily increasing.

**Pig Iron.**—Bullish gossip continues to be the market's diet, one selling interest outdoing the other in picturing rosy conditions. Further advances have been proclaimed by Middle West producers. Certain it is that all bargains have disappeared from the market and that there is more or less uniformity in the prices quoted by different interests to the few automotive foundries that are just now in the market for pig.

**Steel.**—Sellers are showing considerably greater reluctance when it comes to accepting bids that entail concessions from current quotations. The sheet market, especially, has gained in firmness and activity. In the Youngstown district independent producers who up to a fortnight ago were supposed to be shading the Corporation's price to the extent of \$2 a ton are seemingly striving to obtain the full Corporation price on new business. Cold-rolled strip steel is moving in modest tonnages at around 3.85c., base, Pittsburgh. All in all, automotive demand is of a routine character.

**Aluminum.**—The feeling persists among

importers and resellers that just as there has been a minor movement in copper and lead in the last few weeks, so aluminum will come in for more activity in the near future. Quotations so far, however, remain unaltered.

**Copper.**—Although there has been no marked increase in domestic or foreign demand and no perceptible diminution of the large accumulations, the copper market has been elevated, ostensibly for the beneficial effect of such an advance on the copper securities situation.

**Lead.**—Recent price advances by the chief producing interest were ascribed to the large amount of business with which this seller has lately been favored. The "outside" market responded, however, to a certain extent. By way of justification for these advances, it may be said that lead, unlike copper, zinc and aluminum, does not suffer from a large unsold surplus accumulation.

## INDUSTRIAL NOTES

United States Motor Truck Co., of Cincinnati, has had made by the Rothacker Film Co. of Chicago, a two reel motion picture of its executives and factory which will be displayed throughout the country in cooperation with agency owners. Zone men will be equipped with a suitcase and projection machine which will permit screening the films in a hotel parlor, hall, salesroom or in an office. If an agency owner has a prospect who cannot be induced to come to a private movie show, he can take the picture to the prospect's office and screen it on the wall. Tracts in foreign languages will be sent abroad.

Coats-Steamer Automobile Co., Indianapolis, incorporated in Delaware for \$5,000,000, is seeking a location at Terre Haute, Ind., on which to erect a large manufacturing plant. The company, according to George Rowland, of the Rowland-Power Collieries Co., who made the proposition to the Chamber of Commerce directors, is after a location 600 x 75 feet, with acreage for expansion.

May Body Co., Toledo, O., builders of truck bodies, whose plant here was burned out a few weeks ago, has taken a lease on the plant formerly occupied by the Toledo Bending Co. The company will install new machinery for the manufacture of sail and power boats also.

Coast Tire Co.'s plant is now in operation in Oakland, Cal., turning out 200 tires daily, having been opened with a banquet on September 1. The payroll is now \$25,000 a month, is disbursed in the concrete "all-daylight" factory just completed here. Rubber is brought here direct from Java by water, eliminating the shipment of the crude product east and the finished tires back west again.

## MOON SALES INCREASE

ST. LOUIS, Sept. 12.—The Moon Motor Car Co., which last week made a sharp reduction in prices of its cars, based on 1914 labor, material and production costs, announces that domestic sales for the first six months of this year were 14 per cent larger than for the same period last year. With the lower prices it is expected that the last half of 1921 will equal or exceed the first half.

## N.A.C.C. Will Inquire into "Pirate Parts"

## Probe to Follow Complaints That Devices Have Hurt Reputation of Cars

NEW YORK, Sept. 12.—Directors of the National Automobile Chamber of Commerce have authorized a careful and complete investigation of the question of "pirate parts." It is asserted that an increasingly large number of parts of this character are being placed on the market. Many complaints have been made that when they have been used in the manufacture of motor vehicles they have not given good service and have injured the reputation of the cars in which they were used. Some of the vehicle manufacturers say they have taken up the use of "pirate parts" because they could be purchased for prices considerably lower than those charged for the standard parts which previously have been used.

Believing that a very large number of accidents are caused by over-speeding of motor cars and motor trucks, coupled with the over-loading of the latter, the N. A. C. C. is calling upon police officials of the country for a more strict enforcement of the traffic laws, of which there are a sufficient number on the books, but the provisions of which have been too generally disregarded.

Reports show that over-loading of trucks of all sizes have in some cases harmed the roads and in other cases have overcome even the powerful brake equipment, resulting in accidents that could have been avoided.

The N. A. C. C. believes that a two-ton truck carrying four tons is more dangerous on the highways than a five-ton truck with its normal load of five tons. It indorses the Pennsylvania law which requires each truck to bear a lettering showing its weight, the body weight and the weight of the load which it should carry. The chamber opposes truck bodies of abnormal size and advocates loads which will conform with the recommendations of automobile and highway engineers for one-inch width of tire for each 800 pounds of weight.

Secretary Fenn of the motor truck committee reported to his committee last week that Brigadier General Dawes, Federal Budget Director, had asked for a conference on the best means of liquidating the unserviceable army trucks which are stored at Camp Holabird, Md. Sale of these trucks will interfere very little with the market for new vehicles.

At the quarterly meeting of the truck committee in October, there will be a detailed discussion of truck paper and means of making it more promptly acceptable, either through banks or through truck companies. This question will be discussed by a prominent banker.

The committee also will take up the study of new markets for trucks. Attention will be given first to the street railway industry as a market.

## MEN OF THE INDUSTRY

Richard C. Fowler has resigned as assistant sales manager of Delco Light Co. to become vice president of Campbell, Trump & Co., advertising agency of Detroit. Gage C. Tremaine has been named secretary of the company. With the addition of the new officers the agency name has been changed from Campbell, Blood & Trump to Campbell, Trump & Co.

L. L. Murphy has resigned his connection with the Olds sales branch in Detroit to join the Studebaker Detroit branch. Murphy at one time was cashier at the Olds factory.

R. N. Mosher, head of the Michigan Oldsmobile Co. has resigned after 17 years connection with the Olds Motor Works during which time he served as comptroller and later in sales capacities. His plans for the future are not announced.

Olin R. Smith, who for the past three years has been advertising manager of The Moto-Meter Company, Inc., Long Island City, N. Y., has joined the staff of the Palmer Advertising Service, 137 E. 43rd Street, N. Y. C. Smith will specialize on dealer helps such as window and counter displays, direct by mail folders, and dealer material.

Frank G. Eastman has been appointed one of the executives associated with Norval A. Hawkins, director of sales, advertising and service for the General Motors Corp. at Detroit. Eastman was a Detroit newspaper man for several years. He went with the Packard Motor Car Co. in 1911 and soon after was promoted to advertising manager. For the last two years he has been doing special work for the Lincoln Motor Car Co.

C. G. Williams has been appointed manager of the Cleveland branch of the McGraw Tire & Rubber Co. to succeed D. C. Hathaway who has been appointed assistant sales manager of the company. Williams has been assistant branch manager.

William M. Sweet who has been assistant to Alfred P. Sloan, Jr., vice president of the General Motors Corp. in charge of production, will leave the New York headquarters Oct. 1 to take an important executive position with the Klaxon Co. which is a General Motors unit. Sweet formerly was secretary of the Motor and Accessory Mfrs. Ass'n.

C. C. Hanch, vice president of the National Automobile Chamber of Commerce and chairman of its tax committee will soon become executive vice president of the United States Automotive Corp., makers of the Lexington automobile with headquarters in Connerville, Ind. Hanch will have active charge of the operating policies of the corporation, which also includes the Ansted Engineering Co., the Ansted Spring & Axle Co., the Connerville Foundry Corp., The Fayette Painting & Trimming Co. and the Teeton-Hartley Motor Corp.

## FINANCIAL NOTES

Jordan Motor Car Co. directors have voted to declare their regular 1½% quarterly preferred stock dividend payable Sept. 30 to stockholders of record Sept. 20. The company has enjoyed good business for the last quarter showing a good increase in production over the same period 1920.

Columbia Motors Co. of Detroit has filed a balance sheet as of Dec. 31, 1920 which shows cash on hand \$118,186, accounts receivable \$825,418, stores and material \$1,275,933, contracts for parts and materials \$3,290,000,

accounts payable \$26,520, notes payable to banks \$375,000, stock outstanding \$5,169,440, surplus \$42,900 and total assets and liabilities \$6,283,816.

The Chandler Motor Car Co. has declared a regular quarterly dividend of \$1.15 a share payable Oct. 1 to stockholders of record Sept. 20.

International Harvester Co. of Chicago has declared the regular quarterly common dividend of \$1.25 a share payable Oct. 15 to stockholders of record Sept. 24. In June the regular quarterly common dividend of \$1.25 and an extra stock dividend of 2% was declared.

Texas Motor Car Assn. has adopted a reorganization plan calling for an assessment of 21 cents per \$1 stock.

Kelly Springfield Tire Co. sales are 25% ahead of final figures for August, 1920, despite present lower prices. Final August figures should materially increase this lead. Final July sales were close to \$3,000,000. Company has quadrupled its sales without increase in accounts receivable. Existing stocks of tubes held by 126 tire companies placed at three weeks supply and of tires at five weeks supply, based on July sales. This indicates a healthy condition in the industry.

New York Man Appointed  
Kelly-Springfield Head

SPRINGFIELD, OHIO, Sept. 13—Following the arrival here to-day of Charles Willard Young and Edward O. McDonnell of New York, James L. Geddes, chairman of the board of the Kelly-Springfield Motor Truck Co., announces that Young has been chosen as president of the company. McDonnell was appointed as general manager. Both have been connected with the Emerson-McMillen Co. of New York. Geddes said the company has more orders to-day than any day during the last year and that prospects are extremely bright for the future.

## MOTOR TAX TAKEN OUT

WASHINGTON, Sept. 12—New recommendations made to the Senate Finance Committee by Secretary of the Treasury Mellon in reference to taxation do not contain his original proposal for a Federal tax on automobiles. So much opposition to this plan developed that it has been definitely abandoned. He urges repeal of the excess profits tax effective as of January last and of the tax on capital stock for 1922, which was payable July 1 last. Reduction of the high income surtaxes to 25 per cent also is urged. The loss in revenue by repeals and reductions would be partly offset by an increase from 10 to 15 per cent in the tax on the net income of corporations.

## S. A. E. AFTER THIEVES

NEW YORK, Sept. 12—The committee of the Society of Automotive Engineers which has been investigating methods of marking both engine blocks and frames in such a manner that they will be difficult of alteration by thieves will meet in Cleveland Sept. 20. The purpose of the committee is to devise some plan which will be practical from an engineering standpoint. The insurance underwriters have offered a discount of 20 per cent for approved markings.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Sept. 15—The Federal Reserve System's statement for Sept. 7 revealed a decline in the reserve ratios as a result of increased note circulation, deposits and total bills on hand—an indication of increased member-bank borrowings. The fall crop moving demands and the need for additional currency over the holiday period were undoubtedly responsible in part for the \$36,097,000 increase in Federal Reserve notes in circulation. While gold reserves increased \$15,317,000, and cash reserves about the same amount, total bills on hand increased \$26,152,000, largely through the increase in the amount of bills purchased in the open market. Total deposits increased \$27,314,000. As a result of these changes, the ratio of total reserves to deposit and Federal Reserve note liabilities combined declined from 66.8 per cent to 66.2 per cent. The seasonal effect on the banks was more apparent, however, in the statement of the New York Federal Reserve Bank, where the ratio declined from 75.5 per cent to 72.9 per cent. The flow of funds to the interior was reflected in the decline of \$31,188,000 in the New York bank's share of the gold settlement fund. As a consequence the gold reserve of the New York bank declined \$18,427,000 in spite of increased holdings of gold and gold certificates, etc.

Call money on the local market last week ranged from 5 to 5½ per cent, as against 4½ per cent to 5½ per cent the week before. The renewal rate was 5½ per cent all week until Friday when there was a decline of ½ per cent. Call money was in rather liberal supply and funds were obtainable on the "outside" market at rates somewhat under the quoted rates. There was an easier tone in the time money market towards the close of the week when 60- and 90-day paper was obtainable at 5½ per cent to 5¾ per cent, while the longer maturities up to 6 months were quoted at 5¾ per cent to 6 per cent. In the previous week all maturities were quoted at the latter figures. There was little activity in the commercial money market, the rates remaining unchanged for 6 months' prime paper. Although there were a number of large-sized bond offerings during the week, they were, in general, well received and had little effect on the money market.

In the past week the striking features of the financial markets were the decline in the German mark and the activity in the cotton market, following the announcement of the short crop. After having declined below 1 cent last week, the mark on Monday of this week reached a new low for all time of \$0.0091. Spot cotton reached a high of 20¼ cents per lb., marking a rise of 9¼ cents from the low point of June.

The foreign trade figures for August showed the largest exports since March, largest imports since May and the largest excess of exports since February.

# Calendar

## SHOWS

- Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.
- Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.
- Sept. 28 - Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.
- Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.
- Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.
- January—Chicago, Automobile Salon, Hotel Drake.
- Jan. 7-13—New York, National Automobile Show, Madison Central Palace Auspices of N.A.A.C.C.
- Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.A.C.C.

- Jan. 30-Feb. 4—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.
- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.
- Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

- September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.
- September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park; Sociedad Rural Argentina.
- September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.
- Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

- Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.
- Oct. 10-22—Olympia, England, Truck Show, Nov. 4-12—Car Show, Nov. 28-Dec. 3—Motorcycle Show.
- Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.
- November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.
- March, 1922—Santiago, Chili, Annual Automobile Show.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador, Automotive Section.
- Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

- Sept. 14-15-16—Cleveland, Second International Cost Conference, Auspices National Association of Cost Accountants.
- Sept. 14-15-16—Detroit, Credit Convention Motor and Accessory Manufacturers Association.
- Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.
- Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

## S. A. E. MEETINGS

- New York, Sept. 15—Fuel Session.
- Worcester, Sept. 17—New England Section.
- Philadelphia, Sept. 22—Pennsylvania Section.
- Detroit, Sept. 23, Oct. 21, Nov. 18, Dec. 23, Feb. 24, March 24, April 23, May 26.
- Dayton, Oct. 1—First Fall Meeting.

## September Business Improves in Texas

First Ten Days Show Daily Average Record for Entire Year  
—Trucks Better

DALLAS, TEX., Sept. 12—The automobile business in Texas started off with a rush in September. Reports from dealers and distributors in Dallas for the first ten days of the month showed more cars sold per day than any similar period during the present year. As was the case during August when the retailers of Texas just about established a record business, the majority of the sales were medium priced cars. Retailers attribute the increasing number of sales to continued reduction in prices. The prospective customers appear to think the bottom prices have been reached and they are taking advantage of recent reductions, probably fearing there will be an advance before other reductions come.

Dealers in high priced cars report business stimulated by recent reductions in modern priced automobiles.

What was true with the Dallas retailers was true of the retailers of Fort Worth, Wichita Falls, Waco, Abilene, Amarillo, Sweetwater, San Angelo, Temple, Houston, Galveston, Beaumont, Denison, Sherman, Greenville, Gainesville and a half dozen other Texas cities.

Accessory men said business was better than any ten days for the past twelve months. The garage men said they had all they could do. The tire men were kept busy day and parts of the night.

Truck dealers reported considerable sales with more prospects than they have had for months. They declare the good grain and cotton crops with good prices are stimulating sales.

## New Car Developed, To Be Made at Toledo

TOLEDO, O., Sept. 12—A new light car with general dimensions and power plant smaller than those of any car now on the American market has been developed by the Automotive Corp. It is designed as a two-passenger car only and has a wheelbase of 91 in. The engine is a four-cylinder one of 2½ in. bore by 3½ in. stroke; it is air-cooled and is said to develop a maximum of 22 hp. and to turn up to 3500 r.p.m. The valves are located in the cylinder heads and lubrication is by force feed and splash.

The clutch is of the dry disk type and the transmission a three speed and reverse sliding gear type with standard control positions. Transmission to the rear axle is by propeller shaft with a single disk type universal joint at the forward end. Quarter-elliptic cantilever springs are fitted all around. The car is said to weigh 900 lb. and it is to sell at \$375, not including top, windshield and spare wheel. The special advantage claimed for the car is high fuel mileage.

## FISK-FEDERAL MERGER

NEW YORK, Sept. 12—Consolidation of the Fisk Rubber Co. and the Federal Rubber Co. will have no physical effect but it makes possible refinancing of the two corporations as a single unit and is regarded in financial circles as a constructive measure. Production at the Fisk plant is running about 10,000 per day and at the Federal plant at Cudahy, Wis., at about 2000 per day. Neither company has large stocks of tires on hand and the output is kept close to sales. On the basis of current operations, Fisk soon will be on the market for crude rubber and cotton fabric. It had some high priced materials but they were written down to market levels.

## Rumor Durant Will Purchase Peerless

Meeting Expected to Bring Announcement Does Not Materialize—Officers Silent

CLEVELAND, Sept. 14—Reports have been current in Cleveland that an announcement would be forthcoming soon concerning the sale of the Peerless Motor Car Co. to W. C. Durant of Durant Motors, Inc., and it was expected that the announcement might follow a meeting which was to have been held Tuesday. The meeting, however, did not materialize.

B. G. Tremaine, president of the Peerless company, attended a meeting in New York, Tuesday, but other officers of the company have declined to state what subject was taken up.

The report of the sale which has been in circulation is responsible largely for the increase in Peerless stock, which has gone up from \$25 a share to \$40. The Peerless company is a \$10,000,000 corporation, and the Peerless plant in Cleveland covers 20 acres. The company is the only one here which manufactures an eight-cylinder car. It is said that if Durant takes over the company production will be doubled.

## TORONTO TRIES BUSES

TORONTO, ONT., Sept. 12—The City Transit Commission, which has recently taken over the trolley lines, has begun experimentation with trackless gasoline propelled motor buses for use in some sections of the city. A bus of the Fifth Avenue type and a Tilling-Stevens vehicle of the type used on London streets have been procured and will be tested out by the Toronto Commission.

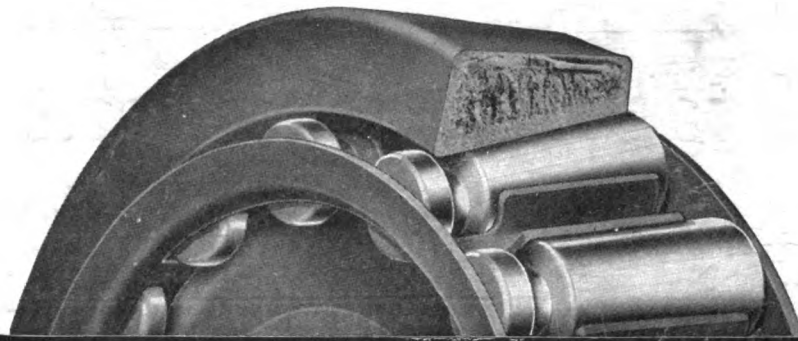
# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

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Number 12

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Three dollars a year



تیمکن تایپر رولر بکس  
یا خود "تیمکن" تایپر رولر  
باریکت دیکر بالیان امر  
یقاد واهی دوتیانک تو تارا  
فنی ایندیانه آمریکا و آرد  
یا ایسی اوتوموبلار و قریطلک  
و طاقتورلا سیکم همدی  
نن ایچیم قولادوب ان  
هیولا دایا نیکلیسه زقوت  
بوسا صرف ایجا بانور

The constant refinement of automobiles, motor trucks, and tractors, not only in the United States, but in Europe, is marked by the ever increasing adoption of Timken Tapered Roller Bearings, consistently to conserve power

*The original Turkish, and the American translation, of a Timken Bearing advertisement appearing in Taskir Efkiar of Constantinople*

THE TIMKEN ROLLER BEARING CO, CANTON, OHIO

Timken Tapered Roller Bearings for Passenger Cars, Trucks, Tractors, Trailers, Farm Implements, Machinery, and Industrial Appliances

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Rear Deck Hinges  
Rear Deck Locks  
Rear Deck Lid Braces  
Channel and Shapes  
Screw Machine Products  
Die-Castings  
All kinds of Stampings  
Other Miscellaneous Auto-  
mobile Hardware

You know—every intelligent executive knows—the vital importance of maintaining, at all times, a well-balanced stock of automobile body hardware.

Inventory sheets have shown too many concerns a vast accumulation of obsolete material, representing, perhaps, an outlay of thousands of dollars—*absolutely wasted*.

Never need this condition exist in your plant. Nor is there any occasion for your being over-stocked on some items and short on others. Neither should you find it necessary to be continually redesigning and substituting.

Ternstedt will supply you with *standardized* hardware for every requirement—and will place it in your plant only as you require it—dispensing entirely with the need of tying up good money in equipment that may never be used.

Purchasing their body hardware *complete* from Ternstedt has put a permanent stop to discouraging inventories for scores of representative motor car manufacturers and body builders.

Let us give you further common-sense reasons why you, too, should concentrate in Ternstedt.

TERNSTEDT MANUFACTURING COMPANY — DETROIT

# TERNSTEDT

## *Automobile Body Hardware*

...BUILT · BETTER · FOR · BETTER BODIES...

LARGEST MAKERS OF AUTOMOBILE BODY HARDWARE IN THE WORLD



# AUTOMOTIVE INDUSTRIES

## THE AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, SEPTEMBER 22, 1921

No. 12

## Service Dominant Idea at M. A. M. A. Credit Meeting

Service to the motor vehicle user is an obligation of both parts and car manufacturers, speakers say. Spirit of cooperation appears in credit discussions. Better selling methods considered a necessity.

By James C. Dalton

**W**HILE there was unanimous agreement that business has turned the corner and that prosperity is on the way, that was not the big, vital dominating thought to be gained by the automotive industry from the fifth annual credit convention of the Motor and Accessory Manufacturers' Association, held at Detroit Sept. 14, 15 and 16.

The fundamental, brass-tacks message of every speaker was that the time has come when the interests of the ultimate consumer must be taken into account before everything else. Each one hammered home with iteration and reiteration the plea, which amounted to a demand for real service to the buyers of motor vehicles.

Every convention has a keynote and this meeting had one which sounded so loud it might have been mistaken for a brass band. That message was SERVICE in the blackest and biggest of capital letters. When the parts makers talked about service they meant not merely the merchandising of motor vehicles but their maintenance after they are sold. In fact maintenance seemed to be considered fully as important as the initial sale, for the replacement market looms large in their calculations.

The plea for service for the purchaser ran all the way from the raw material producer to the man who operates the cross roads service station and sells gaso-

line or adjusts carbureters. There was recognition of the need for making dealers in automotive merchandise real merchants who know how to sell as well as the butcher, the baker, the grocer, et al.

The parts and accessory manufacturers confessed their own obligation in this respect, but insisted that every branch of the industry has at least an equal obligation. They considered the problem from every angle.

Unanimity on the need of service was the more remarkable because that subject had no definite place on the program. When every speaker took it by the nape of the neck and dragged its shrinking form into the light to be put upon the rack there was no escaping the thought that was uppermost in every mind.

Service was by no means the only subject considered and there was much in what was said for the manufacturers of motor vehicles to ponder over. The convention, the most successful the association ever held, naturally was designed for consideration of the problems peculiar to the parts maker, but it was apparent that the 250 members present, representing the leading companies in the parts field, had agreed that the industry as a whole has common obligations and common interests.

Increased sales of motor vehicles are just as much to the interest of the maker of axles and piston rings

as it is to the manufacturer of cars and trucks or the man who sells them. A spirit of co-operation shone through the entire convention, both on the floor and in the hotel lobbies. There was evident an earnest desire to be mutually helpful.

One incident will suffice as an illustration. There was scheduled an open discussion of business conditions within the industry from the credit standpoint. L. L. Smith, assistant treasurer of the B. F. Goodrich Rubber Co., was the leader. He contended that the members of the M. A. M. A. had been unduly merciful and that it was high time drastic action was taken, even through legal proceedings, against companies which have had accounts past due for 12 or 15 months without reducing them a dollar.

The slogan last year, he said, was "no bankruptcies," but these manufacturers have had their chance and haven't worked out of the hole. Many of the ones in this class were virtually insolvent before the war but were saved by the insatiable demand for their products while hostilities were in progress. Now they have reverted to their pre-war status. They are resorting to every means, stock-selling and otherwise, to hang on. He held that it was time to protect the public from these stock jobbing schemes. Manufacturers in good standing have the field pretty well covered and there is no hope for the others, Smith said.

"We're through taking gold notes and gold bonds and promissory notes," he declared.

It might have been expected this ultimatum would have been received with three rousing cheers, but it wasn't. On the contrary there was a storm of opposition. It was asserted that a live company, even though it may be moribund, is much better than a dead one. It was contended precipitate action of this character against the companies which may deserve little sympathy, might lower the morale of the entire industry and force to the wall others which are striving manfully to get out of their present troubles with every prospect of success. Those which are without bank support might involve others which have.

Instances were cited of companies which had been tangled up in bowknots of financial difficulties but had been straightened out through the co-operation and consideration of creditors. The majority plainly were determined to go on "holding the bag" until the time is more opportune for "rocking the boat."

While the plea for charity prevailed it brought with it some plain speaking. Inefficient management was held responsible for the troubles of most of the vehicle companies now in difficulties. This inefficiency ran all the way from general managers who had been good salesmen but didn't know a balance sheet from a roll of wall paper, down to retail sales organizations which failed to function because of the stupidity of some of the men in them. It was held that if executive and managerial ability was hoisted a few notches it would be generally helpful.

The moral hazard in the business was not overlooked and it is likely to play an increasingly important part in the granting of credit. More than one speaker asserted that the industry should purge itself of "fly-by-night" enterprises which prey upon the public by putting on the market a few vehicles which soon become orphans, or which sell worthless securities. It was dryly remarked, however, that the public sometimes resents being protected and that it seems determined to have its pretty gilt bricks.

Fully as striking as the desire to co-operate in saving concerns with potentialities for success, and many of

them have been saved by forbearance, was the proposal made by more than one that parts makers might profitably spend their own money to expand the sale of motor vehicles.

William H. Huff, advertising manager of the Disteel Wheel Corp., Detroit, proposed that a co-operative advertising campaign along this line be conducted through the M. A. M. A. Men should be taught how to sell, he said, and there is a pathetically large number in the automotive industry ignorant of the products they are merchandising. He told of live prospects within his own acquaintance who never had been invited to buy a car or even accessories for the ones they now own. It was his opinion that the M. A. M. A. could well afford to hire a big man to plan selling campaigns. Better motor cars and trucks are a necessity, he said, as well as better distributors and dealers.

Arthur T. Garrett, editor of the house organ of the Timken-Detroit Axle Co., who represented Frank N. Sim, advertising and assistant sales manager, told of the advertising his company is doing to boost sales of motor vehicles without any reference to its own products.

Huff and Garrett spoke in a symposium on "Selling Strategy to Bring the Automotive Industry Back to Normal." The ideas brought out in these talks applied to all branches of the industry and included some of the strongest sermons on service. Notable in this respect was the address of F. S. Armstrong, sales manager of the Vesta Battery Co., Chicago.

Armstrong began by declaring that times could not be "considered normal when hectic buyers were clamoring to buy ash cans on wheels, backed by Gyp the Blood for \$1385 f.o.b. Detroit."

"Automobile manufacturers must realize," he said, "that the buying public is using uncanny discrimination in getting real values. Car selling is not the only strategy. The chief thing to be improved and the one that will help most of all is improved service. It must be service that means something, not merely mechanical service, but the morality of service. This kind of service will improve business. Many a car owner skins his knuckles tinkering at some job for which he would gladly pay a service man what it was worth, but not five or ten times what it is worth. The Gyp the Blood must go. I proudly profess a religion of service. He profits most who serves best. The automotive industry must get together to raise the standards of service. We have only one customer and that is the ultimate consumer."

Most eloquent of Armstrong's words was his statement that August was the biggest month the Vesta Battery Co. ever had.

Joseph Jacobs, advertising manager of the American Hammered Piston Ring Co., Baltimore, advised every company to analyze its own problems and get down to business, chiefly by strengthening its sales organization and teaching its men how to sell and how to give service. He said that because of this system his own company had done as much business in the eight months ending Aug. 31 as it did all of last year and that it expected the year to show an increase of 100 per cent.

Another gospel in addition to that of service was preached. It was the essentiality of the motor vehicle as an agent of transportation. B. F. Rutherford, vice-president of the B. F. Goodrich Rubber Co., and of the M. A. M. A., declared every man in the industry should make this a creed like the Lord's prayer or the national anthem. In estimating what was normal, Rutherford said a good definition was:

"Normal in 1913 plus the progress which has been made since then."

In connection with sales strategy he declared there

never was a time like the present to stick to fundamentals, but that this did not mean to cling like grim death to obsolete methods. Reduce stocks and inventories, he said. Put individuals to the test. It is all a question of economics. Here are some of the things he suggested:

**Establish a price level, study your markets, cut selling costs, cut your past due lists, have salesmen make collections, strengthen the allegiance of your customers, recognize that you are in competition, study the best ways of doing business.**

In a discussion of the credit situation, C. S. Davis, secretary and treasurer of the Warner Gear Co., Muncie, Ind., gave some advice which might be applied by every man with goods to sell. As a preliminary, he said the interests of the car builders were the interests of the parts makers. He advised that information upon which credit was granted should include the following points:

Financial condition and current statement.

Reserve financial resources.

Sales position viewed broadly, including character and capacity of sales organization.

Personality of active officers.

Managerial and organization policies.

Resentment of any imputation that the motor car is not an essential ran through the whole thread of the convention. It was emphasized by Harry G. Moock, general manager of the National Automobile Dealers Association, in his address on "Business Conditions in the Automotive Industry and the Prospects for the Future," from the standpoint of the dealer. It might be stated parenthetically that Moock made one of the hits of the convention. It was evident the parts makers were eager to hear of the dealers' problems and sympathized with them.

Moock sketched the financial troubles which began for the dealers when the governors of certain Federal Reserve Banks gave out the dictum that motor cars were luxuries and that automobile paper would not be rediscounted. He recounted the fight of the N. A. D. A. to have the stigma removed but declared that while the battle had been successful so far as official action went the prejudice still prevailed in many banks, especially in the rural districts.

"Many dealers are honest, statements to the contrary notwithstanding," said Moock. "The dealer is the buffer between the manufacturer and the ultimate consumer. I admire him for the way he has met his problems. He has kept the factories running in spite of every obstacle. The dealers who are real merchants are doing business and selling cars.

"The average business life of the automobile retailer is 3½ years. The average of all retailers is 7½ years. Something must be done besides making cars and shipping them out with bill of lading attached. The dealer

must be shown how to do business. The flux in the industry is a great economic loss. Factory sales managers often don't know what to do. A tremendous educational program is needed to bring automobile merchants up to the grade of other merchants. It has been demonstrated that membership in an association extends a dealer's longevity. The man who has the courage of his conviction that he is selling transportation can dig prospects out of all kinds of odd corners. There is no buyers' strike. Everybody wants cars. It is mostly a question of finance. Everyone who owns an open car wants a closed car. That alone provides endless prospects."

Referring to the subject of legislation and unfair taxes on automobiles Moock said:

"Just so long as business men continue to elect politicians to office just so long will we have politics in business."

He said the automotive industry was singled out for attack because it was least organized.

Moock asserted that the used car problem is one for the entire industry to solve because 90 per cent of the sales made involved trade-ins. In many cases the man buying a car is a better business man than the one who sells.

He, too, stressed the importance of service and he invited the parts makers to co-operate in conducting a course of shop lectures for mechanics.

Many of the speakers brought out the point that it is the retail sale which is vital to the industry. Charles Burr, treasurer of S. K. F. Industries, New York, declared that if the merchandising of automobiles had been on a scientific basis much of the industry's troubles could have been avoided.

"We must address ourselves," he said, "to the question of how to strengthen

this weak spot in the automotive industry."

Utility, price, comfort, safety and low upkeep costs in the order of their importance were given by J. M. McComb, vice-president of the Crucible Steel Co., as the prime essentials for a motor car. He predicted that lower costs would stimulate buying. This idea was echoed by others. It was agreed there must be immediate deflation of prices all along the line.

There wasn't a note of pessimism in the whole convention. It was agreed that the worst is over, that the tide has turned and that prosperity is coming back. No one expects a boom and no one wants one. No one has any illusions. As H. H. Rice, president of the Cadillac Motor Car Co., expressed it, "We can expect a fairly decent business from now on."

Business is better now than it was expected to be a month ago, members of the association admitted, and it has been better for the last three months than it was expected to be. None of the parts and accessory makers have exaggerated expectations for the remainder of this year, but the accumulation of orders on their books is being gradually whittled down and they are getting some

## HERE are some of the striking statements made at the convention:

"The weakest link in the chain of automotive finance is that between the manufacturer and the dealer."—Charles Burr, treasurer S. K. F. Industries.

"A passenger chassis cannot be made to do double duty in the field of freight transportation."—Ezra W. Clark, advertising manager Clark Equipment Co., Buchanan, Michigan.

"It must be admitted that standardization has placed the American car in the pre-eminent position it occupies in the world."—G. Brewer Griffin, manager automotive equipment department, Westinghouse Electric & Mfg. Co.

"We must stop comparing business and profits with 1918 and 1919 and compare them with 1913, for 1913 was last year for us."—J. P. Harris, vice-president Union Trust Co., Cleveland.

"Credit dealt industry a severe blow but only through credit will the results be warded off."—C. W. Dickerson, vice-president Timken-Detroit Axle Co.

"There should be not merely a mechanical service but a morality of service. Gyp the Blood has got to go."—F. S. Armstrong, sales manager, Vesta Battery Corp.

new business. They expect the sale of automobiles to go along for the next three months pretty much as it has for the past four.

The optimism which radiated from the meeting wasn't based merely on hope, it was founded on fact. Fundamental business conditions are better not only in the United States but throughout the world. Improvement will be gradual and there will be ups and downs, but there will be no great slump. The industry has been through a terrific storm and has come through it sound as a rock, although more or less battered.

It was admitted that the mortality attendant upon the storm, as represented by failures, had been surprisingly small. It is true that the safes of the parts makers are well filled with gold notes and bonds, promissory notes, trade acceptances and all kinds of I. O. U.s, but they are not in any sense discouraged.

J. P. Harris, vice-president of the Union Trust Co., Cleveland, who spoke on business conditions from the standpoint of the banker, radiated good cheer. He said he was a firm optimist from all standpoints.

"Some of you may think business is rotten," he said, "but you are so close to it you see the specks on the window. There never was more ground for optimism. The banks will not be stingy with legitimate enterprises, but there will be no loans to manufacturers or merchants who are trying to maintain war prices and refuse to take their losses. The crux of the situation is that you have got to stop comparing with 1918 and 1919. We must compare with 1913. That was last year for us.

**"The worst is over. There is evidence that the supply of credit to grease business has passed normal. The end of the bear market is at hand. Security markets are predicting a revival of business. We may be certain that by late winter or early spring we will be looking at the sunshine with the clouds behind us. By another summer we will be getting back to increased business.**

"All labor must be liquidated to equal the liquidation on the farms. All prices must be equalized with farm levels. The automotive industry will find the next year or two an era of tremendous competition and falling prices. Manufacturers must meet the price cuts of competitors. The parts makers must help. It will be a survival of the fittest. You must meet the competition of superior service. You must get rid of high-priced inventories and get labor down. The army of unemployed will take care of the wage question and bring wages lower.

"You must buy carefully and a shorter period must elapse between production and sale. There must be a rapid turnover for the next 8 or 10 years. You must clean out your stocks and turn them into cash. Everyone must preach optimism. You must convince yourself that the worst is over and that fundamental conditions are sound."

Efficient management, economical production and fair selling to meet competition were urged by M. A. Moynihan, secretary and treasurer of the Gemmer Mfg. Co., Detroit, who agreed that the worst is over.

"As parts manufacturers," he said, "we have our own duty and responsibility to our particular industry and to the entire field of automobile production. Whether we manufacture a fan belt or a motor, that particular unit should have behind it every essential of good design, good quality, economic manufacture and honest selling. This is essential if the automobile is to be maintained as the greatest utility of transportation at a cost within the reach of the average buyer and delivering more service per dollar of cost and maintenance than any other item of family investment. As makers of the component

parts, we have a large duty in bringing about this ultimate result. And our duty compels us further, as individual manufacturers and as an association, to stamp out those practices which threaten our industry—stock-jobbing, misrepresentation, illegal combinations, over-borrowing, under capitalizing, profiteering, contract breaking and the many other faith-destroying elements which have been encountered before and which will bob up serenely again if we are not on the job to promote and protect the name and character of our industry."

Rice, who spoke as the representative of the National Automobile Chamber of Commerce, said one of the wonderful things about the industry was the way it had worked together. The forbearance of the members of the M. A. M. A. in a difficult period had been noteworthy, he added.

"We have been going through a sort of moratorium," he said, "and there is much to be said on both sides as to whether the industry should live up to the letter of contracts. It is largely a matter of give and take. The tide has turned but it is not the occasion for too great optimism.

"My own business is better and we can expect a very decent business from now on. That is the message I bring you from the car manufacturers as a whole. We must be efficient ourselves and have everyone connected with us work hard. The increased efficiency of labor in our industry is striking."

In an open forum discussion on business conditions, G. Brewer Griffin, manager of the automotive equipment department of the Westinghouse Electric & Mfg. Co., said the standardization of a product so far as is possible directly benefits both manufacturer and user, as well as the producer of the raw materials that enter into it.

"The matter of standardization is a sensitive spot with many engineers," he said. "The old time engineer felt unless he could design something that did not exist in the heavens above, the earth beneath, or the waters under the earth, he was not performing in a way that would warrant his title of engineer. Possibly this attitude is right so long as the product manufactured is sold and serviced solely by the individual or concern producing it, but just as soon as distribution of such product becomes general and the service requirements are national or international, then the nearer we approach to accepted standards the better it will be for everyone concerned.

"Whether the manufacturer is entitled to furnish all service parts of his original manufacture or not depends upon two things; first, control by patents which would shut out the furnishment by anyone else; but, second, and most important, is whether he is worthy to receive this business and obtain it by the scope and quality of his service and the relations he maintains with his buyers and users. But I wish to state that I am no friend of the pirate parts manufacturer."

A. H. D. Atree, vice-president of the American Bosch Magneto Corp., in speaking of the "Personal Equation in Granting Credit," said:

**"Competition is growing more keen every day, and it might almost be said, with very few reservations, that any newcomer into any branch of the automotive industry should not be granted credit unless he can show:**

**"A—Quality product at an attractive price.**

**"B—An existing or immediately prospective potential demand.**

**"C—Ample financial resources to meet his obligations and setbacks.**

(Continued on page 583)

# Cadillac Model 61 Embodies Design Refinements

Changes include use of 33 x 5 tires, reduced body height and redesigned rear axle. Slight engine changes have been made in connection with camshaft lubrication, water drain valves, and other minor features. The carbureter now has thermostatic control on auxiliary valve.

By J. Edward Schipper

**R**EFINEMENTS in design embodied in the new Cadillac model make for more pleasing appearance, better performance and—in the case of certain parts—longer life. No radical changes have been made. The eight-cylinder type of engine, which has been used since the first car of this type was introduced in 1914, has undergone very few changes. The plan of power transmission also remains fundamentally the same and no basic features of design have been altered.

All Cadillac cars are now mounted on a 132-in. wheelbase chassis. Formerly a 125-in. wheelbase was used to take care of certain body types, but now all are of the same length, permitting of a standardized manufacturing program as far as the chassis is concerned. By the use of wheels equipped with 33 by 5-in. tires in place of the 35 by 5-in. formerly employed, the height has been reduced slightly. Only one engineering change was necessitated by this lowering of the car—decreasing the size of the rear axle housing in order to maintain the same road clearance as in former models.

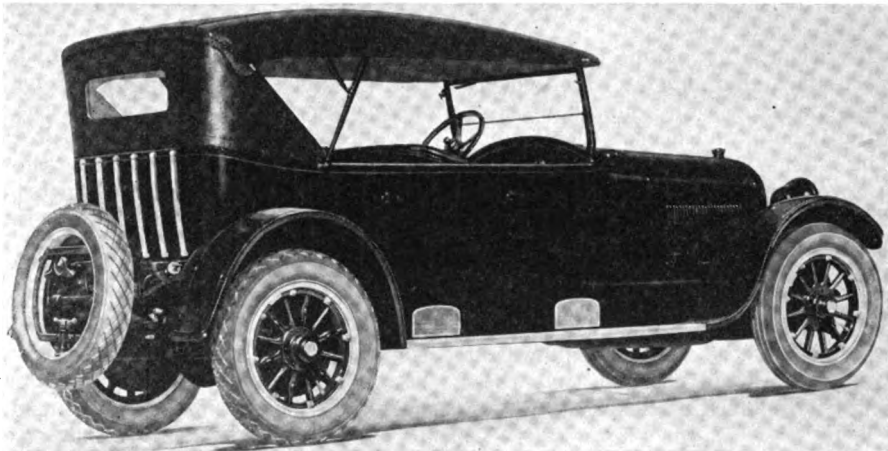
In redesigning the rear axle, increased bearing surface has been provided for the pin on the torque member. In general, the axle is the same as in previous Cadillacs, Timken bearings being used throughout. Bearings are on both sides of the pinion. Three gear ratios are offered, namely, 4 10/11, 4 1/2 and 4 2/13 to 1.

Engine changes are of a detail nature, the only internal alteration being in connection with the oiling system. For camshaft lubrication, the oil is now led through the hollow camshaft instead of through an independent copper lead. Sub-leads were formerly brought from the main lead to the camshaft bearings. In place of these, holes are now drilled in the camshaft at the bearing points, and centrifugal force helps to carry the oil to these. The front end driving chains and the air pump in the gasoline system are oiled from the camshaft. This eliminates the leads

and has the advantage of simplicity. Outside of the change in the camshaft oiling scheme, the oiling system remains the same.

Another change in the engine, made for the sake of convenience and accessibility, is in the arrangement of the water drain valves. It is now possible to open and close the valve at the bottom of the pump by means of an ordinary screwdriver from a position above the frame. An indicator dial showing the position of the valve is now in plain sight. It bears three inscriptions—fill, close and drain. The circulation of water to each cylinder

block is independent, as there are two independent pumps. Thermostatic control of the cooling liquid is continued, with improvements. Instead of the valves being mounted directly on the syphon thermostat as formerly, there is now a connection with a sort of universal action, so that any warping of the syphon can-

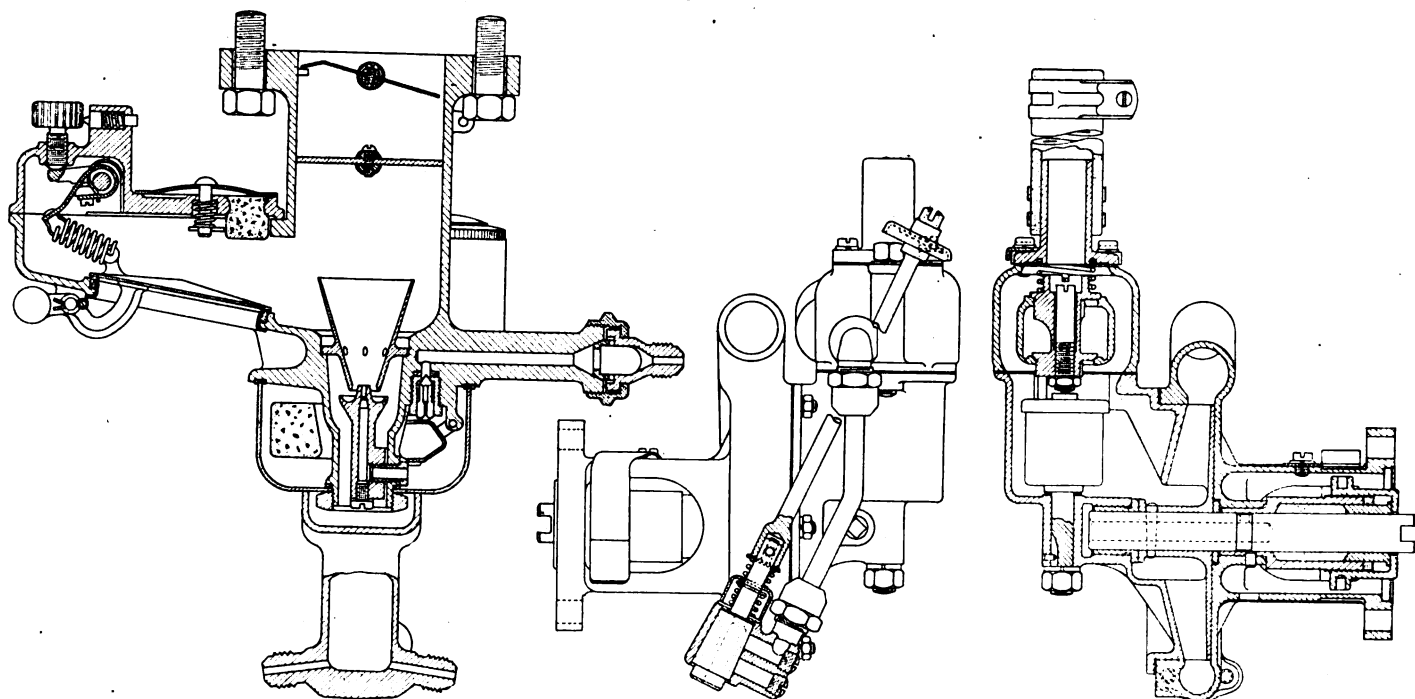


A smaller wheel gives the new Cadillac lower body lines

not cock the valve on its seat. The housing containing the syphon thermostat and the valve is located on the cover of the water pump. In draining the water system, it is necessary to force the thermostat valves from their seats. This is taken care of by the shaft operated by the screwdriver in draining the system, and when the dial is in the *drain* position the drain port is not only open at the bottom for the water to flow out, but the thermostatic valve is also lifted from its seat. The condenser, the purpose of which is to prevent the loss of anti-freeze solution by evaporation, which was used on former models, is still employed.

Changes in the carbureter (which now has a 2-in. intake) include the provision of thermostatic control for the tension on the auxiliary air valve spring and also for regulating the effectiveness of the accelerating pump, which is a feature of the Cadillac carbureter. Referring to the sectional view of the carbureter, it will be noticed that the manual setting for the air valve is continued, but





Sectional view through carburetor

Two views of the water pump

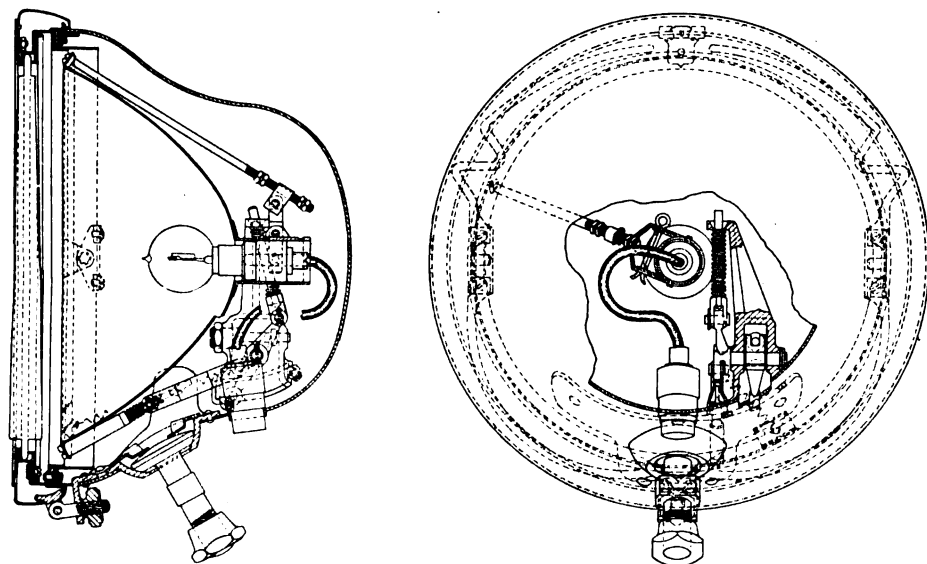
superimposed on this manual setting is a thermostat which alters the tension on the air valve spring in accordance with temperature requirements. On a cold engine, the spring tension is increased, thereby causing increased resistance to the opening of the auxiliary air valves; in warmer weather the effect is the reverse, thus tending to make the mixture leaner.

The thermostat on the accelerator pump, which is located in the fuel chamber, operates a shutter which covers and uncovers a vent, thus increasing the effectiveness of the pump when the engine is cold, and decreasing it when the engine is warm. The object of this acceleration pump or throttle pump is to force gasoline through the spray nozzle when the throttle is opened quickly for acceleration. When the throttle is opened slowly, the pump has practically no effect on the gasoline. The throttle pump is inter-connected with the throttle and its function is to force compressed air into the float bowl. When the thermostat comes into effect and opens the vent, the pump operation is materially reduced. It is claimed that these changes reduce the warming-up period materially.

In the electrical equipment of the car there have been some minor changes. A two-pole generator is used instead of four-pole. Tilting headlights are continued, but have been materially changed in design, for durability and simplicity. The headlights are now mounted on a tubular cross-member which extends across the entire front of the car at midheight of the radiator. The headlamps are mounted on posts which permit of individual adjustment of each lamp. The tilting mechanism for the reflector has been improved so that wear in the operating linkage does not affect the uniformity of tilt in the reflectors. This is accomplished by so arranging the tilting mechanism that it swings over a center to a uniform degree.

Chassis lubrication has been improved by the use of better grease cups in some places and the elimination of others. Grease or oil lubricated bearings on the clutch and brake pedal shaft, clutch release shaft and brake rocker shaft are replaced by bronze bushings with graphite inserts. In the new type of grease cup, a tight fitting piston operating within a cylinder forces grease to the bearings under a pressure claimed to be between 300 to 400 lb. per sq. in. The piston in the grease cup is operated by a small wing nut.

A new chain drive adjustment is provided. The Cadillac chain is so designed that when properly adjusted enough play is left in the chain to permit an oscillation of 1 in. at the periphery of the fan. The adjustment is by means of an eccentric sprocket shaft. In the earlier models, the camshaft sprockets were integral and had their bearings directly on the camshaft. This is no longer the case. The camshaft sprockets now rotate upon eccentric surfaces located on a supporting member which is clamped into the crankcase by a locking device. The camshaft also rotates in a bearing carried in this support. By turning the eccentric surface by means of an adjusting worm the center distance between the crankshaft sprocket



The improved tilting headlights

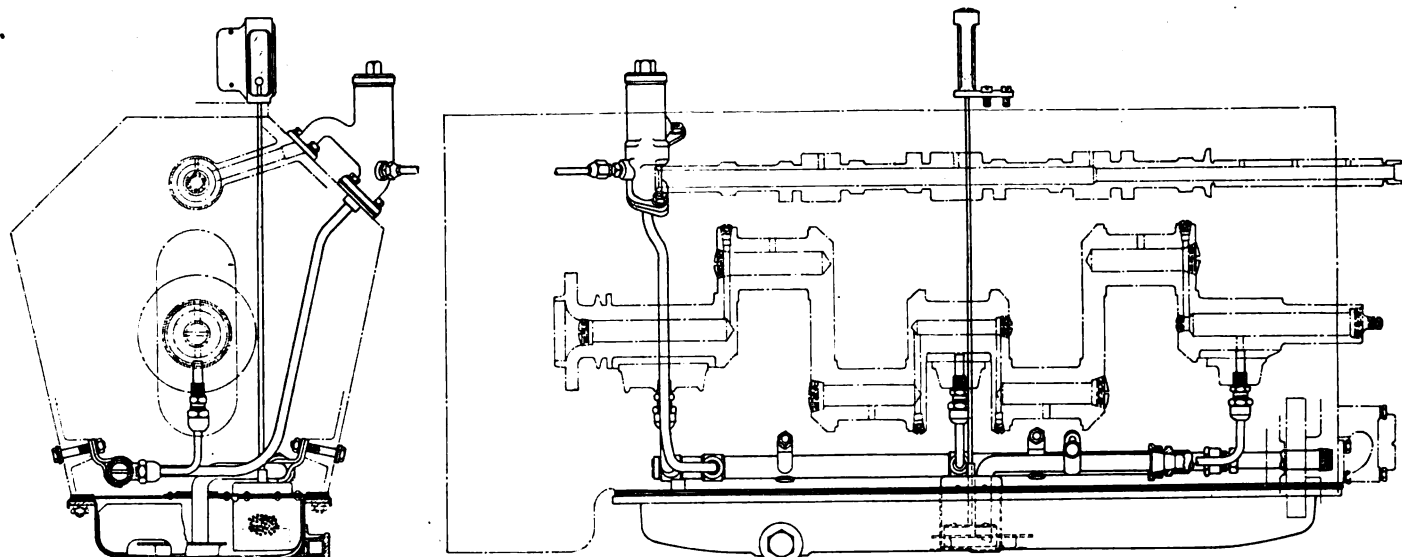


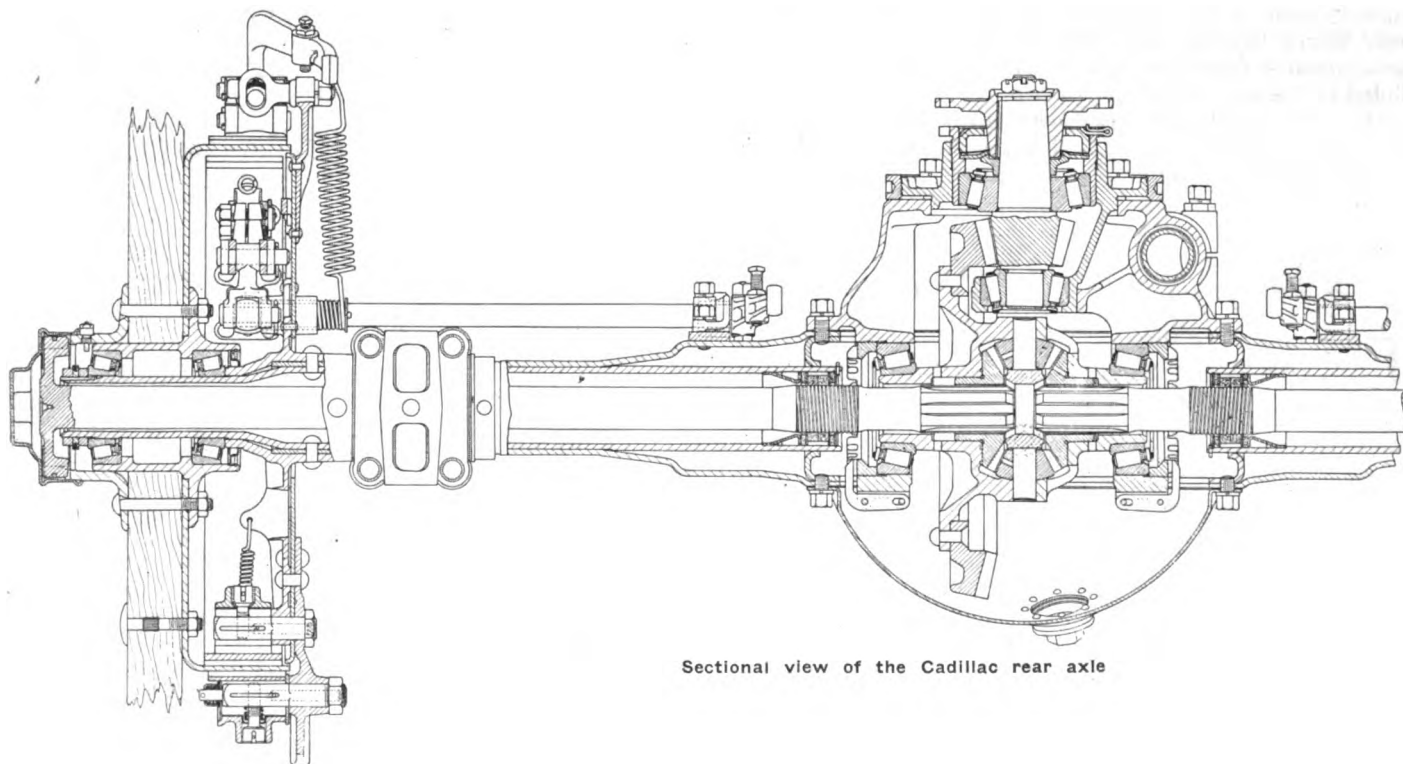
Diagram of engine lubricating system

and the camshaft sprocket, or between the camshaft sprocket and the fan sprocket is increased, thus tightening the chain.

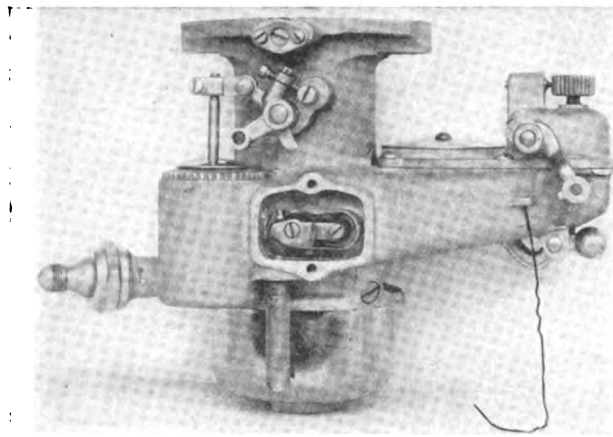
A great many detail changes have been made in the body and fittings of the car. The lowering of the car by the use of smaller wheels is reflected in the appearance of the car. The radiator is higher and the shoulders have been raised and rounded, with the result that the entire front end of the car is enlarged. This improvement in appearance at the front end has been further increased by the use of Bausch & Lomb optical lenses on the headlamps and the small side lamps. The lines of the fenders have been altered and the rear quarters of the enclosed bodies have been changed by greatly reducing the radii at the corners. Two new body styles have been added to the Cadillac line, a two-passenger coupe resembling the roadster in seat arrangement and storage space, and a four-passenger coupe in which entrance to the rear seat is secured by tilting the seat on the right side.

The body interiors have been entirely redesigned, particular care having been used in the selection of metal for fittings. All of the levers and bright metal interior parts are of Duralumin forgings. Owing to the non-corrosive quality of this material it is also used for windshield wing nuts, door handles, floor boards and kick plates under the doors. With the phaeton and sedan bodies is furnished a trunk rack of the same material, which gives six polished strips of aluminum running vertically on the rear end of the car between the tire carrier and body.

The entire front compartment has been redesigned. All of the fittings have been made uniform, the instrument board having been made to conform with the general scheme of decoration of the car. The steering wheel is now made entirely of selected walnut, even to the spokes. The horn button is of the same wood and the rim of the wheel is molded to fit the driver's hand and is as free from metal as it is possible to make it. The tilting feature of the steering wheel, a characteristic of former Cadillacs,



Sectional view of the Cadillac rear axle

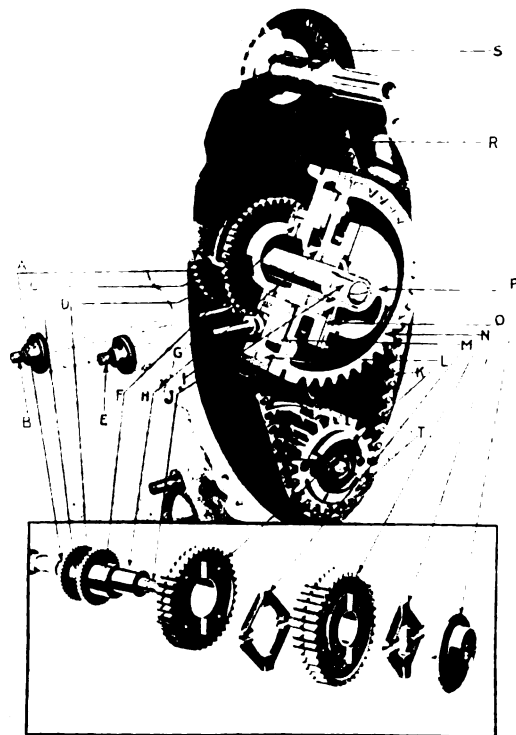


The improved carburetor with thermostatic control

has been discontinued. The spark and throttle lever mounts have been altered; the quadrant has been replaced by a compact arrangement which brings the control in closer to the steering column. Only the finger grips of the new levers are exposed.

The instrument board is convenient and simple. There is a jet black oval plate in the center in which are mounted the switch levers and switch lock. On this plate is the Cadillac crest, finished in enamel and gold. Below the oval plate and at either side are the buttons for controlling the fuel mixture when starting and for deflecting the headlights. The dials of the ammeter and pressure gages are combined in one instrument at the left, which balances a similar circle containing the clock and speedometer on the right. A single lamp is carried directly over the combination switch plate to illuminate the dash. All of the detail work about the front compartment has been gone over. The pedal pads are forgings of Duralumin and the adjustment for the extension of the pedals has been discontinued, for the sake of cleaner design. The hand brake now has a polished nickel grip in place of rubber. A new transmission lock has been provided, supplementing the switch lock, and the switch key fits the transmission lock as well as the tire lock. The ventilator has been increased in capacity and is now operated by one motion of a small lever placed beneath the cowl. A windshield cleaner and an adjustable rear view mirror on the windshield are included in the equipment.

All of these changes have been made without altering the specifications of the car. The price and weight of the car also remain the same.



The Cadillac chain adjustment

Camshaft sprockets N and L are not integral nor do they bear upon the camshaft as in earlier eight-cylinder construction. The camshaft sprockets have their bearings and rotate upon eccentric surfaces H and F of the support C. The support C is clamped into the crankcase by the locking collar A. The camshaft J rotates in bearings carried in the support C. Shafts E and B fitted with worm gears I and G meshing with teeth cut upon the flange D of the support C and with teeth cut upon the collar serve as means whereby the collar A may be loosened or tightened and the support C turned. Turning the support C by the shaft E, which may be done after the collar A is loosened by turning the shaft B in a clockwise direction, raises the sprocket N and lowers the sprocket L as these sprockets have their bearings upon eccentric surfaces of the support C. In other words, the center distances are increased between the crankshaft sprocket T and the camshaft sprocket N and between the fan sprocket S and the camshaft sprocket L. The chains are thus tightened. Camshaft sprocket N is driven from the crankshaft sprocket T by the chain K. Camshaft sprocket L is driven from camshaft sprocket N by a universal cross M through lugs on the inner surfaces of these sprockets. Camshaft J is driven by camshaft sprocket N through the universal cross O and the driver P. The fanshaft sprocket S is driven from the camshaft sprocket L by the chain R.

## Fellowships in Highway Engineering and Highway Transport

THE following Fellowships will be awarded by the Board of Regents of the University of Michigan not later than Nov. 1, 1921:

The Roy D. Chapin Fellowship in Highway Transport, which is offered to provide for the investigation of an approved subject relative to highway transport.

The Roy D. Chapin Fellowship in Highway Engineering, which is offered to provide for the investigation of an approved subject relative to hard surfaced roads and pavements.

Two Detroit Edison Fellowships in Highway Engineering, which are offered to provide for the investigation of approved subjects relative to moderate cost country roads.

General conditions: Each Fellowship pays the sum of \$250 with an allowance of \$50 for expenses. The holders of these Fellowships do not have to pay tuition fees. A

Fellow must hold a Bachelor's Degree from a college of recognized standing. He must enroll as a graduate student in highway engineering or highway transport and as a candidate for the degree of Master of Science or Master of Science in Engineering. He must be in residence for one of the following periods: First semester (October to February); winter period (December to March); second semester (February to June). An application for a Fellowship must include a concise statement of the candidate's educational training and engineering experience, and three references. Applications and requests for information pertaining to the twenty-five advanced courses in highway engineering and highway transport offered by the Graduate School should be sent to Arthur H. Blanchard, at the University of Michigan, Ann Arbor, Mich.

# Many Changes Shown in New Chevrolet

The most important changes in this new model are in the body and its fittings. The front seat has been lowered 4½ in. and the top and back curtains are of new design. Engine and transmission are assembled in a unit. Spiral bevel pinion and ring gear replace straight bevel drive.

A NUMBER of improvements in design have been made in the Chevrolet "Four-Ninety" model, intended to add to the comfort, quietness and life of the car.

Special attention has been given to the steering knuckles, which are now decidedly more robust. The steering knuckle arms are given a heavier section and are fitted to the knuckles with a tapered joint. The pivot bolts are increased in diameter from ½ to 9/16 in. and are mounted in hard rolled bronze bushings. Both bearings on the knuckle are now of taper roller bearing type, with smooth bore. A grease cup is now assembled on the knuckle in such a manner that it is readily accessible for refilling and both the upper and the lower bushings are assured of a sufficient supply of lubricant, it is claimed.

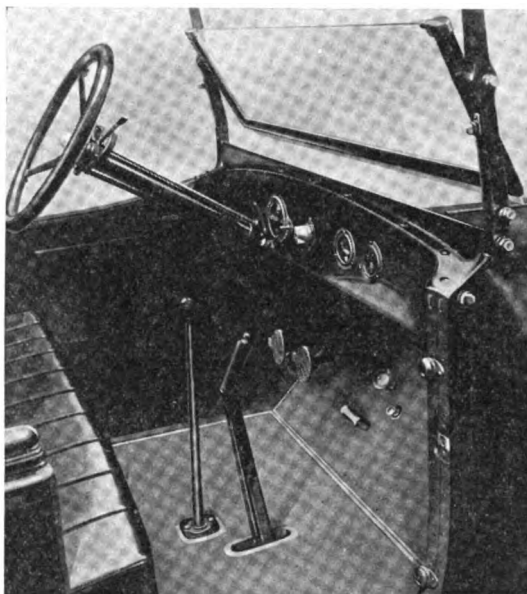
Up to now the Chevrolet has adhered to the straight bevel drive, but the new model carries a spiral bevel pinion and ring gear. The chief advantage of this drive is, of course, its more silent operation, but the spiral bevel gears are also materially stronger. With this kind of drive the end thrust on the pinion is considerably greater, and this has been taken care of by providing the pinion with an annular ball

bearing capable of taking a great deal of thrust.

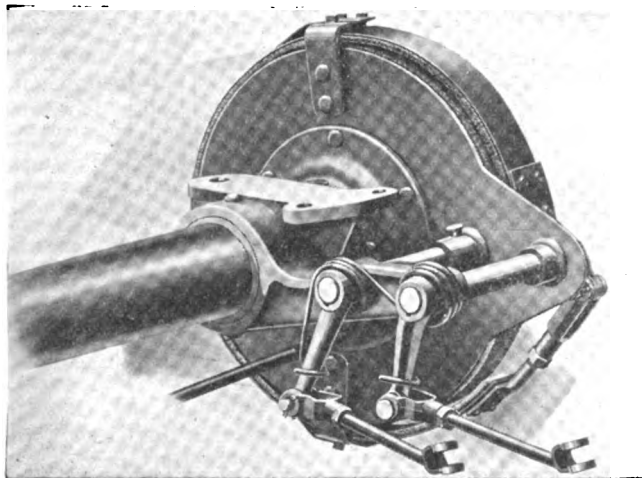
To overcome trouble due to want of alignment between the engine and transmission, these two parts are now assembled in a unit with the supporting members; they are drilled and assembled in a unit jig which is said to assure alignment within 0.005 in., and it is claimed that this alignment is maintained in use. A hand lever is now provided for the emergency brake, and the pull rod assembly has been redesigned. The brake pedal has also been slightly changed. The brake shaft brackets are reinforced so as to be able to better withstand the pull of the brake cables.

Rather important changes have been made in the body and its fittings, the front seat has been lowered 4½ in., to obtain a higher seat back without increasing the height of the car. To gain more leg room the cushions are placed at an angle, and the steering column has been shortened to correspond to the new position of the seat. For the same reason the windshield has been lowered.

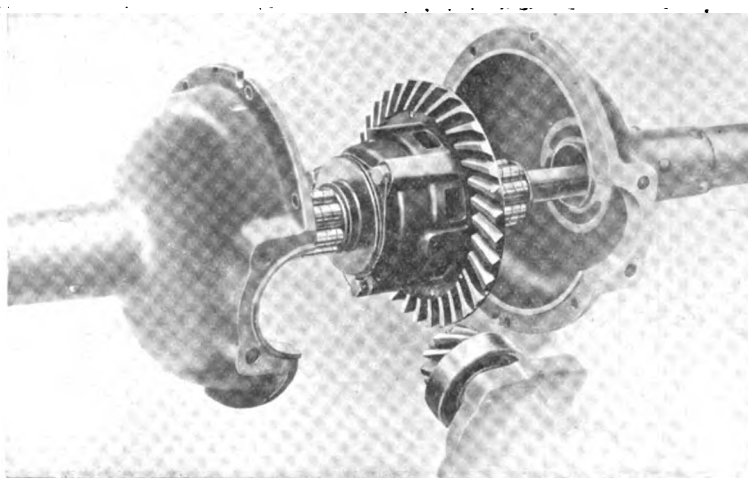
Holton hood catches are now used, the gas tank capacity has been increased to 10 gal., the top and back curtain are of new design, and Gipsy curtains have been added.



Dash and control of Chevrolet "Four-Ninety" showing new hand controlled emergency brake lever



Left brake, complete, showing new brake shaft and brake shaft bracket



Spiral bevel gear rear drive with annular ball bearing on pinion shaft

# Springing and Other Refinements in Motorcycle Design

The need for springing of motorcycles, especially when used on rough roads or when heavy loads are to be carried, is emphasized and several types described. Lubrication and other items are discussed.

By G. H. Savage\*

**A**FTER having ridden practically all kinds of motorcycles in France over all sorts of conditions of roads, the author's criticism is that the springs were not responsive at all to the small and average shock, though they came into action for hard shocks, and for the very severe shocks the springs either came up solid, when acting in compression, and the frame took the final blow, or, in the case of the extension type, the springs were overstressed. If a stop was fitted on this latter type, the frame again took the final blow.

The allowable movement from the normal, under load, was on the average from 1 in. to 1½ in. In the author's opinion it is impossible to design a spring with this allowable movement that will be responsive to the full range of shocks. In consequence the springs used were too stiff, parts broke and shook loose, etc., and the springs themselves broke frequently.

With the helical spring acting in extension, on one or two types of machines the top and bottom ends of the

spring were bolted up solid. The front forks were connected to the head by links, the movement of the forks thus being along the arc of a circle with radius equal to the length of the link. If the two ends of the spring are in line with the spring straight, when the spring is extended under load one end will move along an arc, and it must move out of line with its other end, thus bending or distorting the spring as well as extending it. The angular movement of the spring ends can be altered slightly by having the top and bottom links of different lengths and at different angles in relation to each other, but with these modifications the spring still distorts, and this arrangement has its own objections. In such cases it is usual to have the spring bent when in the normal position, so that it tends to straighten when further extended.

These 2¾-hp. Douglas extension springs broke, as a rule, where the spring commenced to taper near the ends. On the latest Douglas 4-hp. machines the springs are all parallel, and the ends are allowed to swivel on pins; very little trouble has been experienced with this type.

On all the makes, with the exception of the Triumph and Douglas 4-hp., the linkage employed was too light, the chief faults being the small diameter of the spindles

\*Extracts from a paper presented before the Institution of Automobile Engineers, London. The author was attached to the British Mechanical Transport in France and had opportunity to observe the performance of motorcycles used on a large scale. The article is based upon observations made under severe conditions of service, both at the front and at base repair shops, where machines were in some cases redesigned as well as repaired and rebuilt.

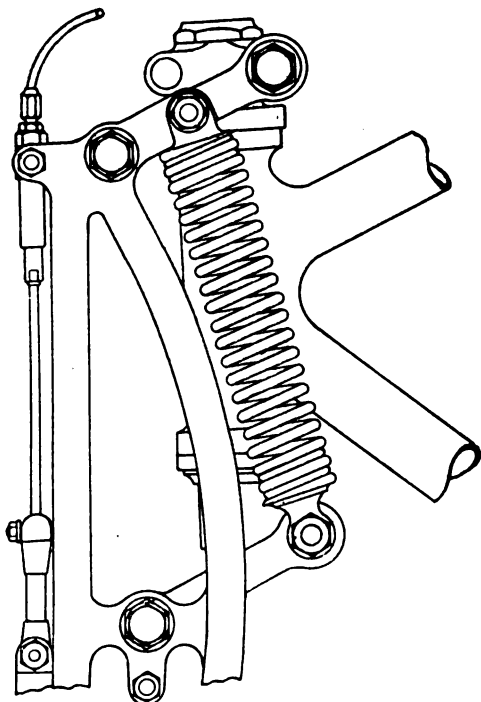


Fig. 1—Douglas front forks with helical springs

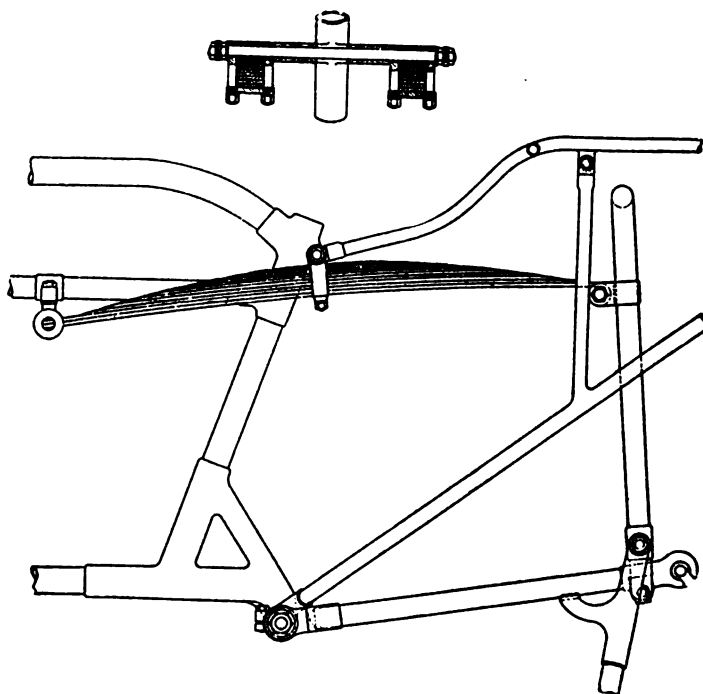


Fig. 2—Springing 2¾ hp. model with laminated rear springs



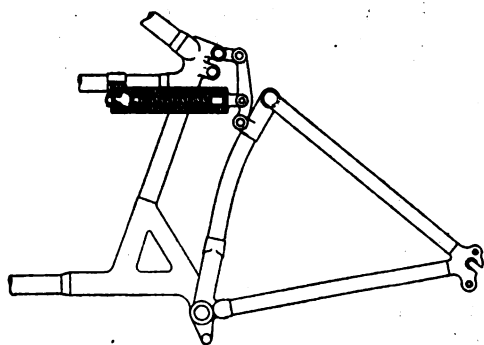


Fig. 3—3½ hp. model with helical rear springs

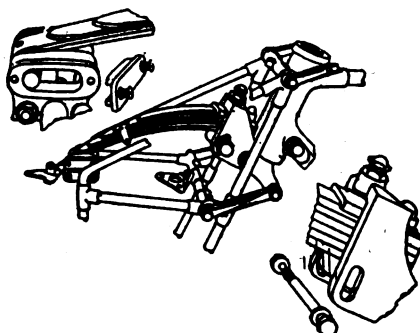


Fig. 4—Front and rear springs on Royal Ruby Standard model

and the lack of a proper method of lubricating them. The author practically never saw a spring linkage taken to pieces, but that the spindles were dry.

On the later type Douglas 4-hp. machine, the spindles are of larger diameter and drilled up, the end of the spindle being screwed, and on this a grease cup fitted; this is a big advance on previous practice, and very little trouble has been experienced with them.

On the Triumph machines the front fork was hinged at the bottom of the fork stem, a ball bearing, which stood up well, being fitted.

Except on the very earliest types of Douglas 2¾-hp. machines the author saw practically no cases on any make where the links had bent during ordinary wear and tear. The diameter of the spindle end, the thickness of the link at the eye, and the face on the spindle which the link came up against were all too small, and once the link started working at the eyes it usually meant new links and spindles to make a satisfactory job. The surfaces for taking side pressure were small, though any play developing could be taken up by washers, and later in the war some makers fitted hardened steel washers. The use of double coil flat spring washers between the faces of the castings and of the links was a good arrangement.

Saddle springs stood up well, but chiefly because the saddles bumped before the springs were overstressed.

A Douglas 2¾-hp. machine with two rear springs, one on each side of the rear wheel, is shown in Fig. 2. The forward ends of the springs rest on a bracket about 8 in. along the middle rail, the center of the springs being hinged to the seat pillar lug, and the rear ends attached to a stay that went over the wheel. The author did not test this machine himself, but has been told that the early reports were good. The next experimental Douglas machines that came out were 3½ hp. machines, fitted with helical rear springs, as shown in Fig. 3. The spring cages showed that the spring had been deflected to the end of its travel often and fairly hard. The machine was good and very comfortable to ride, but the springs were too stiff to be responsive to the light shocks.

Another spring frame machine tested was the Royal Ruby. This machine differed from the latest model shown in Fig. 4, chiefly in the position of the rear spring. It was approximately vertical then. It is now horizontal. The shackles were also different, but the front spring was much the same. This machine, as it came to the author, had had some fairly severe work to do. The only criticism was that the wheels were a little out of track and care had to be exercised when riding the machine. The machine was very comfortable, and very much less tiring to ride than one with a solid frame.

Another design of rear spring was especially fitted to a standard Triumph machine, the general arrangement of which can be seen in Fig. 5. The carrier and rear mudguard were unsprung. The spring had a flat end,

with no eye or shackle, but behind the end was a cross bar, which engaged the spring on rebound. The difference between the riding qualities of this machine and those of a standard Triumph was enormous.

As higher speeds became more common the springing must be developed not only for comfort but to enable the mechanical details to better stand up to their work. It does not appear that this should add much to the cost of the machine as there will certainly after a time be a saving by making the whole machine lighter. But even if the first cost is greater, the springing if well designed should be a great asset.

Manufacturers should decide upon the permissible movement from the normal under load for the front and rear forks of the machine. The author suggests 2½ in. to 3 in. for the front forks and 3½ in. to 4½ in. for the rear. The Beardmore Precision Co. informs the author that they have experimented with larger deflections than they at present allow on their standard spring frame machine, Fig. 6, and have rejected them. They found that the movements were, in their opinion, too great for the short wheelbase of a motorcycle, that the periods were too slow and the springs too heavy. On their standard machines they allow a maximum movement of about 1½ in. for the front wheel and 2 in. for the back wheel.

The Royal Ruby Cycle Co. says that the maximum allowable movements are about 3 in. on front and rear wheels. The Beardmore company says that in its experience the steering is hardly affected by the large movements. This agrees with my own experience.

A considerable number of machines are now fitted with both horizontal and vertical springs on the front forks. The wheel is thus sprung in two directions. That these springs do useful work can be appreciated by rid-

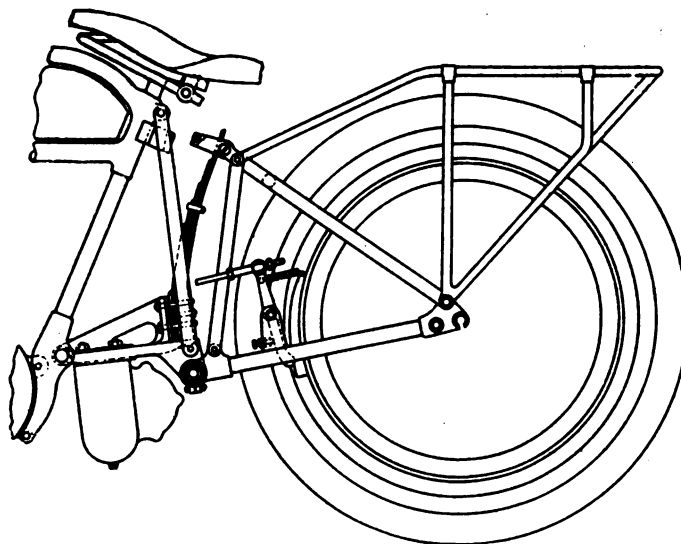


Fig. 5—Rear spring as applied to Triumph machine

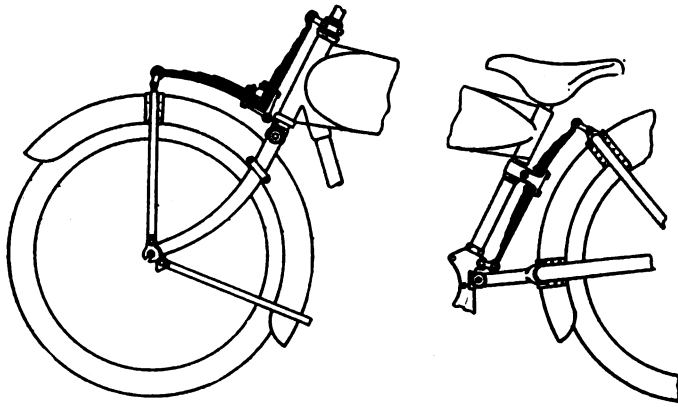


Fig. 6—Springing used on standard model of Beardmore machine

ing a machine so fitted. In the author's opinion, however, these are only useful when vertical springs are too stiff, that is, on a front fork fitted with reasonably flexible springs the horizontal springs would not be required, especially as the motorcycle front forks are already at an angle of about 30 deg. to the vertical.

There are three distinct types of front forks. The most usual is the parallel link type, where the links connect from the top of the front forks to the head of the frame. Then comes the type used on the Triumph and the B.P., where the front fork is hinged at the crown, and lastly the design which seems to be popular on American machines, and which is also embodied in the Phelan and Moore front forks, where the connecting link comes straight off the wheel spindle. It would be hard to say which type is best, as they are, in common with most engineering problems, a compromise of the three; the author prefers the first mentioned, where the links bridge from the top of the front forks to the head. The bearings in this type are long, easy to lubricate, easy to adjust, accessible, simple and out of the dirt, and in practice they stand up quite well. The tendency now is to make the link spindles of larger diameter, as on the Douglas type shown in Fig. 7. This is a move in the right direction. The spindles will, however, stand still further increase in diameter. Some makers are also providing an easy adjustment for taking up any side play that develops. This is satisfactory as long as it insures that the links are still held solidly on the spindle ends, or on a connecting tube in some designs. The links are preferably screwed up against shoulders. In the type of front fork used by Triumph a large proportion of the road shock must be transmitted direct to the frame, or at any rate a great deal more than on the other two designs mentioned. The more flexible the spring, however, the less will this be felt. When the front fork is hinged at the steering crown, there is the advantage of only one bearing against four, see Fig. 8. and this bearing can be made long and of large diameter.

On the P. & M. and American type there is the advantage, when using helical springs, that the angular movement of one end of the spring in relation to the other when being compressed or extended is less than with the first mentioned link type. Another advantage is that there will be slightly less unsprung weight. When the wheel is in front of the bearing it hinges from, it appears that one advantage of this type is destroyed; if the wheel is behind the bearing, it is trailing, and its position could be such that it would be readily responsive to road shocks from a large range of directions.

Whether to make the springs adjustable for different weights and for bad roads is a question. The Royal Ruby Co. embody such an adjustment in their machine,

as shown in the lower part of Fig. 4, and it is without doubt a desirable refinement. If, however, a low priced machine is being built, the author thinks it unnecessary.

Rear springing on a motorcycle is a comparatively new feature. The considerations in the design seem to be accessibility for viewing, repair and lubrication, efficiency, clean appearance and cheapness. The maximum allowable movement from the normal should, the author thinks, be from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  in.

Vitally connected with the problem of rear springing is the practice which is becoming more usual each day—that is, transporting an extra passenger on the carrier. It seems absolutely unreasonable to expect the manufacturer to design a machine to give good springing with one passenger, and also with two passengers, one sitting on the carrier. It is, as a matter of fact, impossible. The author prefers the leaf spring. Satisfactory designs have, however, been got out with helical rear springing, and there is no reason why they should not give very efficient results. The helical rear springs on the Douglas  $3\frac{1}{2}$  hp. machine are shown in Fig. 3. The author has ridden one of these machines and found it very comfortable and well made. The only criticism is that the springs were, of necessity, rather stiff, the allowable movement of the wheel being small. Another machine which has helical rear springing is the Matchless. On this type at present the ends of the springs are held solidly. In the normal position they are out of line, and as the spring is further compressed they move into line. The carrier is sprung on this machine, so that if an extra passenger is transported the springs on the rear wheel have to support the extra weight.

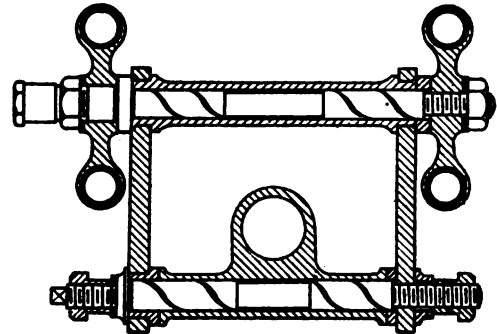


Fig. 7—Front fork links and spindles used on Douglas machines

Saddle springs act as supplementary springs or shock absorbers for the rider only. These saddle springs are part of the springing, but it does not follow that supplementary springs would not be desirable in combination with the main spring, or that the main spring can be stiffer, for in this case the power unit, gear box, etc., which weigh about one and a half times as much as the average rider, would still be badly sprung, and apart from the bad effect of road shock to these units, the rider would feel the vibration. What should be aimed at is to spring the machine and rider as perfectly as possible, and simply look on the saddle springs as the equivalent of the cushion springs on a car.

It would undoubtedly be preferable to have the carrier as sprung weight, providing the machine is ridden solo. If it is sprung it saves the carrier bags and their contents considerably. While the present tendency of carrying an extra passenger continues, the carrier must be unsprung, as a protection to the manufacturer.

The backstand should, if possible, be sprung, thus doing away with the clip on the rear of the mudguard, which is intended to hold the stand up. This spring clip is now being replaced by a positive screw fixture,

but this is a nuisance and is always exposed to the wet and dust.

On the majority of machines the main spindle bearing is a plain bearing (examples of which are shown in Fig. 9) though on at least one design ball bearings have been fitted. All these bearings should be of considerably larger proportions, and as long as possible, and ample faces for the side thrust should be allowed. This bearing is an extremely important feature; if it develops wear soon (possibly through not being well lubricated, or through careless usage) slack, which will destroy the balance of the machine, will be set up. On account of the under lubrication which this main spindle bearing, in common with all others, will undoubtedly receive, the author favors ball bearings as on the Beardmore Precision machine.

The main bearing should be as near to the center of the gearbox pulley or chain wheel as possible. In the normal riding position the center of the wheel should be  $1\frac{1}{2}$  in. to 2 in. below a line produced from the gearbox pulley through the center of the main spindle bearing. Actually, the shortening of the distance between the gearbox pulley wheel and the wheel center is practically negligible even with a 4 in. movement, and the author has never had trouble with a belt slipping on this account. A belt is elastic, and a chain never runs dead tight. Wheel spindle bearings had to be replaced very often. They were not large enough to long withstand vibration.

Some makers are seriously considering lubrication facilities. A great many, on the other hand, even on their latest standard models, fit lubricating means which are useless. They do not seem to realize that unless it is possible to lubricate the part with absolute minimum of trouble to the rider, and unless the system is efficient, the part will go unlubricated. The design in which there is simply a small oil-hole, covered by a pivoted flat spring, is bad in practice, as the oil can end never fits the hole and the hole also holds practically no oil, and in consequence most of it simply runs over the outside. Fitting absurdly small grease cups is another favorite practice. The author favors an oiler with the hinged lid, which is ideal for the lazy man, or a grease cup of reasonable dimensions.

During the war, in France, frames were a constant source of trouble through the tubes breaking, or the frames themselves distorting and twisting; the front down tube was the weakest point and it usually broke just below the head lug. It is possible that the heating in the process of brazing would, by annealing the tube, destroy some of the extra tensile strength of the solid drawn tube. In any case tubes of a heavier gage stood up to their work much better.

The front fork stems broke very seldom, but the same cannot be said for the ball races in the head. These were very poor, and after every 200 or 300 miles riding play developed and the races had to be adjusted. When

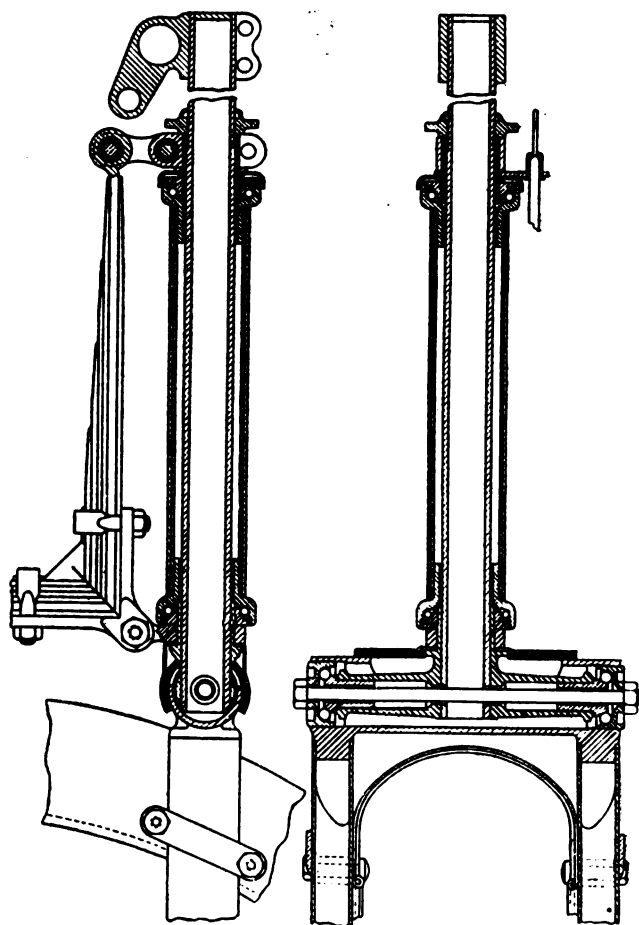


Fig. 8—Front fork construction used on Beardmore machines

this had been done several times it would be found that all the side play could not be taken up and new races were necessary.

Repairing wheels and scrapping them kept a small army of men busy. While many were damaged in collisions, their number was small compared with those that failed through average running. Practically every rim that came in was badly dented. The spokes were loose and often broken, which of course did not help the rim to stand up to its work, but both were at fault, as the spokes were too light a gage. Later on they were made heavier by some manufacturers.

Mudguards had to be replaced very often, as they either broke or cracked and tore away at the point where they were attached to the frame and stays; the method of attachment was usually very poor, and does not seem to have received the attention it deserves at the hands of the designer.

It is generally agreed that larger tires are more economical in the end and give easier riding.

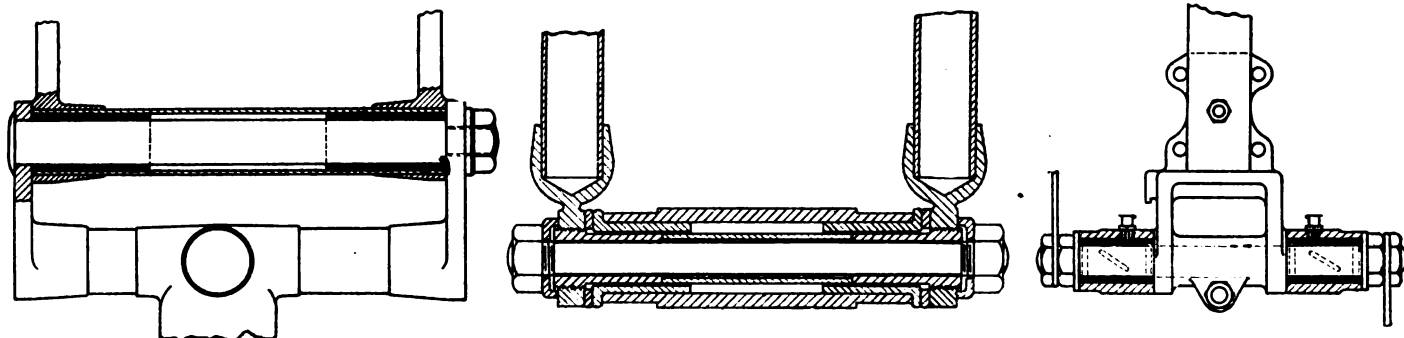


Fig. 9—Examples of main spindle bearing

# Gearing Calculations by the Compressive Stress Method

## Part II

The capacity of gears cannot be accurately determined by the bending stress method for bending stresses are not a true measure of wearing qualities. The maximum surface pressure, or compressive stress, must be considered if tooth wear is to be kept within proper limits.

By Joseph Jandasek\*

**G**EARS cut from cast iron or cast steel are not used in vehicle construction for transmitting any great loads. However, for the sake of completeness, and also to clarify the compressive stress method, the values for allowable compressive stresses for cast iron are given in Table I. Here we can see that while the factor of safety for bending stresses at low speed, up to 100 ft. per min., is about 3—the maximum allowable bending stress being 8000 lb. per sq. in.—the safety factor for compressive stress is only about 2, the maximum allowable stress being 55,000 lb. per sq. in. However, where it is necessary continuously to transmit almost 100 per cent of the full load, the maximum compressive stress must be reduced to 32,000 or 33,000 lb. so that the safety factor for compressive stress for cast iron will be 3 also.

As for gears cut from soft cast steel, unhardened, their teeth can be subjected to static bending stress up to 20,000 lb. per sq. in., leaving the safety factor about 3 as far as strength is concerned. Checking for capacity, however, this corresponds to a compressive stress of about 125,000 lb. per sq. in., which is entirely too high for cast steel untreated. This fact has been confirmed by practice, which shows that soft steel gears are not suitable for the continuous transmission of heavy loads, because of their rapid wear.

If, for some reason, unhardened steel is to be used for gearing, a maximum compressive stress of 40,000 lb. can be allowed for ordinary cast steel and 50,000 lb. for high carbon cast steel, and teeth proportioned on this basis will be durable.

\*Engineer, Republic Motor Truck Co., Inc.

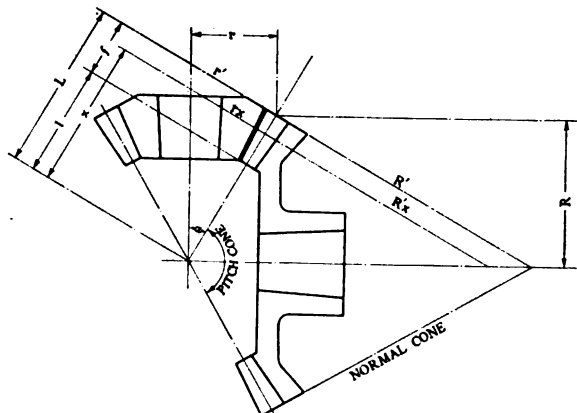


Fig. 15—Diagram of bevel gear set

### Capacity of Bevel Gears

The bevel gear tooth decreases in pitch uniformly from the outer end, where the pitch has the nominal value, to the apex of the gear cone. In Fig. 15,  $r'$  and  $R'$  represent the pitch radii on the normal cones and  $r$  and  $R$  are the pitch radii.  $L$  represents the outer pitch cone radius,  $l$  the inner pitch cone radius.

Now let us take any infinitely small section at the point  $X$  of the tooth at the distance  $x$  from the apex. The tangential pressure  $dW_c$  which this section sustains is also infinitely small and can be found by equation (6), because for an extremely narrow width of face  $dx$  bevel gears can be treated like spur gears, the only difference being that the pitch diameters on surfaces at the section  $dx$  of the normal cones are used in place of pitch diameters in the case of spur gears.

Thus for the section  $dx$  we have:

$$dW_c = 10^{-8} C_x^2 p_x dx \frac{n_x}{1 + \frac{r'_x}{R'_x}} \text{ for compressive stresses, and}$$

$$dW_b = S_x dx p_x y_x \text{ for bending stresses,}$$

where the index  $x$  means that the value of each particular dimension ought to be taken to correspond to section  $dx$ .

From Fig. 15 we see that the values of  $r_x$ ,  $R_x$ ,  $C_x$ ,  $S_x$ ,  $p_x$  decrease uniformly from the outer end to the apex. Hence

$$C_x = \frac{x}{L} C \quad p_x = \frac{x}{L} p$$

$$S_x = \frac{x}{L} S \quad y_x = y'$$

$$r'_x = \frac{x}{l} r' \quad n_x = \frac{n}{r} r'$$

$$R'_x = \frac{x}{L} R' \quad a_x = \frac{r'_x}{R'_x} = \frac{r'}{R'}$$

Of the above  $y_x$  is constant for any section, depending only on the number of teeth

$$n' = \frac{n}{\cos \alpha} = n \sqrt{1 + a^2}$$

$a_x$  is a constant.

Therefore,

$$dW_c = 10^{-8} C^2 \frac{x}{L} p \frac{x}{L} dx \frac{nr'}{r \left( 1 + \frac{r'}{R'} \right)}$$

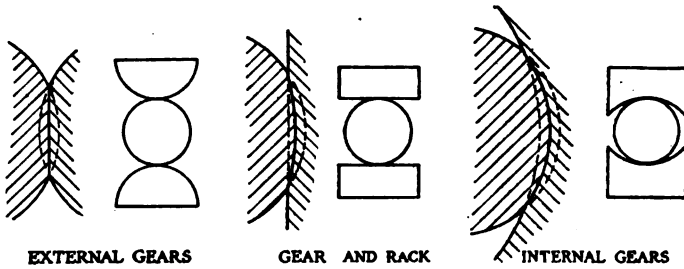


Fig. 16—Diagram of contact relations in spur gears, pinion and rack and pinion and internal gear

and

$$\frac{r'}{L} = \frac{r}{R} = a = \frac{r'}{\sqrt{r^2 + R^2}}$$

$$\frac{R'}{L} = \frac{R}{r} = \frac{1}{a} = \frac{R'}{\sqrt{r^2 + R^2}}$$

Then

$$r' = \frac{r}{R} \sqrt{r^2 + R^2} = r \sqrt{1 + \frac{R^2}{r^2}}$$

and

$$\frac{r'}{R'} = a^2 = \frac{r^2}{R^2} = tg^2 \propto \dots \dots \dots (9)$$

Hence  $r' = r \sqrt{1 + a^2}$

Substituting this in the equation for  $dW$  we have,

$$dW = 10^{-8} C^2 p \frac{n}{\sqrt{1 + a^2}} \frac{x^2}{L^2} dx$$

$$W = 10^{-8} C^2 p \frac{n}{\sqrt{1 + a^2}} \int_l^L \frac{x^2}{L^2} dx$$

$$W = 10^{-8} C^2 p \frac{n}{\sqrt{1 + a^2}} \left[ \frac{L^3 - l^3}{3L^2} \right]$$

Placing  $L - l = f$

$$W_c = 10^{-8} C^2 pf \frac{n}{\sqrt{1 + a^2}} \left[ \frac{1}{3} + \frac{l}{3L} + \frac{f^2}{3L^2} \right]$$

lb. per sq. in. (for bevel gears).

And, finally, for calculating the capacity we get,

$$W_c = 10^{-8} C^2 pf \frac{n}{\sqrt{1 + a^2}} B \dots \dots \dots (10)$$

where  $n$  = number of teeth in pinion,  
 $B$  = reducing face factor.

The capacity of bevel gears is expressed by almost the same formula as the capacity of spur gears, the only difference being that  $\sqrt{1 + a^2}$  is put in place of  $(1 + a)$  and the whole expression multiplied by coefficient  $B$ .

In a similar way we can find the equation for calculating the strength of bevel gears according to bending stresses:

$$dW_b = S_x p_x dx y'_x$$

$$W_b = Sp y' \int_l^L \frac{x^2}{L^2} dx$$

If we integrate this expression between limits  $x = l$  and  $x = L$  and again place  $f = L - l$  we obtain for the strength

$$W_b = Sp y' fb \dots \dots \dots (11)$$

(for bevel gears).

To be absolutely correct equations (10) and (11) should also contain a factor depending upon the number of teeth in contact at a time, which factor varies but slightly, and a factor representing influence of speed, which unfortunately is uncertain.

The uncertainty regarding the influence of these two factors on the strength of the gears makes it permissible to neglect them.

As regards the maximum allowable compressive stress  $C$  and the bending stress  $S$  for straight bevel gears, these cannot be taken as high as for straight spur gears, because the increment load and the pressure on the face are larger, owing to the greater inaccuracy, the misalignment and the more difficult adjustment of the mesh.

#### Comparison of Compressive and Bending Stress Calculation

We will now compare the calculation of gears by the compressive stress method, the applied load being  $W_c$ , and by the bending stress method, the applied load being  $W_b$ .

For  $W_c$  we have (equation 6)

$$W_c = 10^{-8} C^2 pf \frac{n}{1 + a} \text{ lb.}$$

(for steel spur gears with a 20 deg. pressure angle) and for  $W_b$

$$W_b = Sp f 1.25 \left[ 0.154 - \frac{.912}{n} \right] \text{ lbs.} \dots \dots (12)$$

(for stub teeth with a 20 deg. pressure angle). By equation (10),

$$W_c = 10^{-8} C^2 pf \frac{n}{\sqrt{1 + a^2}} B$$

(for bevel gears with a 20 deg. pressure angle).

For the specific load per inch of circular pitch and per inch of face at the same velocity we have:

(for spur gears)

$$\frac{W_c}{pf} = 10^{-8} C^2 \frac{n}{1 + a} \text{ lb. per sq. in.} \dots (13)$$

(for stub tooth spur gears)

$$\frac{W_b}{pf} = S 1.25 \left[ 0.154 - \frac{.912}{n} \right] \text{ lb. per sq. in.} \dots (14)$$

(for bevel gears)

$$\frac{W_c}{pf} = 10^{-8} C^2 \frac{n}{\sqrt{1 + a^2}} B \text{ lb. per sq. in.} \dots (15)$$

In a similar way we can find the specific load per inch

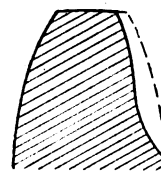


Fig. 17—Showing how wear changes the involute tooth outline to a cycloidal outline

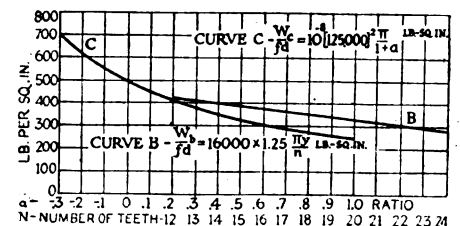


Fig. 18—Variation of allowable bending and compressive stresses with gear ratio and number of teeth

of diameter and per inch of face at the same velocity:  
(for spur gears)

$$\frac{W_c}{fd} = 10^{-8} C^2 \frac{\pi}{1 + a} \text{ lb. per sq. in.} \dots \dots (16)$$

(for stub tooth spur gears)

$$\frac{W_b}{fd} = S \frac{1.25\pi}{n} \left[ 0.154 - \frac{.912}{n} \right] \text{ lb. per sq. in.} \dots (17)$$

(for bevel gears)

$$\frac{W_c}{fd} = 10^{-8} C^2 \frac{\pi}{\sqrt{1 + a^2}} \text{ lb. per sq. in.} \dots (18)$$

Now we can proceed with a comparison of the two methods and their results.



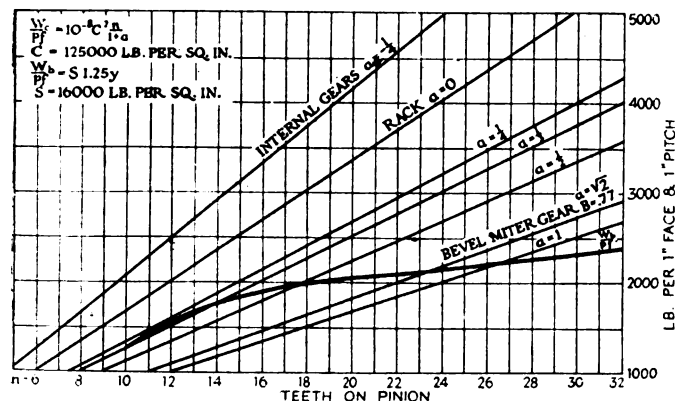


Fig. 19—Variation of safe load per inch of face per inch of pitch with number of teeth

Keeping the gear diameter and ratio constant and considering solely the bending stresses, the designer can select either a wide gear with thin teeth or a narrow gear with thick teeth (see Fig. 1). The dimensions of face and pitch can be determined from equation (12) in such a way that the bending stress  $S$  is kept constant, hence the strength of the tooth remains the same, while it is evident that the compressive stress  $C$  in a comparatively narrow gear will by far exceed that in a wide gear; because, according to equation (4),

$$W_c = \text{const.} \frac{fr}{1+a}$$

Hence, keeping  $r$  and  $a$  constant, the allowable load decreases with the face width,

$$W = \text{const.} f$$

#### Influence of Ratio

The same pinion when meshing with a large spur gear possesses a greater capacity than when meshing with a small one. When meshing with another gear of the same size (ratio  $a = 1$ ), the capacity  $W_c$  of a gear is only one-half as great as when meshing with a rack, for which case  $a = 0$ , while the strength per inch pitch and per inch face for a gear with a definite number of teeth is constant (see equations 14 and 17) and the capacity  $W_c$  is only  $1/2.7$  as great as when in mesh with an internal gear of the ratio 1:4. This is a case similar to that of ball bearings in which we curve the inner and outer races in order to obtain a larger area of contact between balls and races, and thus obtain the maximum capacity for a given size of bearing. (See Figs. 16 and 17.)

This explains why we must use large gears for a ratio of 1:1 and it also explains why there is so much grief with mitre gears for the pulley drive on farm tractors. The capacity of mitre gears is only about 70 per cent that of bevel gears with a larger ratio (see Fig. 18). From equation (15) it may be seen that in the case of bevel gears the capacity remains almost constant for a large part of the range of ratios and drops quickly when close to the ratio 1:1.

Example 1: We found that for a certain compressive stress  $C$ , a 13-tooth pinion is satisfactory when working with a gear of four times the number of teeth. What is the number of teeth required for different ratios so that the compressive stress may remain constant?

The condition is

$$\frac{n}{1+a} = \frac{13}{1+1/4}$$

Generally, comparing with formula (16)

$$\text{(for spur gears)} \frac{n}{1+a} = \text{const.} \dots (18)$$

$$\text{(for bevel gears)} \frac{n}{\sqrt{1+a^2}} = \text{const.} \dots (19)$$

from which equations can be determined the smallest number of pinion teeth for any given ratio, or vice versa. For the results see Table IV.

#### Influence of Quality of Material

Owing to the fact that the capacity  $W_c$  of gears increases with  $C$ , materials of higher ultimate strength stand much more wear than those of lower ultimate strength.

While the allowable load  $W_c$  per inch diameter and per inch of face is constant for each ratio  $a$  (see formula 16), the strength  $W_b$  decreases as the number of teeth increases (see formula 17). Consequently, for a definite ratio and a given value of  $S$  there is a minimum number of teeth  $n$  for each particular ratio if the compressive stress  $C$  is not to increase above a certain safe value (see Fig. 18). Thus gears with a very small number of teeth, though they may be amply strong as regards fracture, wear out sooner than those with a larger number of teeth. Figs. 19 and 20 show how the safe load per inch of pitch and per inch of face increase with the number of teeth  $n$ .

Fig. 19 is constructed on the basis of  $C = 125,000$  lb. per square inch and  $S = 16,000$  lb. per square inch, the allowable stresses for spur gears when inclosed in an oil-tight housing. The further we go in our diagram above the curve  $W_b$ , the less the factor of safety from the standpoint of bending stresses; the further we go below that curve the greater the danger from the standpoint of compressive stresses. Each line representing the capacity  $W_c$  which corresponds to a given ratio  $a$  intersects the curve  $W_b$  in a different point; in other words, for the same maximum stress, each gear reduction  $a$  requires a different number of teeth  $n$ .

For economy in manufacture, the number of teeth in the gears must not exceed a certain maximum, which is given by the point where the curve  $W_b$  intersects the line  $W_c$  corresponding to that particular ratio. Otherwise the circular pitch is reduced and the bending stresses exceed the set limit. And, vice versa, for economy in the manufacture of gears calculated on the basis of bending stresses, the number of teeth must not drop below a certain minimum given by the intersection of the curves; otherwise the diameter is reduced and the compressive stresses will

TABLE IV  
Number of Teeth at Different Ratio A, Compressive Stress C Being Constant

a	n	N	a	n	N	a	n	N
.154	12	78	.63	17	27	1	21	21
.25	13	52	.72	18	25	..	..	..
.35	14	40	.825	19	23	..	..	..
.442	15	34	.91	20	22	..	..	..

be above those desired. Consequently, when the stresses  $C$  and  $S$  are given and we want to use the material to the best advantage, there is a certain number of teeth which must be selected for a given gear reduction  $(1+a)$ . This we obtain easily by placing  $W_b$  equal to  $W_c$ . Hence:

In other words, if a smaller number of teeth is desired than that obtained with given values of  $C$  and  $S$ , either the value of  $C$  must be increased or that of  $S$  decreased. Further, whenever gears have too small a number of teeth, excessive wear must be expected.

For our cases we get special equations:

$$(a) \quad C = 125,000, S = 16,000, \quad 1+a = \frac{7.8n}{1000y} \dots (22)$$

$$(b) \quad C = 90,000, S = 13,000, \quad 1+a = \frac{5n}{1000y} \dots (23)$$

$$(c) \quad C = 110,000, S = 14,000, \\ \sqrt{1+a^2} = \frac{6.9n}{1000y} \dots \dots \dots (24)$$

(for bevel gears).

The ratio of  $C/S$  is 900,000 to 1,000,000 for spur gears, 800,000 to 900,000 for bevel gears and 600,000 to 700,000 for internal gears.

Example 2. What should be the number of teeth

(a) for spur gears when  $C = 125,000$ ,  $S = 16,000$ , ratio = 1:4,

(b) for internal gears when  $C = 90,000$ ,  $S = 13,000$ , ratio = 1:4,

(c) for miter bevel gears when  $C = 110,000$ ,  $S = 14,000$ ?  
Solution:

(a) From curve A in Fig. 22 we find that the proper number of pinion teeth  $n$  for the case where  $1+a = 0.25$  is 14.

(b) From curve B we find that for a ratio  $a = -0.25$ ,  $n = 12$ .

(c) For miter gears we must use equation (24). For  $a = 1$  we get

$$\sqrt{2} = 6.9 \frac{n}{y}$$

This equation can be solved by the trial method; if we take  $n = 24$ , we find that

$$n' = 24 \sqrt{1+a^2} = \frac{24}{\cos 45^\circ} = 34,$$

then

$$y' = 0.118$$

and

$$\sqrt{1+a^2} = 1.405,$$

which is only a slight error for the required gear ratio. Hence, 24 teeth for each bevel gear is a proper number if the stresses  $C$  and  $S$  are to be in the right proportion. It is better, however, to use unequal numbers of teeth, making the driving bevel with 23, for instance, and the driven one with 25 or 24 teeth. In this way the action of the teeth will remain uniform longer and the life of the gears will be prolonged. If helical teeth are used, their number can be made a little lower, say  $n = 21$ , and both gears can be made of the same diameter to facilitate production. Even here, though, the action is more uniform with different numbers of teeth.

### Strength of Helical Spur Gears

One of the objectionable features of helical spur gears is the end thrust produced when the gears are in action. When helical gears are transmitting motion between two

TABLE V

Ratios Used by Author in Double Reduction Transmissions				
Speed	Total Ratio	Engine R.P.M.	Rear Wheels R.P.M.	Miles P. H.
Direct—High .....	1:5.76	1400	243	29
Direct—Low .....	1:13	1400	106	12.6
Low—High .....	1:30	1400	47	5.6
Low—Low .....	1:67.8	1400	20	2.0
Reverse—High .....	1:26.8	1400	52	6.2
Reverse—Low .....	1:60.8	1400	23	2.3

parallel shafts this end thrust can be avoided by placing two helices of opposite hand side by side, a form of gearing that has become known as "herringbone gears." The advantages of helical gears in general and of herringbone gears in particular can be summarized as follows:

(a) The action is continuous and smooth; there are no shocks from transference from tooth to tooth, hence the pitch can be made finer than with straight teeth.

(b) The teeth do not wear out of shape; the bending action of the load on the teeth is less than with straight gearing and does not fluctuate.

(c) The gears work silently and without vibration.

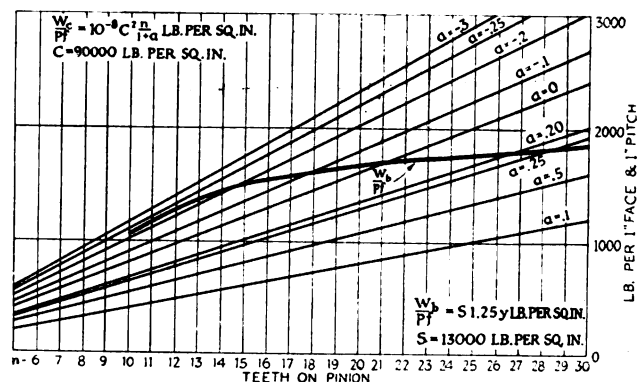


Fig. 20—Variation of safe load per inch of face per inch of pitch with number of teeth and gear ratio for different stresses than in Fig. 19

(d) The friction losses are reduced. Therefore, herringbone gears can be used for higher ratios and greater velocities than any other kind.

A herringbone gear tooth very seldom breaks off, because these gears are capable of transmitting from ten to twenty times the working load without fracture. This makes it plain that a calculation on the basis of breaking or shearing stresses gives little indication whether the gears are going to last or not.

As to the helix angle, there are good reasons why a moderate angle is to be preferred. In all helical gears the pressure acts in a direction normal to the teeth, and is the resultant of the tangential and axial pressures. The normal pressure becomes greater in proportion to the useful driving pressure as the helix angle is increased, while the available normal tooth section becomes less. Further, when the helix angle is considerably steeper than the angle of repose for the material in contact, there is a tendency for the teeth to bind with a wedge action. Herringbone gears with abnormally steep helix angles show loss of efficiency and increased wear from this cause.

In reference to the strength of helical spur gears the teeth need not have the same breaking strength as with straight spur gears, because they do not have to withstand the heavy and indeterminate stresses which arise from inequalities of angular velocity. The main thing is to provide against wear. By using a finer pitch, leaving the diameter the same, each tooth has its wearing surface reduced, but this is more than compensated for by the larger number of teeth simultaneously in contact. In high ratio gears, using pinions of exceptionally small diameters, the pitch is finer than for ordinary ratios, but the face width is extended to give the proper wearing surface.

An important factor in determining the proportions of teeth is the relation between the pitch line velocity and the maximum permissible specific tooth pressure. In present practice, the results of experience in the matter of safe working load under given conditions have been reduced to a relationship between pitch line velocity and shearing stress on the pitch line thickness of an imaginary straight tooth, assuming only one tooth in engagement at a time. The shearing stress is usually assumed to be an approximate measure of the specific tooth pressure and the relationship referred to affords a convenient means of arriving at approximate necessary dimensions.

Curve K in Fig. 13 and Table III give values of shearing stress in pounds per square inch on the pitch line section of an imaginary single tooth for corresponding pitch line velocities  $V$  in feet per minute. These values are entirely empirical, but are based on the results of practical experience.

The circular thickness of the gear tooth at the pitch line can be found by multiplying the circular pitch by 0.40 for gears with short addendum of 0.3 of its working depth

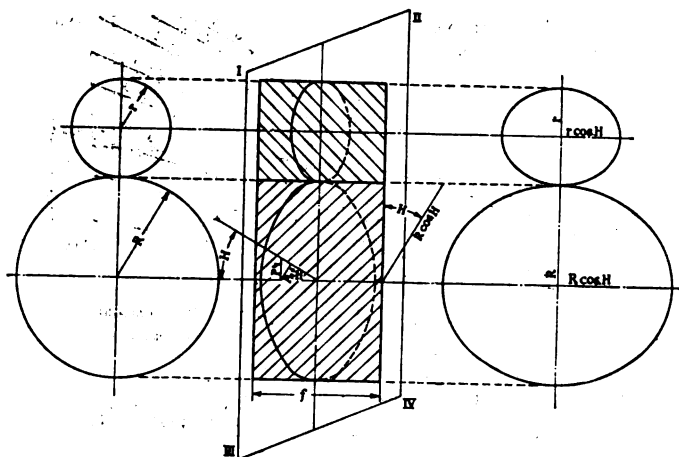


Fig. 21—Section through helical gears

and a 20 deg. pressure angle. Then the section area of the single tooth at the pitch line equals  $0.4 p_n f / \cos H$ , where the normal pitch  $p_n = p \cos H$  and the allowable tangential force at the pitch line

$$\frac{W}{\cos H} = 0.4 K p \frac{\cos H f}{\cos H} \text{ lb.,}$$

where  $K$  = shearing stress factor in pounds per square inch. Finally,

$$W = 0.4 \cos H K p f \text{ lb.} \dots \dots \dots (25)$$

(for herringbone gears).

As the herringbone gears usually have a standard angle of helix of 23 deg.,  $\cos H$  is almost equal to 1. Therefore, it is left out in the above equation and included in constant  $K$ . The formula then reads

$$W = 0.4 p f K.$$

Table III gives safe shearing stresses  $K$  in pounds per square inch for herringbone gears as found in standard text books on gearing.

By the compressive stress method we can, however, find an accurate equation for determining helical spur gear dimensions. In Fig. 21 let us pass a plane I, II, III, IV through a pair of helical gears perpendicular to the direction of the tooth which is in contact at the moment. The sections through both gears will be ellipses in contact along their minor axes, with major axes  $r/\cos H$  and  $R/\cos H$  and minor axes  $r$  and  $R$ .

It is known from calculus that the radius of curvature of an ellipse at the end of the short axis is (major axis)<sup>2</sup>/minor axis, or

$$\frac{r^2}{\cos^2 H} : r \text{ and } \frac{R^2}{\cos^2 H} : R.$$

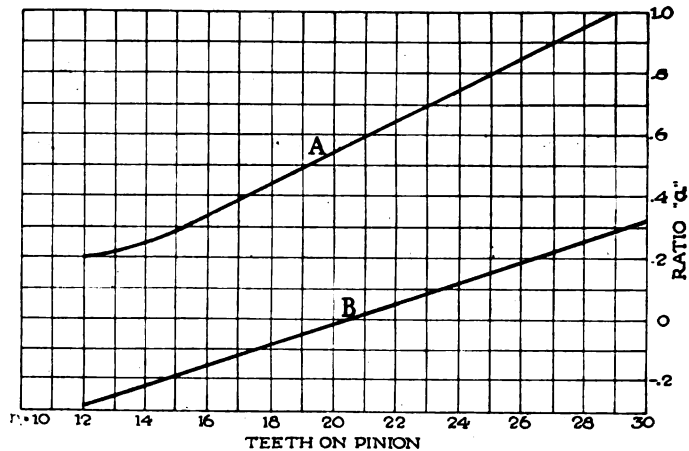


Fig. 22

That is, the radius of curvature for the pinion is  $r/\cos^2 H$  and the radius of curvature for the gear  $R/\cos^2 H$ . We can now insert all necessary dimensions in equation (5):

$$\frac{W_c}{\cos H} = \frac{C^2}{16.3 \times 10^6} \frac{f}{\cos H} \frac{r}{\cos^2 H} \frac{1}{1 + \frac{r}{R}}$$

and

$$W_c = \frac{C^2}{16.3 \times 10^6} \frac{f r}{\left(1 + \frac{r}{R}\right) \cos^2 H} \dots \dots \dots (26)$$

Further,

$$2 \pi r = n p.$$

We then get:

$$W_c = 10^{-6} C^2 p f \frac{n}{(1 + a) \cos^2 H} \dots \dots \dots (27)$$

(for helical spur gears),

where  $p$  is not the normal but the circumferential pitch. Herringbone gears being in most cases used for high reductions we can omit the factor  $a$  and obtain:

$$W_c = 10^{-6} C^2 p f \frac{n}{\cos^2 H} \dots \dots \dots (28)$$

(for helical spur gears with large reductions).

Comparing equations (2) and (27), we can see plainly that the shearing stress  $K$  in equation (2) is only an approximate and comparatively poor measure of the compression on the tooth surfaces.

## Materials for Automobile Engines

ACCORDING to communications in German business papers, the following are specifications of materials used in German automobile engines:

Cast iron for cylinders and pistons—

Silicon	1.7 %
Phosphorus	0.4 0.5 %
Sulphur	0.07 %
Manganese	0.6 %
Graphite	2.6 %
Total Carbon	3 %
Combined Carbon	0.65 %

Cast iron for piston rings—

Carbon	2.6 %
Graphite	2.0 %
Combined Carbon	4.63 %
Manganese	1.3 %
Silicon	2.7 %
Sulphur	0.12 %
Phosphorus	0.1 %

Cast aluminum for crankcases—

Copper	6 %
Nickel	2 %
Silicon	0.01 %
Zinc	8 %

Remainder—Aluminum.

## Truck Axles

IT was stated in the Aug. 25 issue of AUTOMOTIVE INDUSTRIES that Timken axles were used on the two-ton models of the Independent Motor Co. This statement was incorrect. Axles made by the Wisconsin Parts Co. are used.

# Various Possibilities in Airplane Flying Controls

Means have been devised for relieving the pilot from judgment in the necessary movements of control mechanism, the purpose being to increase safety. Among the methods used are a pendulum connected to control levers, certain aerofoil arrangement, aerodynamic balancing mechanisms, servo motors, and gyroscopes. These devices are appraised here.

**S**INCE the first stages of development of the art of flying, inventors have been seeking an "open sesame" to automatic control. It has been considered that if some means could be devised to relieve the pilot from exercising judgment as to necessary movements of the control mechanism, possibility of accident would be removed and immediate advance in the art assured.

One method forwarded long ago, and periodically re-occurring in various forms, is through the use of a pendulum connected to the control levers. It is found, however, that the pendulum weights are as much subject to inertia forces as to gravity forces, and that the corrective gravity components are wiped out by the undesirable inertia components.

Automatic stability through aerofoil arrangement and design is also sought. No great difficulty is found in making an airplane inherently stable. But this is done with a sacrifice of controllability. The inherently stable airplane is "stiff" on the controls, and fights the pilot. A properly designed airplane is inherently stable only to the extent that it does not interfere with change of altitude at the will of the pilot. Extreme inherent stability is no more to be desired than is a motor car steering mechanism that would hold the car to a straight course, and resist every effort to turn.

## Balancing Mechanisms

Aerodynamic balancing mechanisms have also been designed, constructed and tried out. The net result, ordinarily, has been only "a long journey for a small load." One particular device of this type has attempted to secure lateral stability through aileron action from vertical fin forces. Vertical fins at each upper wing tip, hinged at the base, are lever connected to the ailerons. Pressure on the vertical surfaces from a side slip or skid actuate the ailerons to correct the side slipping or skidding attitude. It is a nice problem to secure properly proportioned parts, and over or under control is the tendency. Possibilities as an auxiliary to manual control are present, but it would appear that the same result could be secured by balances directly connected to the control surfaces.

## Servo Motors

Servo motors, similar to the power steering mechanism on steamships, are used on the larger airplanes to assist the pilot in moving the control surfaces. Commonly these comprise a series of clutches, or friction disks, driven by a wind motor, shifted through the action of the control cable to act in conjunction with the control column or wheel. The movement of the surfaces is at all times in the hands of the pilot as far as amplitude and speed of motion are concerned, the servo motor doing the actual work of displacement.

The servo motor principle is excellent, and merits further development. Those servo devices available to date are open to criticism of mechanical design, reliability, service life, and adaptability to ready incorporation in the design.

## Gyroscope Control

Airplane control through gyroscopes and electric motors has been tried out with some success. On straight away flying, a control of this type relieves the pilot of all duty except supervision. However, on landing, the gyroscope control is thrown out, as its sole function is to keep the plane in balanced horizontal flight and to resist any change in altitude whether desired or not.

The gyroscope control is of necessity complicated, comparatively heavy, and subject to failures. It can, and doubtless will be developed and refined, as it meets the requirements of large planes on long flights.

The most common method of securing ease of control is to balance the control surfaces themselves, so that little effort is required to displace them. Several types of counter balance are in use. One is a double cambered extension of the control surface tip, reaching forward of the hinges. Another, the auxiliary balance type, comprises a small surface held away from and forward of the control surface proper, and rigidly connected to it. Both types are in common use, and if properly designed, simple, effective and efficient.

To sum up, no one invention, device or design is going to meet all operating conditions. On small planes—up to 70 ft. span—a reasonable amount of stability and an intelligent proportioning of the control surfaces will provide satisfactory air qualities. Balanced control surfaces here are a refinement rather than a necessity, as the effort required to move the surfaces is relatively small. On the larger planes, balanced control surfaces are essential. Inter-connection of the aileron leads is advisable, so that the loads carried by the pilot's controls are only those of displacement.

Aerodynamic controls that remove all connection between the pilot and the control surfaces are hazardous. Servo motors are an aid and merit further development. The gyroscopic control will prove advantageous in large air cruisers to come. The problem of flying controls cannot be solved once and for all for all planes, but refinement of original designs based on common laws, together with attendant development of control accessories, will render flying more certain and less hazardous.

The greater the development along these lines, the more rapid is the commercial growth of flying likely to be. Such development already has been going forward to a considerable extent.

# A New Machine for Use in Sinking Large Dies

Is especially adapted for machining the surface of dies used in the manufacture of pressed body panels, cowls, fenders and the like, the tool being guided by a "master" which may be of soft material.

**I**N the manufacture of modern sheet metal automobile bodies use is made of very large dies for forming the panels, doors, cowls, fenders, etc. These dies, which are made of cast iron or steel, involve a very heavy expense and, besides, the time in which they can be produced by the methods which have been in use is long and rather uncertain. The surfaces of a body must be without perceptible inaccuracies, and if a slight mistake is made in the die sinking operation it is often necessary to rework the entire surface of the die. In making these dies it has been necessary to take them from one machine to another, and great demands are made on the skill of the operator. After the machine operations are finished the fitting still involves lengthy and laborious hand operations.

A special machine for cutting or sinking dies for large parts of the character mentioned has been developed by the Keller Mechanical Engraving Co. This firm has been making die sinking machines for a good many years, but until recently there was little possibility of applying these machines to the production of such dies as are used in the manufacture of metal bodies, due to the fact that the operation of their machines depended on a principle which made the pressure of the tracer passing over the "master" or model equal to the pressure of the cutting tool on the block. This made the use of masters or models of soft material impossible. The models for body parts are usually made of wood, and as these could not be used directly in the die sinking machine, a number of rather expensive intermediary processes would have been necessary, thus rendering the process impractical.

This difficulty has been overcome in the new machine by the use of electric control. In this machine the pressure of the tracer on the model is entirely independent of the pressure of the tool on the work. The machine operates on the milling principle, the tools used being combination face and end mills. The master and the work are clamped to the stationary table of the machine, the former above the latter; a tracer controlling a number of electric contacts passes either horizontally or vertically over the model. Both the tracer and the cutter are capable of motion in three planes at right angles to each other; in other words, they have feeds in three directions. When the travel or stroke of the cutter in its work is normally in a horizontal line, parallel to one of the main planes of the master or work, the regular feed of the cutter head, after each cut or stroke, is in a vertical direction, and vice versa. Finally, there is what may be called the "in and out" motion, which, compounded with the stroke or travel of the tool head, gives to the cutter a motion corresponding to the line formed by a section of the master surface at the level of the tracer. Feed and travel controls are interconnected and each of the two may be made either vertical or horizontal. All of these motions are on heavy

slides and are effected by means of lead screws driven by electric motors. The feed is automatic in both the vertical and the horizontal plane. Quick return motions are provided for both the transverse and "in and out" directions.

There are several electric motors which are mounted directly on the machine with practically all wiring fully inclosed. Of these the cutter drive motor is of 2 hp. and the feed motor of  $\frac{3}{4}$  hp. The circuits of the motors are controlled by a series of push-button switches arranged on a switchboard in a location convenient for the operator.

In the manufacture of such sheet metal parts as here referred to it is, of course, necessary to have both a punch and a die or a male and a female die. If the punch is produced directly from the model the die can be made from a plaster or cement cast taken from the model, or, better still, this cast can be made from the punch after it is finished. Allowance for the thickness of metal to be formed can even be made in the die by covering the model with a layer of sheet wax of the required thickness.

The machine here illustrated can cover die surfaces up to 72 x 48 in., and even this is not its limit, as in the case of larger die surface, after part of the die has been completed the whole machine can be moved transversely on its bed and the rest of the surface finished.

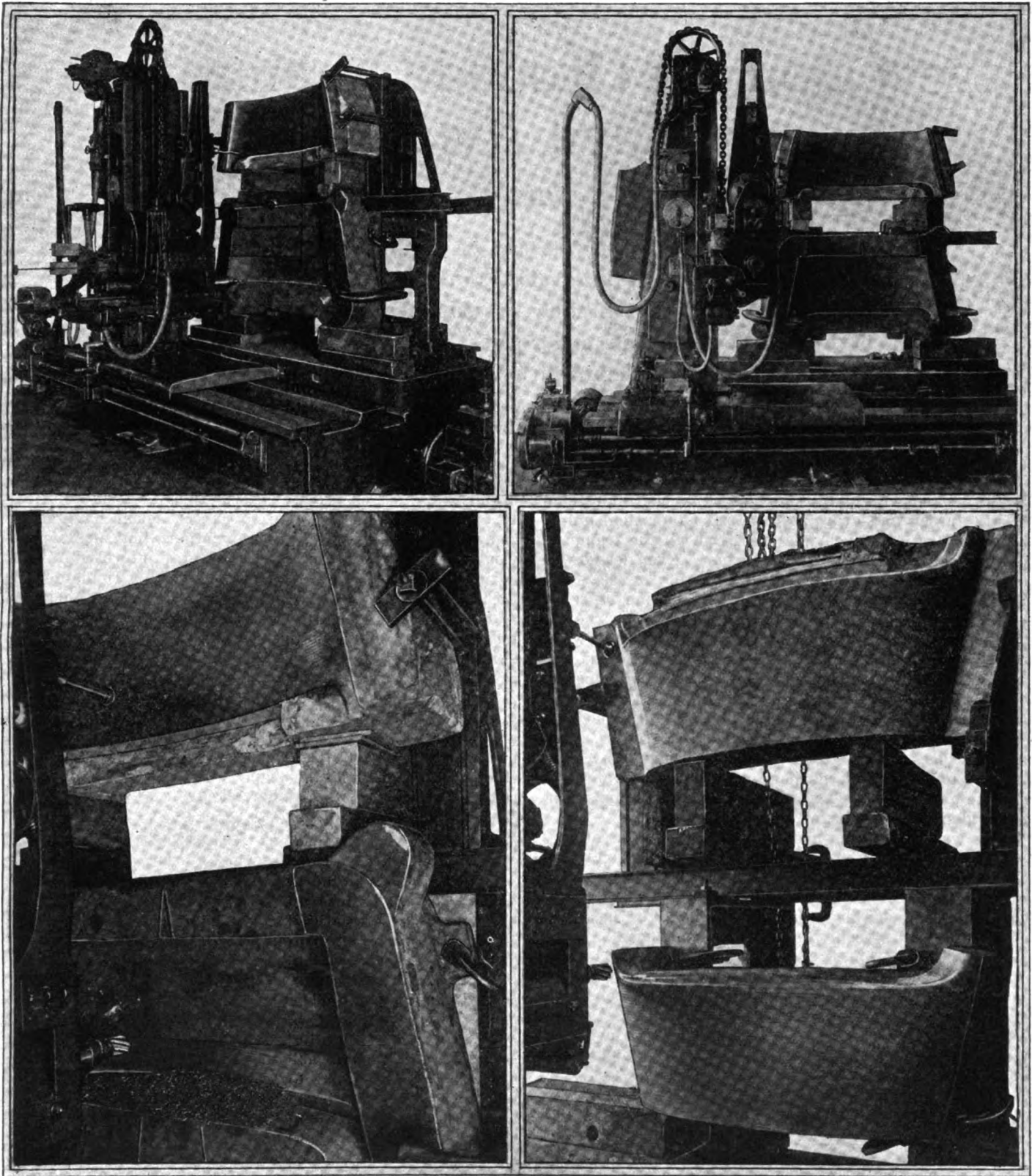
The worktable of the machine is stationary and is provided with T slots for mounting the master and the work. The transverse feed of the spindle head can be varied from 2 to 12 in. per minute by means of rheostatic motor control and change gearing. The vertical travel is at the rate of 6 in. per minute. The feed per stroke can be made anything from 0.030 to 0.250 in. The spindle can be driven at from 60 to 420 r.p.m. and is arranged to take a taper shank (No. 12 B. & S.) capable of carrying end mills up to 5 in. diameter.

The spindle head is carried on a sliding column and is counterbalanced. This, as well as other moving parts, has a large bearing surface and is provided with taper gibs. The spindle is driven from a separate electric motor through back gearing. Lubrication of the spindle is from two sight-feed oilers which communicate with all bearing surfaces. The cutter is lubricated by means of a gear-driven rotary pump, the surplus oil draining back to a tank in the bed.

It is always advisable to use the coarsest feed consistent with the nature of the job. The raised feed lines are easily ground off and a correct, smooth surface is obtained in a short time.

The illustrations herewith show the machine working on the die and punch for an automobile cowl. In this operation a 2-in. mill is used for the roughing cut and most of the finish cut, and a  $\frac{3}{4}$ -in. mill for sections too small for the 2-in. mill. Each piece is completed in 24





Upper left—Keller automatic die-sinking machine at work on a cowl. Upper right—Front view of machine, showing starter box for main spindle motor, method of carrying cables in flexible metal conduit and balancing of cutter head. Lower left—View showing master in cement (above) and die blank of cast iron being worked on (below). The tracer and milling tool can be clearly seen. Lower right—Master and blank for punch for cowl

hours. We are informed that in many places more than  $\frac{1}{2}$  in. of stock was removed.

The first machine of this type was installed in the plant of Edward G. Budd & Co., body builders. Machines have also been furnished to the Studebaker and Dodge plants and one for the Ford plant is in the process

of manufacture. The machine should not only greatly cheapen but also expedite the production of dies for body parts.

The machine is equally applicable to large forging dies. Obviously it has advantages for dies for crankshafts, camshafts, axles, etc.

# Developing a Ground Organization for Civil Aviation

## Part I

No reliable commercial air service can be maintained without suitable landing grounds at regular intervals. France has developed an excellent ground organization. Mr. Bradley presents here an analytical description of French developments and relates them directly to American problems. An important contribution to civil aviation development.

By W. F. Bradley

**S**INCE the day when the Wright brothers made their first soaring flight in South Carolina, the impression has spread and grown that aerial navigation, unlike any other form of travel, was free from all the trammels of route and road, of port and harbor. Even leaders in the aeronautical movement have been guilty of the error and have been responsible for the organization of trials and competitions intended to improve the speed, the reliability and the endurance of machines at a time when their efforts ought to have been directed towards the creation of conditions under which planes could operate with the highest degree of safety.

The greatest obstacle at the present time to the development of commercial aviation is the absence of aerial roads—the lack of the entire ground organization corresponding to the docks, harbors and explored waters of maritime navigation, or the permanent ways, signals, stations; and sidings of our railways.

There was a time not many years ago in the history of the American nation when it was more important to make roads than to develop automobiles. The nation realized that and gave its support to the good roads movements with such enthusiasm that the industry has been able to attain its present prodigious importance.

Commercial aviation at the present time needs land organization, the creation of chains of landing grounds, weather report stations, gasoline depots, repair shops, etc., without which real development is impossible.

Until such a service has been established all over the country there can be no healthy development of commercial

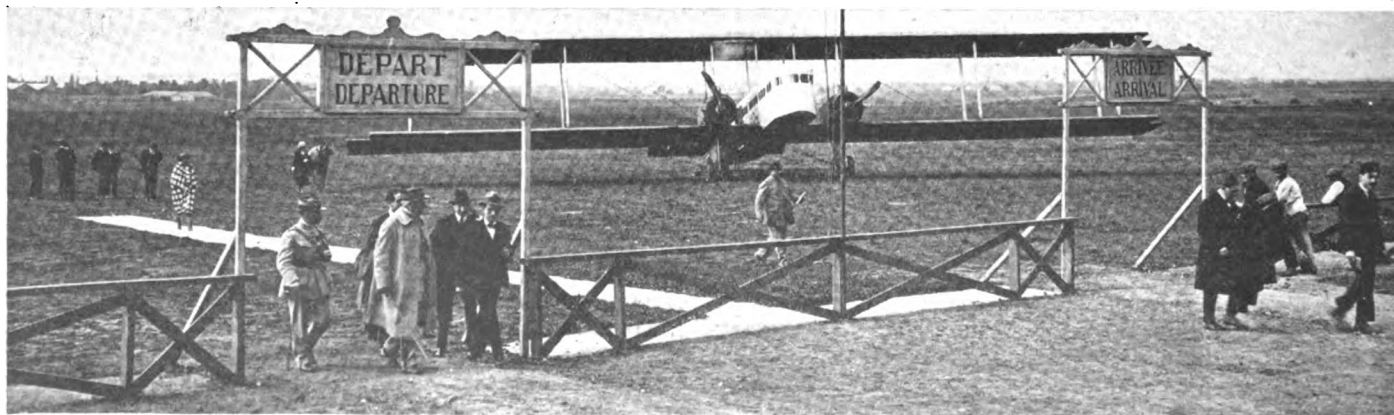
aviation. This duty devolves on the national Government and not on private enterprise or local authorities. It is not only unreasonable to expect aerial navigation companies to create ground organizations, but such a plan would be as detrimental to the general interests of the nation as the old system of toll roads. This fundamental fact has been realized by the French aviation authorities, and as a consequence the Government has set itself the task of laying out aerial roads which must be free for all—in distinction to aerial lines which would remain the property of certain vested interests.

The importance of France in connection with this program lies in the fact that her territory constitutes the cross roads of Europe. This special geographical and commercial situation of France has been fully appreciated by the Government and has largely influenced them in their plans for developing commercial aviation within their frontiers.

### Opening Aerial Lines

Whenever there is interest in opening up two points by aerial communication, the French Service de la Navigation Aérienne undertakes the whole of the ground service, leaving the actual operation of the planes in the hands of aerial navigation companies. In other words, the Government builds the aerial roads, and private companies or individuals use them.

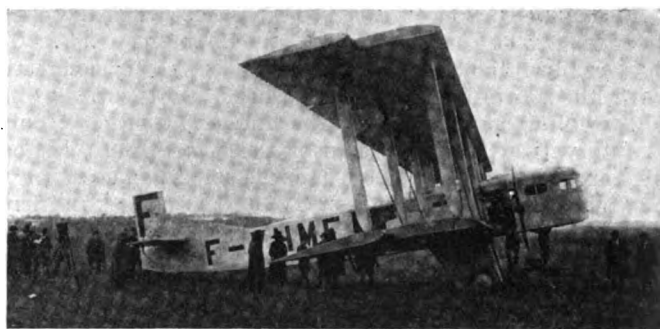
No reliable and regular commercial air service can be maintained unless the entire line of flight is marked out by landing grounds at intervals of sixty miles. In coun-



Arrival of Farman twin motor plane at Bourget, near Paris, coming from London



Belgian and French planes used on international service



Farman twin engine Goliath used on Paris-London service

tries where much fog prevails, such as northern France and practically the whole of England, this distance must be decreased to thirty miles. The foundation of commercial aviation is economy of time and safety. This implies regularity, for so long as there is a doubt regarding the possibility of a plane reaching its destination there can be no real economy of time. The attempt has been made in Europe and elsewhere to run regular services without a string of landing grounds, with the result that planes would frequently start out on time, get within a few miles of their destination and then by reason of fog or other weather conditions be obliged to swing round and return to their starting ground. Had intermediate grounds been available, the planes could have landed there and either have waited for an improvement in weather conditions or have transferred the passengers to automobile or train.

While these landing grounds must be frequent, they need not necessarily be elaborate. In very many cases the pilot does not even need protection against the weather, for his machine is capable of being parked out in the open. He must be assured, however, of a prepared ground on which he can land with safety, of a supply of gasoline, a telephone, and weather reports.

#### Types of Landing Fields

Under the scheme worked out in France, and which is being gradually applied to the whole of that country and will be extended to other European countries, five different types of landing grounds are provided for. They begin with a very simple form of emergency landing ground, in charge of a guardian—usually a man and his wife, who live in a cottage on the field—a supply of gasoline, a selection of tools, a telephone to the nearest town, and weather bureau reports. These emergency landing grounds should measure about 500 by 500 yards, or have an area of ten acres, and while being on the direct line of flight, they should, if possible, be by the side of a main road, so as to assure ease of access and if possible be near a town or village.

Although the French Government idea is that all landing grounds from the simplest to the largest, intended to be used by passenger or freight carrying planes, should be owned and controlled by the State, experience in other quarters has shown that economy can be effected and very good results obtained by renting land for emergency landings. This is particularly applicable when traffic is light. An emergency landing ground may not be required more than once a year, but when it is needed it is needed urgently. It is therefore possible to get an option on land which can remain under cultivation, but which at the same time will always be kept in such a condition that planes can land on it with perfect safety.

Ignoring the emergency ground, four types of aerial stations are provided under the European scheme. These begin with a third class station, followed by a second class,

a first class station, and most important of all, an aerial port. The plan of the French Aerial Navigation Service provides for correlation between each of these, so that as traffic increases, or the necessity makes itself felt, each type of landing ground can be developed into a higher class without any buildings having to be torn down or any rearrangement of the general plan.

The area of the ground must not be less than fourteen acres, this being on the supposition that the approaches are clear, without tall trees, high buildings, or high tension electric wires. Although long-distance planes will not usually make landings at these intermediate stations, the grounds should be laid out so as to give adequate protection to planes obliged to make a landing, and also have the necessary facilities to be used as regular stopping places. Even the third rate station should have one permanent shed not less than 110 by 100 ft., a workshop fitted up for metal and wood working, forge, stores, and automobile garage. There should be two trucks on the ground, one of 1½ and the other of 3-ton capacity.

In addition to the caretaker, who will live on the ground, there should be a ground manager, preferably an aviator; a weather bureau should be established, and a wireless telegraphy station installed. In laying out a third-class station additional ground should be secured to enable more sheds to be erected, as required. The single shed is intended for planes which have to make a forced landing, or for the planes running on a regular schedule, but only making short stops on the ground.

#### Second-Class and First-Class Stations

The second-class station, under the French scheme, is an enlargement of the third-class post, with more sheds, better mechanical facilities and a bigger supply of gasoline, oil and spares. A first-class station, while on the same general lines as the smaller ones, calls for an elaborate equipment. It should have at least two permanent sheds, a long-distance wireless installation, well-equipped machine shop, gasoline, oil and spare parts, central offices, customs office if near the frontier, a station master's office, a complete weather bureau, and as many private sheds as are required for local flights. The aerial port is the most important of all, for it is generally the terminus of international lines and the scene of much local flying.

At the present time there is only one aerial route in the world laid out approximately on the lines indicated above. This is the line from Paris to London. No pilot can fly in Europe unless he possesses a Government license and unless his physical condition is found satisfactory at half yearly medical examinations. For this service there is a special medical department at Le Bourget with the necessary instruments for testing eyes, heart, nerves, pulse, etc. Weather reports are prepared by the French Government Meteorological Department and are received and despatched from all stations along the route seven times a day.

Few figures exist on the cost of construction and operation of aerial routes, for few such routes exist. The only really reliable data in existence is that in connection with the Paris-London route, where, on the basis of a big terminus at each end of the line, and landing grounds at intervals of thirty miles over the entire route, the cost of construction is 20,000 francs per kilometer, or at nominal rate of exchange, \$2,300 per mile. In arriving at this figure the whole of the cost of the Bourget air port is included, whereas it would be reasonable to only charge one-third to this line, for this port is also the terminus of the Brussels and Warsaw lines.

Building an aerial route is very much cheaper than building a highway, for using the French figures as a comparison, a twenty-three-foot first-class highway costs 200,000 francs per kilometer (\$23,000 per mile) to build, and has to be remade every ten years. The maintenance of an aerial route of this nature is 2,000 francs per kilometer (\$230 per mile) per annum. Unlike a highway or a railroad, the cost of the aerial way does not increase in proportion to the increase in traffic, for there is no limit to the width of the road, and overhead charges decrease enormously as traffic volume increases.

It is the practice of the French Government department to purchase land outright when building an aerial route. This is more costly than would be the case in the United States, for land is considerably divided, and in order to get suitable ground a vast number of holders have to be dealt with. It generally happens that one or more in the group refuses to accept the Government offer, and before the obstreperous individual can be made to yield legal proceedings have to be undertaken, with consequent delay and expense.

#### Government Revenue from Aerial Traffic

An important income may be expected from an aerial route carrying intensive traffic. This will principally be obtained from port dues paid by the companies running regular home and foreign services, and by casual tourists. In France the fee for landing on a State ground is one cent per horsepower, with an additional fee of 20 cents if the machine is fitted with wireless. The pilot is entitled to assistance from the ground hands in bringing in his plane, starting the motor, bringing water, oil, and gasoline, etc. For starting or landing at night an additional fee of \$4 is charged for lighting the ground.

For the use of a shed the price varies according to whether the machine is a casual tourist or a regular liner. For the former the use of a shed for twenty-four hours costs 2 cents per square meter, this area being obtained by multiplying the wing spread by the length of the machine. For touring or privately-owned planes sheds can be rented for periods of three months at a cost of slightly less than 1 cent per day per square meter of surface, this including light and caretakers. Special arrangements are made for regular liners, the owners of which require sheds only and maintain their own staff.

On the important landing grounds repairs can be carried out by the ground staff, the rates being 70 cents an hour (nominal exchange) for skilled labor and 50 cents an hour for unskilled labor. Material is charged at cost price and the total amount increased 25 per cent for overhead. For the use of a tractor the charge is 35 cents a kilometer, and for a five-ton truck 70 cents a kilometer. For a passenger car the charge varies from 20 to 30 cents a kilometer, according to the size of the automobile.

An adequate weather report service must be organized in conjunction with every established aerial route. Under the system of State owned landing grounds, as it exists in France, the Government Weather Bureau organization is made use of and reports sent to every station along the

line of flight. On the Paris-London line, for instance, which is subject to much fog, it is most important that the pilot should know, before starting out, what kind of weather he will find over the sea, and whether landing conditions will be suitable at the end of the trip. It is quite possible to make a start under bad weather conditions if the pilot has the information that he will run into clear atmosphere within a few minutes, or if he is sure that he can pick up his bearings on the coast and that his terminus point is not hidden in fog.

There is no complete wireless telegraphy service in operation on any aerial line. On the Paris-London route wireless ground installations exist, and weather reports are received by these, but wireless between ground and plane has not yet been completed. This problem is receiving close attention, and it is expected that before the end of the present year all the regular passenger-carrying planes on the Paris-London route will have wireless, enabling them to keep in touch with their terminus point during the 2½ hours they are in flight. It is recognized that a good wireless system is essential to any properly organized line.

#### Night Landings

Night flying still remains one of the problems of the future, for such trips can only be carried out with safety on a perfectly organized aerial route, with landing grounds every thirty miles, every one of which is fitted not only with a light house, but with an installation for flood lighting. Flood lighting sets, such as were used during the war, are now in service at the big aerial stations, but there is no chain of lights across country necessary to guide the pilot to his destination. At the present time such installations as exist are in the nature of a makeshift to assist pilots who for any reason whatsoever are out after sunset. Eventually it is intended to light the entire Paris-London route, but for the present flash lights exist only at the Bourget and Croydon termini and the frontier station at St. Inglevert, and have a visibility of twenty-five miles. Merely to show the pilot his route suitable lights on the railroad stations would be sufficient, but if the service is going to be carried out with the same degree of safety as during the day it is essential that every emergency landing ground should be equipped for flood lighting, and that this should be ready to be switched on whenever a pilot signalled from the air that he was under the necessity of coming down. At the present time no such organization exists.

War experience has shown that night landings can be made with a high degree of safety by the use of fuses dropped with a parachute, but the cost of these is so high that no planes carry them even for emergency purposes. Electric generating sets on the plane have not given any great amount of satisfaction, for if employed without batteries they give the least light when it is most needed, and the use of batteries constitutes an extra load from which very little extra service is obtained. For signalling purposes an isolated light is of much more value than a more powerful light in the center of a city. As an instance, the flash light on the top of the Eiffel Tower, nearly 1000 feet above the ground, is not so readily picked up as less powerful lights placed on aerodromes well outside the city.

#### License Methods

No plane can be flown in France unless it has received a navigability certificate after having been technically examined and approved, and unless it is officially registered and carries its registration numbers and letters on the wings and fuselage, as provided by law. No pilot can fly unless he has his official license and has passed a medical



examination. For public services, carrying passengers and freight, the control is really severe and corresponds, in a general way for both machines and crew, to that in force for ocean-going vessels.

In establishing the French airplane license, the procedure adopted is similar to that for automobiles. All new types have to be examined by a Government technical department before they can be put into service, but all subsequent machines of the same type are given a navigability card on proof being shown that they conform in every respect to the original model. The registration certificate certifies the nationality of the machine, whether it is privately owned or in public service, the name and address of its owner, and the identification marks it must carry.

Only war planes can carry the military marking consisting of red, white and blue circles. Commercial machines are in two classes: those used in public service for passengers and freight, and those used privately by their owners. The first one of the series of letters painted on the wings and fuselage indicates the nationality. These letters have been determined by international agreement, and are, among others, F for France, G for Great Britain, O for Belgium, etc. A heavy black line under the identification marks shows that a plane is on private service. A registration card corresponding to the numbers carried must be aboard at all times. These regulations do not apply to experimental machines, which, however, must be kept within a radius of three miles of their factory or flying ground.

In addition to its registration certificate, every plane must carry a navigability license, which really corresponds to a ship log book, and if on public service this must be filled up with particulars of every trip made and an account of all repairs and work done on the plane and the engine, thus giving the aviation authorities a complete history of every plane used for passenger service.

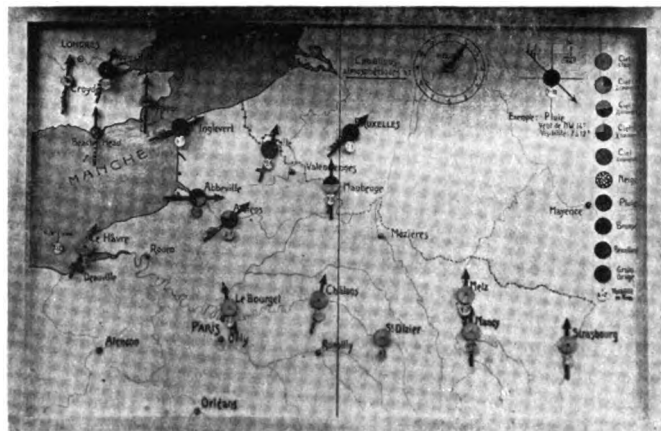
Every pilot on a public service plane must possess a license, which is only issued after a practical examination, and a log book containing a record of his medical examination, all flights undertaken, accidents, etc. The license is only given for a period of six months, at the end of which time the pilot must undergo another medical examination. The pilot's log book is also renewable every six months, and unless the holder has accomplished a minimum of ten hours' flying in this period he must undergo another practical examination.

#### Commercial Status

There is not a single aviation service in Europe at the present time which is on a paying basis from its commercial receipts, and it is only by reason of State subsidies that European lines are being kept in operation. It is by means of this subsidy system that the Government is able to keep a close control on the aerial navigation companies and to insist on the regularity of operation and the adoption of precautionary measures which will reduce accidents to the lowest possible figure, and so gain the confidence of the public.

The slogan of the Aerial Navigation Service is "Safety First," and anything which savors of stunt flying or recklessness is rigorously suppressed. Stunt flying is looked upon with a particularly evil eye.

It is the duty of the State to insist on the highest degree of safety in planes and engines, and here again the subsidy system is of value, for it enables the Government to maintain a more rigorous control than would be possible in any other way. Every plane must carry three log books, which must remain aboard, must be filled up every day, and which must be shown to the aviation authorities whenever requested. These books are the route log, the



View of weather report boards at Le Bourget aerial point

plane log and the engine log. The route log contains a record of every trip made, with indication of the number of passengers or load carried, the length of ground test of the engines before starting, maximum number of revolutions of the engines on the ground and in the air, quantity of gasoline and oil carried, any incidents which happen en route, observations of the pilot, wireless messages received or transmitted, the route followed, direction and force of the wind, drift, speed, altitude, and general atmospheric conditions.

#### Standards of Safety

The plane log contains, in addition to a complete description of the airplane, a record of the initial tests before going into service with horizontal speed at various altitudes, climbing ability, horsepower, loading, etc. This log also contains the make and numbers of engines and propellers, the date fitted and dismounted, and the number of hours of flight. The records required regarding the plane are date of each trip, number of crew carried, name of pilot, hour of starting and arrival, duration and length of flight in miles, number of passengers carried, weight of freight or mail, and quantity of fuel carried. A detailed account has also to be maintained of all repairs or modifications to the plane and the number of hours' flight between each. For the engine log practically the same information is required, so that with the three books a complete history is available at all times of the life of the plane and its engine or engines.

In the present state of aviation development it is difficult to establish absolutely rigid standards of security, for while on the one hand it is desired to protect the public in the greatest possible measure, on the other hand some room for initiative must be left with manufacturers.

For a public service machine it is stipulated that a plane should be capable of rising with its full load, and without the aid of a head wind, within a length of 330 yards, and land with its engines stopped in a length of 270 ft. Its climbing ability should be 9840 ft. in a maximum of forty-five minutes. Every multi-engine plane must be capable of maintaining horizontal flight at an altitude of 6500 ft. during one hour with a single engine if it has two or three, and with two engines if it is fitted with four. For every plane intended for trips of more than four hours' duration double control must be provided.

One of the French regulations is to the effect that planes making trips of more than four hours' duration or carrying more than four passengers must be fitted with a wireless transmitting and receiving set, carrying at least 180 miles. There is a certain amount of laxity on this point, however, owing to the technical difficulties con-



nected with the installation of wireless on planes. There is the fact, too, that few public service planes make single trips of more than four hours' duration.

No restrictions are placed on the design or construction of airplane motors and the regulations, in general, are merely of a nature to prevent accidental stoppage or break down. There is a stipulation that for public service planes having a load of 2½ tons or more (useful load plus weight of fuel) at least two engines shall be fitted, it being understood that each engine shall be capable of maintaining the machine in the air, as previously mentioned in this article.

An engine revolution counter must be fitted with a red mark on the dial showing the limit number of turns, the pilot and mechanics being forbidden to exceed this figure. Every public service plane must be fitted with double ignition and double distributor and have an ignition cut out for each engine and a separate one operating on the two together. There must be a gasoline shut-off cock for each tank, placed in such a position that it can be operated by the mechanic. A thermometer is stipulated for each engine, so mounted that it will show the temperature of the water at the outlet from the cylinders.

Precautions against fire are a space of at least three-quarters of an inch between the exhaust pipes and all parts of the plane, with the end of the pipe in such a position that it is impossible for the exhaust gases to come in contact with any combustible part of the plane. Carbureter air intake pipes must be brought entirely outside of the fuselage and be fitted with wire gauze screens as a precaution against fire. Provision has to be made for the proper escape of all gasoline overflowing from the carbureter, in whatever position the plane may be flying.

Under the French subsidy scheme every engine must be taken completely out of the plane and entirely overhauled after a maximum of 100 hours' flight. Every plane must

be stripped, examined and re-erected after a maximum of 200 hours' flight. In reality these limits of service are rarely attained. Taking as an example the Farman twin-engine Goliaths used on the Paris-London and Paris-Brussels service, the rule adopted by this firm is that every engine shall be lifted out of the fuselage after a maximum of sixty hours' flight. The engines are then completely pulled down, examined, repaired, re-erected, tested, and put into service again. Although this is the general rule regarding the length of time an engine shall be allowed to remain in service, it is very rarely that an engine remains untouched for this length of time.

The companies running regular airplane services are unanimous in stating that it is impossible, at the present stage of aerial development, to adopt any hard and fast rules for the examination and dismounting of engines. The most reliable companies have preferred the sixty-hour to the official 100-hour limit of the French authorities, but they never assume that because an engine has only done ten hours' flight it is therefore in good condition. With close examination after each trip and a sufficient number of reserve planes regular service can be assured, but the life of an engine is such a variable factor that it is difficult to establish really reliable operating costs.

Main European Airplane Lines in Regular Service

Route	Service	Distance, Miles	Time, Hr.	Cost, Pass.	Cost Freight
Paris-London	Daily	233	2½	300	5 f. to 7.50 kilo
Paris-Brussels	Daily	186	2	175	3 to 4 f. kilo
Paris-Amsterdam	Daily	250	3	300	5 to 6.50 kilo
Brussels-London	Daily	186	2	225	5 to 7.50 kilo
Amsterdam-London	Daily	264	3	400	
Paris-Strasbourg	Daily	248	2½	150	2.50 f. kilo
Paris-Prague	Daily	560	6	500	7 f. kilo
Paris-Warsaw	Daily	870	9	800	
Toulouse-Barcelona	Tri-weekly		2½	468	
Toulouse-Alicante	Tri-weekly		6	924	
Toulouse-Malaga	Tri-weekly		9½	1,068	
Toulouse-Rabat	Tri-weekly		12	1,560	
Toulouse-Casablanca	Tri-weekly	1,150	13	1,680	18 f. kilo

Mall is carried on all these lines.

## Time - Temperature - Humidity Control for Kilns

AN apparatus for controlling the temperature and humidity of the air passing through dry kilns as used in connection with automobile body-building establishments and aircraft plants has been perfected by the C. J. Tagliabue Mfg. Co. It is based on the principle of the wet and dry bulb. Two thermostatic bulbs are employed, containing a fluid very sensitive to temperature changes. The dry bulb affords the means of keeping the air temperature inside the kiln within the desired limits and is simply influenced by the temperature of the air. The wet bulb is influenced by the rate of evaporation of the water fed to it by a wick.

The drier the air is the more rapid does the evaporation proceed, and a greater amount of heat is therefore ab-

stracted from the wet bulb. This reduces the temperature of the wet bulb in comparison with the temperature of the dry bulb. The opposite, of course, also holds true. It is therefore evident that the temperature of the wet bulb indicates the humidity of the air, and the humidity can be controlled in any desired way by so varying the water supply as to maintain corresponding wet bulb temperatures. The Tag Controller automatically maintains the required air temperature by regulating the heating coils and maintains the desired humidity by regulating the steam sprays. The setting point of the controller is automatically shifted to take care of any desired air temperature and any desired humidity during the desired time period, by means of a cam revolving by clock work.

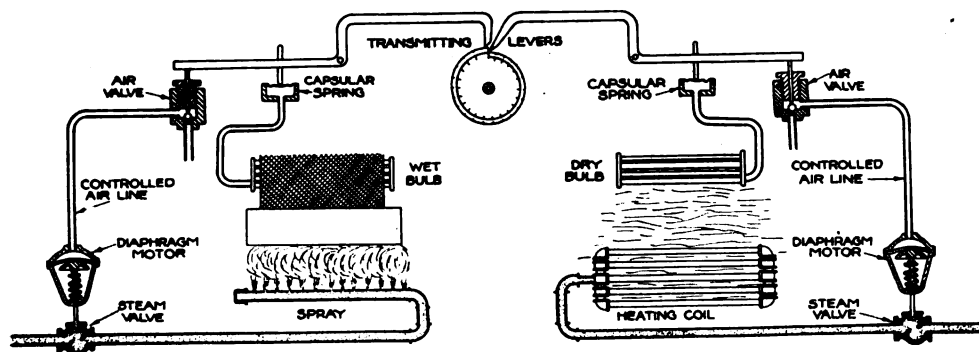


Diagram of Tag Time-Temperature-Humidity control system

TO protect aluminum and its alloys from corrosion by browning the metal electrolytically, the aluminum is suspended in an electrolyte consisting of a sulphur compound of molybdenum with a zinc anode at a temperature of 60 deg. to 65 deg. Cent. The aluminum is soon covered with a dark brown coating, and may be bent or rolled without cracking the coating. Aluminum thus treated was immersed in a salt solution for two months without showing the slightest corrosion.

# A Practical Analysis of British India as a Market for American Motor Vehicles

## Part II

Much detailed information is here given regarding trade conditions met in various sections of India and the routes which trade naturally follows from coast to interior, with particulars regarding primary and secondary distributing points and the territory served from these points.

By Charles Sumner Turner

**A** MAJORITY of the leading motor trading firms in British India were evolved within or from old established merchant firms whose business activities included sales agencies for engineering supplies. Under this category were included motor car agencies, and in time these were assigned to a special department of the business or to separate companies. Ample facilities of finance, personnel and establishment, in combination with choice of best available British and Continental car agencies, assured pre-eminence in the trade to the firms so evolved. In the last year before the war, when American cars in India were a negligible quantity, the establishments of the leading motor trading firms in Calcutta, Bombay and Madras were impressive. Outside of these cities motor trade was negligible. Some of these companies possessed exceptional facilities of plant for service and body building, essential to a proper treatment of high-class European motor car trade at that time.

During the war period the only motor car source of supply was America. Most important American car agencies were attracted to the few pre-eminent firms, and several firms of minor importance to the motor trade of pre-war days attained much success and extension of their organizations through their control of important American agencies. In the post-war years many new motor trade enterprises were instituted, but the future of some of these is problematical at this time.

In the two years of 1919-20 British India imported from various car exporting countries approximately 26,000 passenger cars; the greatest quantity in any prior two-year period having been 8000 cars in the years 1916-17, against which 3000 to 4000 cars was a fair average of imports over a two-year period before the war. This shows a most interesting and extraordinary development.

From the viewpoint of an American motor car sales executive, it is apparent that selling organizations in India, with two or three conspicuous exceptions, have not attained physical and financial development commensurate

with the amount of business undertaken in the past two years. It is not far outside the facts to estimate the large quantity of cars imported into India in 1920 being little more than half the quantity originally ordered.

Under normal conditions any trade development in India is a slow progress. It has been plainly seen that the extraordinary business undertaken in a short period was considerably in excess of what could be readily assimilated through the facilities of trade present or immediately in prospect.

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**I**N July, 1919, the British Trade Commissioner in India and Ceylon made the following comment:

"The advent of the motor car has revolutionized life in India, and together with the common use of the electric fans, has enormously added to the comfort of Europeans, especially in remote interior districts. The car is popular with Europeans and natives alike and there is little doubt that the demand from India will reach an intensity in the future which would not have been credited in pre-war days."

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Capable management of an important motor trading firm in India requires superior ability and considerable capital. It is a serious matter to obtain the necessary capital to pay factories for cars five to six months prior to the arrival of the cars in the territory. When firms must borrow capital or use the capital facilities of shipping, or other firms, a factor is introduced which may be helpful or not, according to the disposition toward the motor trade of those controlling these facilities. English capital facilities

are quickly assigned to new trade channels and purposes essential to British trade and industry, and such capital was a conspicuous factor in our large motor trade of recent years with India, during which time America was, until the very recent past, the only source of motor car supply for that market. American motor car and other trades do not now present the attraction they did to British trading capital during the war and post-war periods. British capital in India is primarily a trade facility, and in view of the preponderant British trade of that market, capital has many opportunities for use, is generally assigned to the most secure and convenient channel. The necessity for the application of American credit facilities to this trade in a greater degree than in the past is obvious.

Other factors such as personnel, diverse conditions of peoples, politics and trade peculiar to different places and territories throughout India define the logical sphere of influence of many firms.

American car manufacturers whose export trade is de-

pendable or who plan to gain a share of this trade, have much to do, as regards the Indian market in particular, in the way of interpreting to dealer trade requisite methods for quantity distribution of American automotive products, since such methods are unlike British and Continental methods.

For America to secure the largest share of the Indian motor trade our manufacturers must accord the market the same intimate treatment accorded to our business with the United Kingdom, which foreign market alone exceeded the importance to us of India in 1920.

An excess of agencies, in all classes of trade, is a characteristic of most important firms in India, including those in the motor car field. The condition manifests the apparent path of least resistance to sales effort, and we had the same here in America at a comparable stage of our motor trade evolution. Below are shown agencies exercised by several important firms, according to announcements that have come to the writer's notice.

Firm at Calcutta and Bombay	Firm at Calcutta, Bombay and Allahabad	Firm at Bombay
Panhard & Levasor, Berliet, Minerva, Mors, Bianchi, Angus Sanderson, Bean, Vauxhall, Cadillac, Studebaker, Dodge.	Sizaire-Berwick, Austin, Briton, Talbot, Cubitt, Calthorpe, Guy "8," Castle "3," Royal Enfield Cycles, Bat Cycles, Austin Trucks, Halford Trucks, Velie, Briscoe, Harley Davidson Cycles.	Fiat, Sunbeam, Angus Sanderson, Vulcan, Morris Cowley, Morris Oxford, Wolseley, Austin, Leyland Trucks, Thornycroft Trucks, Vulcan Trucks, Willys-Overland, Willys-Knight, King, Garford Trucks.
Firm at Colombo	Firm at Madras	Firm at Calcutta
Auto Carriers, Austin, Swift, Sunbeam, Rover, G. W. K. Humber, Berliet, Willys-Overland, Garford Trucks, Harley Davidson Cycles.	Daimler, Vauxhall, Sunbeam, Wolseley, Angus Sanderson, Studebaker, Chevrolet, Federal Trucks.	Daimler, Standard, Talbot-Darracq, Commercial Trucks, Mathias, A. U. B. Willys-Overland, Oakland, Garford Trucks, Hupmobile.

One solution appears in demonstrating to some dealer controlling an important American agency the desirability of restricting his sales efforts to a minimum number of makes. Another is to encourage and assist the development of new firms and influence their activities.

Before the war the urban trade of Calcutta, Bombay, Madras, Rangoon and Colombo was practically the only important motor car trade in India. Now conditions are greatly changed.

The accompanying map shows where throughout India there are motor trading firms at the present time. The lines indicate logical relationship of major and minor places. This presentation is fairly comprehensive of places where motor car business is being done, and undoubtedly the near future will find this trade appreciably extended to other points not shown on the map.

#### Principal Ports of Entry

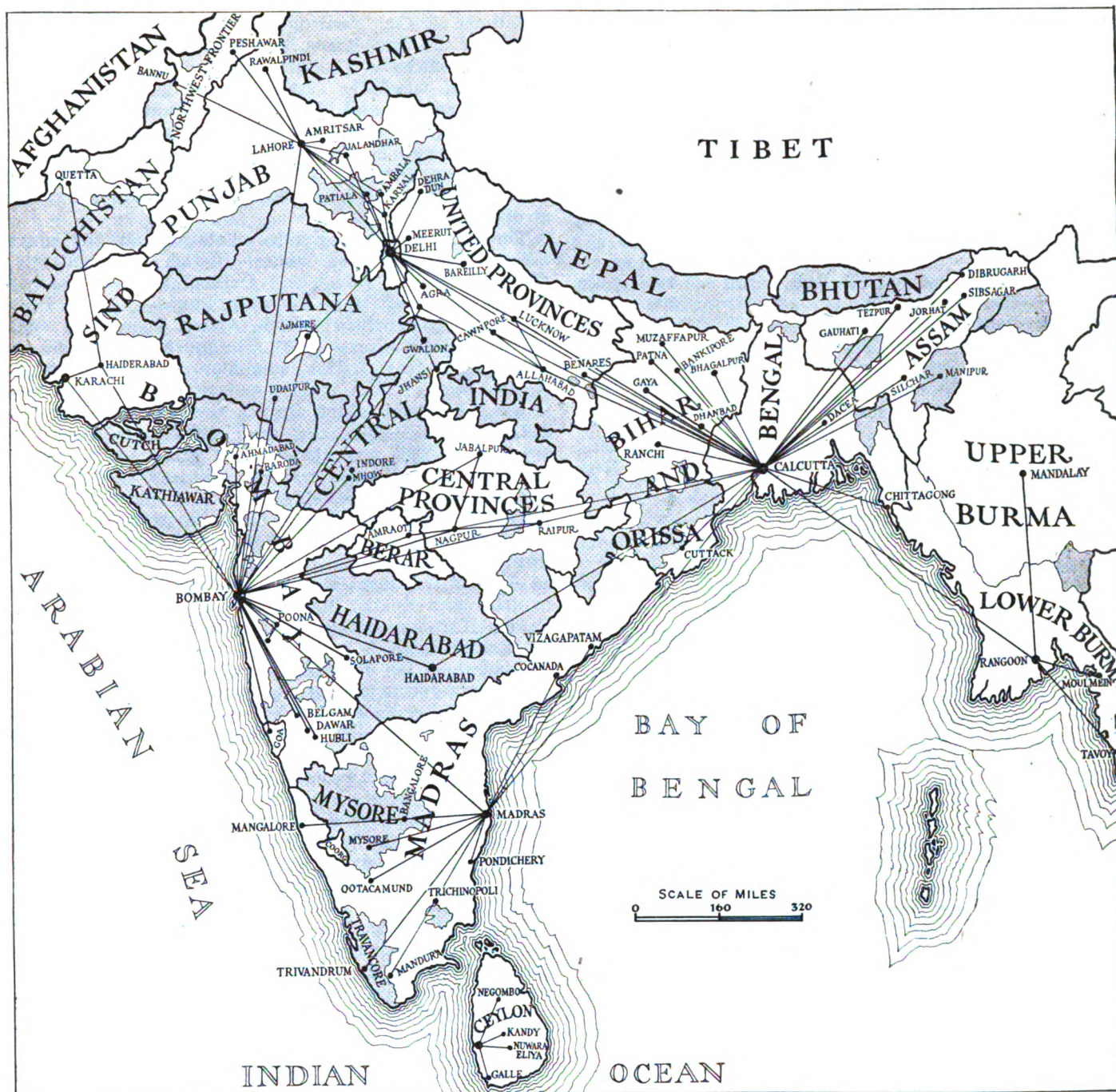
The principal points for car imports into India are Calcutta, Bombay, Madras, Karachi, Rangoon and Colombo, Ceylon, at which points the largest motor trading firms are established. The motor trade development of the interior is progressing rapidly, and such places as Delhi, Lahore, Cawnpore, Lucknow, Nagpur and Hyderabad (Deccan) are to a considerable degree removed

from their former trade dependence on the chief coast ports.

The following outline of principal distributor and sub-agency points and relative territory presents an intelligent basis for allocating agencies throughout India and Ceylon at this time:

Principal Distributing Point	Sub-Agency Point	Territory	
		Minor	Major
Calcutta	Dacca, Chittagong, Gauhati, Tezpur, Sibsagar, Jorhat (sub-div. of Sibsagar), Silchar, Manipur, Dhanbad, Ranchi, Gaya, Bhagalpur, Muzaffarpur, Cuttack, Patna, or Bankipore,	Kamrup, Darrang,  Cachar, Manipur State, Manbhum, Bihar and Orissa Province	Bengal Province Assam Province
Delhi	Allahabad, Cawnpore, Lucknow, Benares, Agra, Aligarh, Meerut, Dehra Dun, Jhansi, Bareilly, Gwalior,	Patna,      Bohilkhand Div. Gwalior State, Central India	Delhi District United Provinces Provinces
Lahore	Ambala, Karnal, Amritsar, Jullundar, Rawalpindi, Patiala, Peshawar, Bannu,	    Patiala State, Northwest Frontier Province	Punjab Province
Bombay	Ahmadabad, Poona, Belgaum, Sholapur, Dharwar, Hubli (town in Dharwar), Mahdbaleshwar, Baroda, Indore,  Mhow, Udaipur, Ajmer, Nagpur, Jubbulpore, Raipur, Amraoti, Hyderabad, and/or Secunderabad	Baroda State, Indore State, Indore State, Mewar State, Rajputana, Merwara State, Central Provinces Berar Province	Bombay Presidency Central India Provinces
Karachi	Hyderabad, Quetta,	Sind	Hyderabad State Bombay Presidency Baluchistan
Madras	Vizagapatam, Cocanada, Trichinopoli, Madura, Ootacamund, Mangalore, Bangalore, Mysore, Trivandrum, Quillon (Kollam),	Godaveri,   Nilgris, South Canara, Mysore State, Mysore State, Travancore State,	Madras Presidency





Map of India showing ports of entry, trade centers and territory served from each. The shaded areas are the native states

Rangoon	Burma
Mandalay,	
Moulmein,	
Tavoy,	
Colombo	Ceylon
Kandy,	
Nuwara Eliya,	
Galle,	
Negombo,	

The sub-agency points shown are located within administrative divisions or districts of same name as the town, where not otherwise indicated. Such districts, owing to the present stage of motor trade development, would not, in many cases, exactly define the sphere of trade influence of the places shown.

With regard to British India proper (which excludes Ceylon), in former days the motor trade at interior points of middle and northern India was handled almost entirely through or by firms at Calcutta and Bombay, and

some of the important firms of these two cities now have establishments at interior points.

Whatever method a car manufacturer might adopt for the purpose of advancing his business in India, his objective should be a minimum of distributor dealers at the eight principal points shown, and territory, therefore, assigned generally as indicated. In view of the increasing trade importance of interior territories and the firms therein, it is possible to effect principal arrangements at Cawnpore, Lucknow, Allahabad, Nagpur and Hyderabad (Hyderabad State). The motor trade of Central India, Central Provinces and Hyderabad State, when not dealt with directly, comes logically within the trade influence of Bombay, and the last named is strongly influenced from Madras. Most of the places shown within Central India and the Central Provinces being on or near the main transcontinental routes, more Calcutta controlled agencies might be established.

**Registration of Motor Cars, Trucks and Cycles in British India  
as of March 31, 1920**

	Cars and Trucks	Cycles	Total
Bengal (Calcutta).....	6,373	1,542	7,915
Assam .....	355	83	438
Bihar and Orissa .....	1,020	375	1,395
Delhi .....	204	69	273
United Provinces (Allahabad) .....	1,076	556	1,632
Punjab Provinces (Lahore) .....	1,617	1,108	3,618
Bombay (includes cycles) .....	10,180	...	10,180
Sind (Karachi) .....	428	209	637
Madras City .....	2,846	1,389	4,235
Madras Presidency .....	920	710	1,630
Central Provinces ((Nagpur).....	423	302	725
Rajputana (Mount Abu) .....	29	20	49
Northwest Frontier Prov. (Peshawar) ..	476	371	847
Burma (Rangoon) .....	2,432	1,186	3,618
Ceylon (Colombo) .....	3,000	1,650	4,650
<b>Total .....</b>	<b>28,379</b>	<b>7,920</b>	<b>36,299</b>

In the thirteen months following the above registration date, to April 30, 1921, the total imports of vehicles into India from all sources was approximately as below:

Cars .....	15,757
Trucks .....	2,957
Cycles .....	5,187
<b>Total .....</b>	<b>23,901</b>

Some presentation of territorial arrangements of the Ford dealers in India is interesting. The Ford Motor Co. of Canada, Ltd., supplies the Indian market, and in relative local advertising to the distinctive Ford trade emblem is added the legend "Made Within the Empire."

The currently announced arrangements of the above firm for India are as follows:

**Bengal-Assam-Bihar and Orissa-Delhi District and United Provinces**

Kilburn & Company, Managing Agents, Calcutta.

Ford Motors (Calcutta), Limited, Calcutta and Dhanbad. (Dealing exclusively in Ford Products.)

Works and chief service station, Russa Rd., Calcutta.

Town service station, Mission Row, Calcutta.

Sales and showrooms, Chowringee Road, Calcutta.

Branch and service station, Dhanbad.

**Sub-Agents**

Bengal—Ford Motors (Calcutta), Ltd., Dhanbad.

Bihar and Orissa—Arthur Butler, Ltd., Muzaffarpur.

Khemraj Puramall Sarawji, Ranchi.

Massidin Bros., Bhagalpur.

Delhi—Russa Engineering Works, Ltd., Delhi.

Mohd. Ekram Khan & Co., Benares.

The Cawnpore Motor Co., Cawnpore.

The Oriental Motor Car Co., Lucknow.

H. Pestonji & Co., Agra.

The Star Motor Co., Dehra Dun.

Gilbert & Sons, Allahabad.

Assam—Russa Engineering Works, Ltd., Dibrugarh.

Kilburn & Co., Tezpur.

John Smeal & Co., Silchar.

G. F. Jeffrey, Esq., Manipur.

Central Provinces—The Bundelkand Cycle and Motor Co., Jhansi.

A. Ahmedjeebhoy & Co., Raipur, and The Krishna Stores, Aligarh.

North Indian Motor Co., Bareilly.

The Punjab Motor and Carriage Co., Karnal.

Norman Orde & Co., Meerut.

Burma—Ford Motors (Burma), Limited, Rangoon, Burma.

**Bombay-Baluchistan-Punjab and Northwest Frontier Provinces**

Ford Automobiles (India), Limited, Bombay and Lahore.

Madras—Oakes & Co., Madras.

Ceylon—Brown & Co., Limited, Colombo.

Kilburn & Co., mentioned above, are the managing agents of the firm, Russa Engineering Works, Ltd., with principal offices at Calcutta and branches at Bombay, Dibrugarh, Gauhati, Tezpur, Karachi, Lahore, Delhi, Jorhat, Rangoon and Madras. This is the most important and extensive motor trading organization in India, their American agencies including Hudson, Essex and Paige cars. There are other important motor car firms having principal offices at chief coast ports and branches at other trade centers.

The British Indian Empire contains 1,802,657 square miles; the provinces under British administration (Bengal, Assam, Bihar and Orissa, Madras, Bombay, Baluchistan, Northwest Frontier, Punjab, United Province, Central Province, Burma, Ajmer, Coorg and Andaman Islands) comprise 1,093,074 square miles, or 60 per cent of the total. The remainder is included in the Native States. The total population of British India is 315,156,396, of which British territory contains 244,267,542, or 77½ per cent, and the Native States 70,888,000, or 22½ per cent. (The gross population of India is not particularly significant to a review of the motor trade of that country.)

These stupendous figures can be grasped only by contrast. The area of India is equal to the whole of Europe, except Russia. Burma is about the same size as Austria-Hungary; Bombay Presidency is comparable in area with Spain; Madras, the Punjab, Baluchistan, Central Provinces and Rajputana are each larger than the British Isles.

The population of India exceeds that of Europe without Russia and is three times that of the United States. The United Provinces and Bengal, with the Native States attached to them, both have as many inhabitants as the British Isles.

All of the Native States are under the control of the Indian Government, but generally they are not under British Indian Government administration. It is impossible in this article to attempt any comment on the diverse conditions present in these states. Their present value to the motor trade is generally unimportant, except as regards limited purchases of highest priced cars by the rulers of various states, however, the potentialities of future trade are interesting, as undoubtedly motor transport and trade of contiguous districts where that trade is developing rapidly will have an effect.

At and from Calcutta, a city enjoying financial, industrial and commercial supremacy in India, motor trade has experienced its greatest development in India.

Delhi, the capital of India, is rapidly attaining major importance as a motor trade center. British firms are extending their organizations thereto.

At Madras, British enterprise dominates trade. The territory served therefrom is mainly dependent on agricultural industry; comparative poverty in readily exploitable mineral wealth and difficulty of coal supply has prohibited any industrial development comparable with Calcutta and Bombay. The Native States of Mysore in this territory is rated more progressive than other states and motor trade is active there. What little motor business is to be obtained from the Native State of Hyderabad is strongly influenced from Madras.

Within Bombay motor trade development ranks with that of Calcutta. The cotton trade and industry of India is practically centered at this place. Native capital and individuals participate in the industry and commerce of Bombay to a degree not present at the other coast towns mentioned, and this element is practically the dominant factor. Places and territories tributary to Bombay do not at this time offer like opportunities for motor trade development to those present from Calcutta. Native



States within and without (Rajputana and Central India) the Bombay Presidency present obstacles to a free diffusion of motor trade and its development.

Bombay trade has at this time considerable influence with Mesopotamia resulting from new trade routes defined by the war's exigencies, and the writer is informed that Ford Automobiles (India), of Bombay, control that territory for the particular products they represent.

Karachi, which was formerly a motor trade tributary of Bombay, has attained much independence of position during recent years, and the trade there is worthy of and desires treatment as a principal motor trading point from which the territories of Sind District, Bombay Presidency and Baluchistan would be served.

Lahore, as the distributing point for the Punjab provinces, has been a trade tributary to Bombay, and as a motor trade center has attained importance within itself and relative territory. A few Bombay motor firms maintain branch establishments there.

At Rangoon there are only a few important motor firms, the major portion of which are British. In Burma one comes in contact with the Chinese element in commerce, and in recent years they have entered somewhat into the motor trade. The interior motor trade of Burma is for the present far behind similar trade in other British provinces, probably due to insufficient enterprise. Only a few firms have been concerned with the trade there in the past, but an interesting development of motor trade anticipated.

At Colombo, Colony of Ceylon, the motor trade is mostly in British hands and an intensive trade in this limited territory is well developed. As in India the largest motor trade organizations are of British and Continental ownership and management and are exceedingly enterprising in the development of business. Native wealth and a considerable number of native firms are concerned with the motor trade. In Bombay native owned and managed motor firms rank among the foremost. With a few conspicuous exceptions native firms do not possess facilities comparable, either in employees or establishment, with those of British firms, and in the matter of a consistent loyalty to a particular agency franchise in the face of many solicitations to undertake others, much may be desired. It is believed, however, that much is to be gained by American car manufacturers cultivating such firms and assisting their development. Trade at present with some of the lesser native firms is complex, and if business is undertaken direct it should be carefully considered in all its aspects.

Only those who have had an intimate and comprehensive experience in recent years with the trade under review can fully appreciate the extraordinary development of motor car use within India that has occurred during the past few years. The relative trade development has been insufficient for effectively dealing with present and prospective opportunities and problems, although the present development is creditable to those concerned therewith, in view of the facilities at hand.

The motor car has not only caused some congestion of trade, but more congestion of traffic in the large cities where large quantities of cars were absorbed, as at times and places the native bullock cart determines the movement of motor traffic. Motor vehicle having demonstrated its efficacy and necessity to metropolitan transport problems, the elimination of the native cart is a matter of serious consideration on the part of authorities in the large cities. The report of a committee appointed to consider the problem of rapid transportation to and from Calcutta states that the replacement of bullock and buffalo cart transport by motor transport is an urgent necessity and recommend that the possibility of fixing a definite date after which bullock and buffalo carts will not be permitted to use the streets be very carefully considered.

Throughout the interior of India are great systems of roads and practically all of the places shown on the accompanying map are connected by main trunk roads, and these are supplemented by a comprehensive system of secondary roads.

Total mileage of railways in India open for traffic exceeds 36,000 miles. Total number of passengers carried by all railways annually is approximately 500,000,000, and total weight of goods carried, approximately 90,000,000 tons. Railway transport supports 1,062,493 people, the estimated number of actual workers being 474,184.

That India is experiencing a reaction from extraordinary prosperity and an exceptionally unsatisfactory internal trade year, does not alter the future outlook for motor trade in that market. There is a large trade to be obtained there by American manufacturers in the future, but it is necessary to discount much of the war and post-war experience, as radically changed trade conditions are now present. Trade possibilities exist and can be secured by American manufacturers if they are prepared to face competition and meet the conditions here outlined.

## Tractors Used in Alaska

**T**RACTORS have succeeded dogs as the motive power for freight in many parts of Alaska, where these tractor trains are now operated regardless of the low temperatures. This is made possible by a recently perfected frost pad which protects the cooling system in all temperatures. These machines have kept to their freight schedules at 40 below zero. The photograph shows a Holt tractor with its train.

An engineering asset of this particular machine will be found in the articulated roller frame and the equalizer bar which join the two portions of the tractor truck and supporting roller. This latter factor enables the tractor to conform to the unevenness of the ground and to climb over obstacles and yet assures traction. It is one of the refinements and modifications made possible by war experience. In one district the tractor has caused a drop of winter freight rates from \$350 to \$25 a ton.



Holt tractor used to haul freight in Alaska

# Inaccuracy of Current Unemployment Statistics

Present unemployment statistics are based upon past employment figures which were abnormal. Mr. Tipper discusses the inaccuracies and points out the danger of hasty conclusions. The importance of the problem is not minimized, however, since responsibility must be recognized.

By Harry Tipper

**A** CONSIDERABLE amount of discussion has been going on in the newspapers concerning the changes in employment and the extent of unemployment in the various parts of the country. These discussions have been reinforced by statistics from State and Federal authorities and from the American Federation of Labor—the only places where general statistics are accumulated from the original sources regarding the degree of employment.

A great deal of stress has been laid upon the amount of unemployment and the figures of the actual number of people unemployed have been used many times to inforce an argument or to illustrate a condition.

That there is a great deal of unemployment is unquestioned. The lack of activity in many industries and the reduction of activity in many others from last year have altered the amount of employment in connection with these industries and the workers who have been let out have either swelled the ranks of the unemployed or found work of some kind elsewhere.

It is very difficult, however, to arrange general statistics so that they are reasonably accurate, unless all the factors are known and considered in the analysis of the individual statistics from which the general compilations are made.

The spirit of turnover in labor has its effect upon the number engaged in or liberated from an industry, as the amount of production fluctuates. The tendency of workers to move about in their own special occupation from one establishment to another or from one industrial group to another makes it a very difficult matter to determine the actual number normally engaged in such industries or to determine the net number left out of employment as they readjust themselves.

There are no statistics indicating the number of people who came from the farms during the high wage period at the end of the war and who have returned to their original occupations. There are no statistics indicating the number of women who entered employment at that period but who were normally unemployed in industry and who have since gone back to domestic occupations.

It is impossible to determine those who have been re-employed perhaps casually and perhaps on short time since they were discharged from the industrial jobs they previously held, and the relative factor of turnover has not been determined in any of these cases.

As a consequence, the statistics of unemployment are very inaccurate as an index of conditions and more inaccurate as an index of the fluctuation of

buying power. The statistics of unemployment have run between four and six millions for several months, rising and then falling as the depression developed.

It is obvious that the straitened circumstances of the workers would be more visible and the distress more acute if these statistics could be accepted on their face value. The savings of the worker on the average are not sufficient to withstand a long siege and unemployment to this extent would put a severe strain upon the resources before such a long period had elapsed.

During the war and after the end of the war there was an abnormal employment in many lines of industry, recruited from other lines of work. The bidding for labor had proceeded to such lengths that men without familiarity with the particular industry were accepted so long as they had a modicum of skill in the particular occupation. Those industries where the pressure for production was greatest offered the largest inducements to the workers and drew many employees from outside industries, from the farms, and from various occupations.

Such employment was abnormal, temporary, and did not represent any of the conditions of the industries in question.

The depression has not been equal in all lines. The percentage of production has varied very considerably and along with the unemployment there has been a certain amount of re-employment going on all through the depression and a return of the workers to their original occupation or type of life.

It will be impossible to get a true picture of the extent of unemployment in each line of industry until the reports received by the governmental authorities and the Federation of Labor are more detailed and the analyses more accurate in arranging the general compilations.

Furthermore, it is impossible to determine the number of workers employed in industrial occupations, for the same reason. The number of people applying for particular kinds of work and the number of people waiting for the possibility of work are a much better indication of the local conditions of employment than the general statistics as they are gathered at present.

This does not minimize the seriousness of the situation, however, and the extent of unemployment existing at present, nor does it solve the problem nor offer the slightest suggestions for solution.

As the organization of industry becomes more complicated, the possibility of balancing the industrial organization so that its employment for all the workers within

the field becomes more difficult. The increased subdivision of the work and the rigid limitations of the system remove the flexibility from the workers' skill so that there is no opportunity to adjust the work for the maintenance of a reasonable proportion of the various occupations required for the industrial group or establishment. When they are used to working at a simple subdivision of an occupation, with its rigid and monotonous technique, the workers lose their capacity and adaptability and they are unable to operate under new circumstances.

This difficulty has been experienced for a great many years in Great Britain where the unemployment has been a continuous problem for a quarter of a century at least.

The problem has not been of great importance in this country up to the present because a large part of our working population is drawn from immigration and most of the immigrants have been accustomed to the adaptability of the older methods practised in the countries from which they come.

Nevertheless, the increasing rigidity of labor is a problem directly connected with the future of the unemployment question and the organization of industry will be obliged to answer in some way or another the question of reasonable permanent employment within the industrial group. When the worker is willing to work and cannot find work because the instruments of his skill are idle, he is likely to charge industry or his government with responsibility for his condition.

Where the unemployment becomes a continuous problem for a number of years, as it has been in Great Britain, this demand settles into a well-defined policy of action and may result in governmental interference with its burden of taxation and its obnoxious regulation.

It is amazing that so little attempt has been made to consider the factors, the difficulties, and the responsibilities in the question of unemployment and that so much unrest is allowed to foment quietly because numbers of workers are deprived of their work without ap-

parent cause and have no other outlet for their restless activity save their thought upon the matter.

The general employment statistics as they are reported at present undoubtedly exaggerate the difficulty because the factors of re-employment and adjustment have not been considered in the compilation.

Accurate statistics on this matter are very desirable. Ignorance of the problem leads to a great deal of idle speculation and misapprehension on the subject. Some of the editorials which have been written in the newspapers would have been differently arranged if all the factors were understood and much of the propaganda that has been spread out to the unemployed would have lost a good deal of its significance.

Without a knowledge of the factors, attempts to relieve the situation have proved expensive and inefficient wherever they have been tried by authorities although small experiments by local communities and local establishments have met with some measure of success.

The whole question of statistics on labor is important and complicated, but particularly in the fluctuation of unemployment better examinations are necessary, more correct analyses and compilations should be established. Of course, this cannot be done until the manufacturer and employer generally have developed more accurate statistics and are in a position to give these detailed analyses to the governmental authorities.

As it stands at present comparatively few factories have all the necessary records in such shape that they represent a true analysis of the employment situation in their case. Consequently, the general statistics provided from hundreds of thousands of sources are arbitrary and inaccurate. Because they are inaccurate they lead to false conclusions and enlarge the difficulties of the case.

The unemployment problem is an important one, but it is not likely to be affected by experiment until the factors that enter into it are more definitely understood in their relative influence upon the fluctuations.

## Service Dominant Idea at M. A. M. A. Credit Meeting

(Continued from page 554)

"D—Is the buyer a corporation, a partnership or an individual?"

In a paper prepared by F. N. Sim, advertising and assistant sales manager of the Timken-Detroit Axle Co., who was unable to be present, he advised the revamping of sales strategy.

"Let's stop trying to get temporary advantage of each other by untimely price cuts, market juggling, etc.," he said. "Let's have plenty of competition but let's make it good-natured and square and then let's spend most of our time making people want to buy automobiles."

"Let's revamp our advertising, change our selling talk and revolutionize our thinking on this subject."

"There are thousands of car and truck owners secretly wishing someone would come along and persuade them to buy. They want to be sold. The buyers' strike they talk about is in the majority of cases a mental attitude. It is not wholly sincere. While there may be somewhat less buying power at present, there is enough on tap to keep the industry moving."

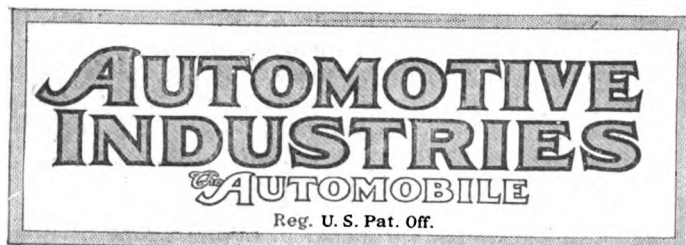
Ezra W. Clark of the Clark Equipment Co., Buchanan, Mich., advocated intensive development of the special motor bus as a means of increasing

business. He said experience had shown that converted motor truck chassis would not serve the purpose. He declared there were tremendous possibilities along this line and that his company was taking advantage of them by building special motor bus axles.

E. H. Broadwell, vice-president of the Fisk Rubber Co. and president of the association, presided at the sessions. M. L. Heminway, the general manager, sketched the achievements of the year, paying particular attention to the plan of forming groups of manufacturers in the same line of business.

The association's credit department as "the safety valve of the industry," was described by C. A. Burrell, the efficient manager of the department. The work of the department has been done so well that he was able to tell the members that if they had been governed entirely by its reports they would not have a bad account in their books. The department is intimately familiar with the financial affairs of nearly 800 manufacturers and more than that many jobbers. Members were urged to make wider use of the credit department.

"The industry is fundamentally sound," Burrell said, "Morale is what wins battles and the automotive industry never retreats."



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## Maintaining Quality

**I**N cutting the cost and selling prices of passenger cars, is quality going to suffer? Every car manufacturer is welcoming with open arms any practical means of decreasing cost of manufacture. This is as it should be so long as quality is not sacrificed at points where it is essential to proper performance. There are places in some designs at least where machining limits are held much closer than necessary. In such places a saving can often be made by allowing wider limits without changing performance in the slightest degree. But this legitimate saving should not be the signal for using less care in maintaining close limits where these are required for proper running fits and adequate durability.

One of the greatest savings in manufacturing cost is that resulting from more efficient labor. Several plants are now building nearly twice as many cars in proportion to the number of men employed as were built when labor was at a premium and inefficient.

Since the cost of material is one of the largest items in the total cost, there is, of course, chance to econo-

mize in that direction, but the danger here is very great. The purchasing agent should rely upon the judgment of the engineering department and make no change in favor of a cheaper article until it is evident that the change will not adversely affect the performance of the finished vehicle. A large percentage of orders for cars to-day are repeat orders, and nothing can upset this condition more certainly than a cheapening which renders performance less satisfactory or renewal and service charges more frequent.

Much has been done and is still being done to decrease the cost of manufacturing processes, but there is reason to believe that similar economy has not been brought about in the purchasing and selling departments. Selling costs are too high. Improved and more economical purchasing methods are possible. These are questions which every wise manufacturer should weigh carefully.

Cost cutting at the expense of quality is at best a dangerous proceeding. In any case it should not be resorted to until every possible economy in purchase, manufacture and selling has brought the cost as low as this practice permits.

## Export Market Outlook

**D**URING the year 1920 American automotive exports attained the enormous value of over \$382,000,000. In recent years our exports have grown at a tremendous rate, as may be judged from the fact that as recently as 1914 our car and truck exports together were valued at only \$28,000,000. This growth came about without any great efforts on our part. Throughout the war there was no competition in foreign markets, as all the industrial countries were engaged in the fray; in fact, the needs of the belligerents greatly swelled our exports. After the war, for a period extending over nearly two years, the industries of most of the European industrial countries were unable to produce a surplus for export, partly owing to the difficulties of getting back to a peace basis and partly owing to the abnormal demands of their own home markets. The American industry alone was prepared to make deliveries, and it reaped the advantage of this preparedness.

The period of no competition in the world's automobile markets has come to an end, and the question now is whether we can hold our own under the new conditions. On the one hand the outlook seems promising. Large-scale production of automobiles as we know it to-day is confined practically to this country, and where purchasers buy strictly on the basis of price and service value we will probably have little difficulty in meeting all competition. One thing in our favor is that technical development never stopped here, while little was done in Europe along this line for about five years. Previous to 1910 most of the striking improvements in automobile design originated in Europe. Since then America has been leading in the creation of new features. We need only mention the electric starter, the spiral bevel gear and the vacuum fuel feed. There can be little doubt that such pioneering in technical development as represented by these improvements adds to the prestige of

the American car in the eyes of foreign buyers.

On the other hand, private passenger cars are not bought wholly on the basis of price and service value. Appearance, tradition and careful handwork in the finishing of mechanical details have their influence, especially on buyers in the higher priced classes and in countries where the automobile is less an article of utility than it is here. That we shall have a hard fight to maintain our pre-eminence in the export field is indicated by recent figures on Belgian imports. During the first half of 1920 the United States led in these exports by a wide margin, but since then there has been a very pronounced change. The imports from the United States have dropped to a small fraction of their last year's value, while those from France have increased remarkably, and the latter country has secured a wide lead in that market.

One reason for this change is undoubtedly to be found in the exchange situation. Dealers in Belgium importing cars from the United States must pay in dollars, which are at a very high premium as compared with the depreciated Belgian currency. When they import from France they pay in French francs, which are still more depreciated than Belgian francs. Besides, Belgium is more or less contiguous to the French industrial district, and its language is the same as that of France, which facilitates commercial intercourse. Perhaps the Belgian purchaser looks upon the French product very much like the Canadian upon the U. S. product.

The change in the Belgian imports shows that we have not a very firm hold on some of the markets acquired during the war. The consoling thought is that Belgium in this respect is not an average country, but is influenced by close business ties to one of the countries strong in automobile production.

## An Ideal Transmission

**T**HERE appears to be a disposition among many engineers to regard the present type of gearbox as so near to perfection that but little effort is being made to produce new and more suitable types. Certain changes in detail design or control mechanism are occasionally attempted, but the major elements have remained about the same for many years.

An ideal transmission would, however, have certain characteristics not possessed by the conventional type. The primary function of the gearbox is to increase the torque applied to the rear axle when the torque of the engine is not sufficient to propel the car at the desired speed, and the gearset must in any case perform this function if the engine is kept small and light. It is conceivable, however, that the gearset might be made to perform another function, namely that of so adapting the load of the car to the output of the engine that the latter would always operate at full load and consequently under most favorable conditions with respect to fuel economy.

Such a mechanism is theoretically possible. Whether it can be reduced to practical form and be so designed as to be manufactured at a reasonable price is a question which is at least worthy of careful consideration. The fuel saving which would be

made possible by such a device would be very considerable, since it is a well known fact that economy at full load is more than double as good as that attainable when the engine is throttled so as to run, as it does most of the time in the average passenger car, at one-fifth to one-third full load.

Efforts in this direction have been made from time to time in the case of gas-electric vehicles, but first cost, weight and other considerations have militated against their commercial success. It is not beyond the realm of possibility that the desired results can be attained by purely mechanical means. There is room here at least for the application of ingenuity which might bear good fruit.

## Producing Closed Bodies

**R**EPORTS from various parts of the country indicate that the increased interest of the public in closed models may have a favorable effect upon fall and winter sales during the coming year. Answers to a questionnaire recently sent out by AUTOMOTIVE INDUSTRIES, moreover, indicate that manufacturers are greatly interested in the permanent top. Several are going to equip at least one model with permanent tops as standard equipment. Many others are seriously considering such a step in the near future.

This interest in permanent tops, together with the recognized gain in popularity of the regular closed job, brings to the foreground body production problems that hitherto have not been prominent. Price is undoubtedly a large factor in limiting the number of closed cars sold at present. Many persons who can afford to buy a given open car cannot afford to pay \$600 more for a closed job. The increased cost of the closed car lies very largely in production difficulties at present. Close study of body production methods may make considerable change.

One manufacturer stated recently that he considered it perfectly possible to so perfect closed body production methods and equipment that a closed job could be turned out for the same price as an open one. In fact, he has set out to do this very thing in his own plant. Whether or not he is successful, he is undoubtedly correct in his belief that the cost of closed body production can be materially reduced.

Improvements both of design and production, moreover, may be expected in permanent tops, so that the cost of these will be correspondingly reduced. Very close attention can well be given at this time to both the market analysis and production problems of the permanent top and the closed body.

**I**F every car and truck manufacturer would make it a point to see that each new model is capable of traveling under average conditions farther per gallon of fuel than the next earlier model the total saving in fuel during the life of the vehicles so improved would be astounding. Certain vehicles now extensively used in New York average nearly eight miles per gallon. A few years ago similar vehicles in the same service made about two miles. Persistent effort might easily produce similar results with other vehicles. Isn't it worth trying?



# Sales Exceed Dealers' Expectations

## New Price Cuts Have Not Deferred Buying

### Entire Industry Surprised at Way Business Holds Up—No Real Slump Likely

NEW YORK, Sept. 21.—Probably the most striking fact disclosed by a study of conditions in the automotive industry is that they continue to be better than expected. August was the best month of the year. When price cutting began at the end of August the general belief was that there would be a sharp falling off in retail sales on the theory that prospective buyers would hold off in the expectation of further cuts. No accurate data are available on this subject, but reports from numerous distribution centers indicate that sales are holding up very well in comparison with August, and that if there is a falling off it will not constitute anything in the nature of a "slump."

#### Continuance in Doubt

It is not to be expected that sales will continue at the present level until the beginning of 1922, but neither was it to be expected that business in July and August, which has been a perennial slack season, would be as good as in May and June, which ranked among the best months of the year. Manufacturers believe there will be a gradual "tapering off" the rest of this year, but this "tapering off" is not yet strongly in evidence.

Judging the rest of the year by the experience of the first eight months, the decline in sales will not be as sharp as has been expected. There is in prospect an unusually heavy demand for enclosed cars, and many attractive new models will be brought out this fall at prices much less than those which prevailed a year ago. This will tend to stimulate sales.

#### Buying Power in the South

Buying power is greater in the South than it has been in many months and there has been considerable stimulation in sales in that section. Farmers are coming back into the market to a certain extent and export trade is slightly better. The truck market, which has been virtually dead for months, is showing signs of life.

There probably will be a few more price cuts, but the indications are that there will be no epidemic of them, and the industry is hopeful that prices will remain fairly well stabilized until the

show period in January, although a period of sharp competition has returned.

Production for the industry as a whole is running about 70 per cent of the same period last year, but it should be remembered that production at that time had begun to fall off because of the "buyers' strike" which was well under way. A few of the quantity producers are running their plants practically at capacity, but it is probable a majority of the passenger car factories are running at not more than 50 per cent of capacity. It is difficult to estimate truck production, but on the whole it probably does not exceed 25 per cent of capacity. It is impossible to fix percentages of "normal" because what is "normal" for the industry has not been determined.

## Reorganization Plan for Willys in 30 Days

NEW YORK, Sept. 20.—Creditors of the Willys Corp. have been notified that while negotiations for a reorganization of the company have not progressed as rapidly as had been hoped, some definite decision is expected within 30 days. Committees representing the bank and other creditors are continuing their work.

The reorganization plan under consideration contemplates that a large part of the new funds needed will be provided by a prominent firm of New York bankers who have had an engineer's report on the Willys plant at Elizabeth. This report was delayed but it was presented to the bankers last week and a definite decision by them is expected soon. Creditors are warned that it would be extremely unwise to press claims at this time although the committees state that they will not consent to an indefinite delay.

## Truck Owners Fight Ohio Load Limit Law

COLUMBUS, OHIO, Sept. 21.—City and county officials assembled in the office of County Prosecutor King recently to discuss provisions of the Burke law, which limited the loads to be carried on the streets and highways of the State. The result was that steps were taken to enforce the law, which haulers and truck men believed to be very unreasonable.

The fight against the law in the conference was lead by Walter Francis of the C. & C. Haulage Co., representing truck owners, who declared that the enforcement of the law would work a great hardship on contractors and truck owners in general.

## Moline Refinancing Meets with Approval

### Proposed Capitalization Will Pro- vide Big Stock Issue—90 Per Cent Agree

MOLINE, ILL., Sept. 21.—New financing plan of the Moline Plow Co., which the bankers' committee believes will re-establish the corporation on a sound financial basis, has been outlined and approved by approximately 90 per cent of the interests involved.

Proposed new capitalization will provide for the \$10,000,000 of 7 per cent debentures, an equal sum in 7 per cent first preferred stock issue and \$7,500,000 in second preferred stock. Preferred stock issues will be entitled to cumulative dividends after two years. Common stock issue has not been determined, but \$10,000,000 common stock now outstanding will be traded in on the common at the rate of one share of new for ten shares of old. Majority of the common stock will be held by the protective committee for banking and commercial creditors for a period of years believed by the company sufficient to work out its difficulties.

Holders of \$7,000,000 of 7 per cent first preferred stock now outstanding will receive the new second preferred issue, par for par. Holders of \$1,500,000 of 6 per cent non-cumulative second preferred outstanding will receive one-third or \$500,000 in new common, it is said.

Banking and commercial creditors and holders of \$4,000,000 of 7 per cent notes outstanding will go into the new organization on an equal footing, it is reported. Their total claims aggregate \$20,000,000. These claimants will receive 50 per cent in debentures and 50 per cent in first preferred stock of the new issue.

Banks, it is said, have agreed to advance \$2,000,000 to the company on its notes, for immediate working capital.

## Cunningham Factory to Increase Production

ROCHESTER, N. Y., Sept. 21.—Improvement in business has been noted by James Cunningham, Son & Co., automobile manufacturers, during the past ten days and the company is planning on a production of 35 cars this month. Most of the machines are custom built. The company's 600 employees are working on a basis of 40 hours a week.

At the annual meeting of the stockholders held here this week, the directors elected are as follows: Augustine J. Cunningham, James C. Dryer, John W. Fulreader, Francis E. Cunningham, Campbell A. Baird.

# Peerless Deal May Be Closed Soon

## Collins Would Not Get Stock's Control

**Offers to Buy 80,000 of 200,000  
Shares at \$50—Half to Be  
Paid in Cash**

CLEVELAND, Sept. 20—Negotiations for the acquisition of control of the Peerless Truck & Motor Corp. by R. H. Collins, former president of the Cadillac Motor Car Co., and his associates, had not been concluded at a late hour to-night. Conferences lasted throughout to-day and far into the night. The indications are said to be favorable to a successful termination of negotiations. Attorney George B. Siddall of this city, who is secretary of the Peerless Company and has been named a committee with B. G. Tremaine, president and general manager of the corporation, to negotiate the deal, issued the following statement to-night:

"The trade with Collins has not yet been made but negotiations are still pending. At a meeting to-day progress was made but in a transaction of this importance there are many points which must be covered. The stockholders of the company may rest assured that all of them will be treated alike. It probably will be several days before the matter will be brought to a conclusion."

### Notification to Stockholders

Although no announcement as to details has been made by any one participating in the negotiations, information concerning it became available when circulars that are to be mailed to stockholders were seen. These are to be put in the mails when necessary signatures to the contract are obtained. The circular says that the negotiations at present are limited to B. G. Tremaine and his associates who are now virtually in control of the management of Peerless and its subsidiaries and R. H. Collins acting for himself and his associates for the sale of shares of stock in the corporation. W. C. Durant, former president of General Motors Corp., is allied with Collins. Another well defined report is that Collins will assume active management and that his word will be law as to whether or not there shall be changes in the personnel of the officers and directors.

All stockholders of the company are to be given an opportunity to sell their stock to Collins and his associates. Tremaine stipulated this should be done and his proposal has been accepted. Collins,

according to information contained in the circular notices that are ready for mailing to stockholders, is to purchase at least 50,000 shares and not more than 80,000 shares of the 200,000 shares outstanding. He is to pay \$50 a share for the stock, of which not less than \$10 a share shall be paid in cash and the balance in six equal installments which shall be paid semi-annually over a period of three years with interest at 6 per cent.

Stockholders who desire to sell on the terms given will be asked to deposit their shares with the Cleveland Trust Co. In the event that more than 80,000 shares are deposited under the agreement the amount of each stockholder's stock to be sold shall be such proportion as 80,000 shares shall bear to the total number of shares of such stock deposited. Thirty days are given for the consummation of the sale under the depositary agreement, provided, however, that the attorneys may grant an extension to not later than Nov. 15.

The Peerless company is one of the largest and most prosperous automobile plants in the Cleveland district. When operating normally it employs 2,500 men. The plant covers 20 acres and it has continued its payment of dividends this year. It has paid as high as 10 per cent annually on outstanding stock and the dividend this year is 4 per cent. The corporation has a capital of \$20,000,000 with approximately \$10,000,000 outstanding.

### Durant Personally Associated

NEW YORK, Sept. 21—W. C. Durant personally is associated with R. H. Collins in the negotiations for control of the Peerless plant but Durant Motors, Inc., is not involved. In this respect the relations of Durant with Collins are no different than they have been since the announcement several months ago when Collins left the General Motors Corp. that he would incorporate a Michigan company to manufacture a high class eight cylinder car.

Soon after the original announcement of Collins' plans he purchased one of the large units in the old Cadillac plant at Detroit. If his offer to the Peerless company is accepted the Detroit factory will be used for other purposes which he has in mind.

Acquisition of a well equipped factory such as that of the Peerless company will give Collins an opportunity to get to work at once with the organization he already has built up. His proposal to the Peerless company contemplates the complete redesigning of the car with the exception of the 8-cylinder engine, which he regards very highly. It is probable that in this redesigning he will put into effect most of the ideas he has had for a new car.

## A.A.A. Backs N.A.C.C. on Manufacturers Tax

**Senate Expected to Be Satisfied  
Industry Is United for  
Revision**

WASHINGTON, Sept. 21—Endorsement by the American Automobile Assn. of the proposed manufacturers' tax on commodities which the National Automobile Chamber of Commerce has recommended, is expected to make the Senate understand that the automobile industry, from manufacturer to user, is united in an effort to obtain a more equitable form of tax assessment through a revision of the present internal revenue laws. The Smoot bill, which would make the necessary revisions, will be introduced by Senator Smoot this week, when Congress reconvenes.

The brief in support of the plan is a substitute, for the House bill was filed on Saturday with the Senate Finance Committee by the Manufacturers' National Tax Committee, of which Charles E. Hanch of the National Automobile Chamber of Commerce is vice-chairman. The report which Hanch signed as chairman of the tax committee of the N.A.C.C. says that the Smoot plan is approved because:

"Without lessening the amount of revenue, it removes the burden of invidiously discriminating war taxation from selected industries upon whom it was imposed for the purpose of limiting particular production as well as raising revenue. The reason for such limitation having expired, the policy should die with it, or it should be a popular tax because its amount is definite and certain and its relation to costs easily calculated by the mass of buyers of average intelligence. It cannot therefore be made an excuse for unduly enhancing price or a mask for inexcusable extortion."

The A.A.A. directors, in a statement said that the main motive in endorsing the manufacturers' tax is to give relief to the business interests of the country and to provide employment to more than 5,000,000 now idle men.

## Report Ford Plant Will Run Only 5 Days Denied

DETROIT, Sept. 19—Reports that the Highland Park plant of the Ford Motor Co. would be operated hereafter on a five-day basis were emphatically denied. The plant was closed Saturday to balance stock, but work was continued as usual at all branches. The monthly production schedule has not been changed.

## Owen Tire Company in Receiver's Hands

### Action Follows Charge of Stockholder That Funds Were Spent Extravagantly

CLEVELAND, Sept. 21—Manton M. Scott, this city, has been appointed receiver for the Owen Tire & Rubber Co., which conducts a tire-making plant at Bedford, a suburb of Cleveland. The appointment was made upon the application of William C. Gleason, a stockholder.

Gleason in his petition set forth that there are 3000 stockholders of the corporation, whose plant is on a 14 acre tract. He said that the company is greatly indebted for large quantities of material, some of which has been delivered and some of which is to be shipped from vendees; that creditors are annoying the company with their claims, and that many threaten to sue. He asserted that large sums of money have been illegally paid out for salaries and as commissions and for expenses.

### Insolvency Alleged

The petitioner alleged that the company is not insolvent, and that a receiver was needed to protect company interest for the present, to conserve the interest of stockholders by withholding appropriations for extravagant purposes and to conduct the business.

The debts were placed at \$800,000. In order to pay claims, the directors are attempting to sell \$600,000 gold bond notes, but in the last 30 days only \$14,000 has been realized from these sales. The court is asked to restrain this action.

### Committee Is Named

On Aug. 8, a special meeting of stockholders was held and a committee was named to act with the directors and the active managers, but, it was charged, the proper co-operation could not be obtained.

At the plant of the company it was stated that the assets are greatly in excess of the debts and that the concern is far from being insolvent. The corporation was organized about two years ago.

## Gas Production 807,980 Gallons Lower in July

WASHINGTON, Sept. 19—Production of gasoline fell off 807,980 gallons per day during July, as compared with the month of June, according to estimates prepared by the Bureau of Mines to-day. However, the output for July represented an increase of 196,542 gallons over the daily average production for the year 1920. Stocks of gasoline on hand at the refineries were produced during the month of July by approximately 66,000,000 gallons.

The daily average production of gasoline for July was 13,536,833 gallons,

which is a decrease from June of 807,980 gallons per day, but this is an increase of 196,542 gallons over the daily average production for the year of 1920. Stocks of gasoline on hand at the refineries were decreased during the month of July by approximately 66,000,000 gallons.

The daily average production of lubricating oils for the month of July was 22,635 larger than the production for June. Stocks of lubricating oils were decreased during the month of June by 2,244,823 gallons.

## 15 Per Cent Cuts Made on Standard Trucks

DETROIT, Sept. 16—Price reductions averaging 15 per cent on its entire line were made by the Standard Motor Truck Co. to-day, the announcement being based upon a general reduction determined upon by leading parts makers, and by manufacturing economies effected through higher labor efficiency.

The new Standard prices are:

	New	Old
Model 1-K 1-1½ ton....	\$1,800	\$1,950
Model 76 2½-3 ton.....	2,000	3,100
Model 66 3½-4 ton.....	2,800	4,000
Model 5-K 5-7 ton.....	4,400	5,250

Under the influence of lower prices a much more active demand in heavy duty trucks is looked for by Standard in the remainder of the month of September with probable increases in October and the early winter months. August without any particular sales stimulus proved to be the best month the company has enjoyed in a year.

## Aircraft Plant May Be Built in America

WASHINGTON, Sept. 19—It appears that the plea of the National Advisory Committee for Aeronautics for further researches into dirigible transportation will have a salutary effect upon the development of this industry in the United States. The destruction of ZR-2, built in England for the United States Navy, brought about the resolution of the Advisory Committee and may result in the establishment of an aircraft plant in this country under the auspices of the Government, in order to conduct experimental work for obtaining definite information regarding the strength and quality of materials and girders used in the construction of airships and for the development and checking of theories used in the general design of airplanes.

Several groups of American financiers are deeply interested in the promotion of aerial transportation, especially through the use of rigid air ships. Negotiations are now under way with the DuPont, U. S. Steel Corp. and General Electric Co. and other powerful financial interests for the establishment of dirigible routes to New York and Chicago. Several conferences have been held and experts employed by the syndicate have reported a system of dirigible transportation would be feasible and profitable.

## Senate Revenue Bill of Interest to Trade

### Revision Permits Manufacturers to Compute the Tax on Wholesale Sales

WASHINGTON, Sept. 19—While the final revision of the House internal revenue bill in the Senate Finance Committee made little change in principle, the new administrative methods proposed in the Senate bill are of particular interest to automobile manufacturers and dealers. The revision of Section 900 of the present law permits manufacturers to compute the tax upon retail sales on the basis of their wholesale selling prices in cases where they are doing both a wholesale and retail business. The House bill which repeals this provision of the present law was approved by the Senate Finance Committee but subsequently under the pressure of complaints from automobile manufacturers and others, it reconsidered and finally made the required change.

### Important to Manufacturers

This change is particularly important to manufacturers maintaining branch offices, as the House bill would allow private dealers to sell cars much cheaper than branch establishments, thus making a discrimination.

Because of the recent complaints from the automotive trade, the Senate Finance Committee reconsidered its endorsement of the House bill, changing the language of Section 900, dealing with tires, inner tubes, parts or accessories, and restored the language of the present bill. Dealers and others in the industry contended that the change in the language would allow new interpretations and cause much confusion in the administration of the act.

The Senate Finance Committee also amended a clause in Section 901, in which affiliated corporations may base their taxes on price of sale, instead of purchase price. It is revised so that the price must be the fair market value. This change, if approved by the Senate and the conference, will affect many holding corporations in the automotive trade.

## Ford Foreign Output 6140 Cars in August

DETROIT, Sept. 20—A statement from the Ford Motor Co. says foreign plants during August produced 6140 cars, of which 2773 were turned out at the Canadian plant. Buenos Aires made a large increase in output. Total revised output both domestic and foreign for August was 118,100 cars. Kearney assembling plant was a leader in larger output, with Detroit second and Philadelphia third. The total output for four months ended Aug. 31 last was 426,759 cars.

## Federal Finances for Export Firms

### But Automotive Concerns Have Made Little Effort to Obtain Assistance

NEW YORK, Sept. 19—Manufacturers and exporters of automotive equipment have made little effort thus far to obtain assistance from the War Finance Corp. in financing their foreign trade. This corporation, whose powers were recently amended by act of Congress, is the governmental agency which has a lending power of \$1,000,000,000 created for the sole purpose of helping American exporters to build up their overseas business and to supply them with credits that cannot be obtained from banks and other institutions.

#### Broad Powers

Its broad powers and its specific application to the automotive industries were outlined here to-day by W. G. Bogue, the legal representative of the corporation, which has its offices at Washington. He stated that no reason existed why its financial facilities could not be extended to the automotive industry and that the corporation already had granted large credits to manufacturers of machinery and locomotives. That similar credits could be extended to the automotive industry is the belief of Bogue, and he added that manufacturers who stand in need of such assistance should submit specific proposals either to himself or direct to the corporation at Washington.

"So far as I know," he said, "only two or three efforts have been made by the automotive industries to obtain credit, and we have naturally presumed that they were not in need of such assistance. The first of these efforts was that of an American company which had an order for 50 trucks for a foreign government. Financing was asked for, but the corporation found that the trucks were destined for war purposes and the business was refused, the only reason being that the products were not to be used in peace time pursuits. Otherwise, I am sure the credits would have been granted."

#### Scope Not Realized

"A second request is now before the corporation; the proposal having originated here last week and having been forwarded by me for final action. This concerns an export order for tires and accessories, and, I hope, will be successful."

Many exporters have believed, without any reason for such belief except newspaper stories, that the corporation would aid only in the financing of agricultural crop shipments. This is in error, as was revealed by a recent announcement of financing offered on sugar machinery and locomotives. The institution was organized and is being used for the aid of all exporters of American products,

either raw or finished, except for war purposes.

The corporation deals directly with the American manufacturer or shipper, and the credits are given to him. This is the opposite of the case with the financing companies organized under the Edge act, which furnish credit to the foreign purchaser. All dealings of the War Finance Corp. are with the American company and credit is extended upon the presentation of negotiable security, the American company, of course, being held responsible for the payment.

#### Five-Year Credits

Furthermore, the exporters must show that the financing cannot be handled through the customary banking channels. Credits may be extended for as long as five years, although they generally have been for six, nine or twelve months. The longest credit now outstanding is for two years.

"The bulk of our recent financing has been of agricultural commodities," Bogue said. "But it is not the purpose of the corporation and its present activities to slight manufacturers. Exporters should submit specific proposals and, as the activities are being conducted without red tape, they will receive satisfactory and immediate action."

The offices of the corporation are in the Treasury Building at Washington, and all credits are granted from there.

## N. A. C. C. Makes Headway on Insurance Reform

NEW YORK, Sept. 19—Considerable progress is being made by the insurance committee of the National Automobile Chamber of Commerce in its negotiations with the leading insurance companies looking toward reduced cost of insurance on motor vehicles. It is felt that only a negligible proportion of underwriting losses can be traced to construction features of the cars and that external causes account for most of them.

Continued thefts of large numbers of cars in certain districts have been reflected in premiums which now have reached an almost prohibitive point. Measures for curtailing these thefts are having the active attention of car makers and underwriters. Rigid enforcement of laws proposed or already enacted, it is believed, would do much to meet this situation.

#### GOOD MOTORCYCLE MARKET

COLUMBIA, S. C., Sept. 20—Motorcycle companies would seem to have a fertile field in some of the counties of this State, for six of them have not a single motorcycle, according to registration figures compiled by the State Highway Department. The six counties reporting no motorcycles are Bamberg, Barnwell, Calhoun, Jasper, McCormick and York. Another interesting fact brought out in the registration figures is that there was, up to Aug. 31, but one automobile dealer registered in Berkeley County.

## Lima, Peru, Takes Up Motor Bus Travel

### Converted Ford Trucks Now in Use—Regular Services Are Established

LIMA, PERU, August 31 (*By Mail*)—Motor bus transportation is on the increase in Lima, Peru. In addition to the two large European buses (De Dion-Bouton) with solid tires that were recently put in service between Lima and Miraflores, one of the suburbs, a popular priced light American truck (Ford), with pneumatic tires, has been converted into a bus and is running between Lima and Magdalena, another suburb of the capital. Other and larger trucks have been converted and are running over the same line.

During a recent strike on the inter-urban electric car line, these converted buses did valiant service, working overtime, hauling stranded suburbanites to their homes. Improvised buses, with nothing but planks for seats, resting on the side boards of the trucks, did good business.

#### Regular Bus Service

A regular bus service has been instituted between the center of Lima and a point on the outskirts of the city, known as Bolognesi Square. The fare is 10 cents Peruvian (less than 5 cents gold), the same as first class fare on a street car. The fare by motor bus from Lima to the suburbs is about twice what it is by electric train line, but up to the present time the buses are doing a good business.

For years Lima has had a public taxi service. There are now more than 500 light cars in this use, and numerous larger cars. The fare for a trip within the city limits is 50 cents.

Motor truck freight transfer has been in practice for some time between Lima and Callao, the port of Lima, a distance of nine or ten miles. In spite of a bad road the trucks are competing with a steam road and mule carts. There are perhaps 225 or more trucks, the majority light trucks, in use in Lima and the immediate surrounding territory.

A possible market for motorcycles is developing in Lima, owing to the fact that the roads between the capital and some of the suburbs have been a little improved. The consumption of gasoline is on the increase in Lima. It is estimated that at least 25 per cent more gasoline will be used in Lima in 1921 than in 1920, though the increased consumption is probably due to the larger number of small cars running.

It is possible that the tariff on automobiles and kindred lines may be lowered. This makes buyers cautious. But should this reduction take place, taken in connection with the fact that cotton, one of Peru's chief exports, is advancing in price, makes the future look encouraging.

## Show Managers Plan Promotion Schemes

Enclosed Car "Weeks," Appreciation and A. E. A. "Days" Discussed at Meeting

CHICAGO, Sept. 21—An Enclosed Car Week this fall and special days at the winter shows as agencies of stimulating sales were suggested to the trade by the National Association of Automobile Show and Association Managers, which has been holding a sales promotion meeting here this week.

The show managers, representing a majority of the larger dealer associations throughout the country, met here to exchange ideas and make them available for the trade generally on ways and means of arousing public interest in automobiles throughout the fall and winter, and turning that interest into sales profits for dealers. It was brought out before the meeting was hardly under way that trade associations in six large cities—Kansas City, Detroit, Buffalo, Brooklyn, Syracuse and Rochester—had completed plans for Enclosed Car Weeks in October. Other cities were reported considering the idea and general discussion indicated that quite a large number of "weeks" may be looked for in October and November. The six cities named will have their "weeks" in October.

### Special Days Urged

The association recommended to dealer associations and show managers generally that special days be set aside during their winter shows as Appreciation Day and Automotive Equipment Day. Appreciation Day was suggested by E. E. Peake, manager of the Kansas City Motor Car Dealers Association and president of the shows managers' organization. Peake tried out the idea last winter, first appearing before civic organizations and explaining the importance to the city of the automotive industry. His request that these organizations support the show in appreciation of their acknowledgment of the industry's part in the progress of the city resulted in much favorable publicity and in the largest show crowd in Kansas City history on Appreciation Day, which took the place of the former Society Day. Automotive Equipment Day was suggested by Ray W. Sherman, merchandising director of the Automotive Equipment Association, who said that his organization would be able to co-operate with manufacturers, jobbers and dealers in utilizing the day for promotion purposes.

### Merchandising Discussed

The association spent the greater part of a day discussing merchandising methods, with the idea of taking home new ideas to their associations and individual dealer members. On this subject they heard addresses by W. Frank McClure, sales promotion director of the

Fort Dearborn National Bank of Chicago and chairman of the national commission of the Associated Advertising Clubs of the World, and G. Raymond Schaeffer, advertising manager of Marshall Field & Co. Both men advocated for mercantile as well as for manufacturing businesses use of institutional and confidence building advertising in addition to more commodity advertising.

Among the larger cities represented at the convention by association managers were: Detroit, Kansas City, Cleveland, Buffalo, Brooklyn, Syracuse, Minneapolis, Newark, St. Louis and Des Moines.

## Milwaukee Looks for Gains Through Cuts

MILWAUKEE, WIS., Sept. 21—Milwaukee distributors and dealers look for a sharp accentuation of recent improvement in sales as the result of the general price reductions announced by manufacturers, placing most list prices at or below pre-war figures. Discussing the situation, Tom C. McMillan, head of the Overland Wisconsin Co. and president of the Milwaukee Automotive Dealers Assn., said:

"The whole situation rested with the public, which refused to buy anything except of absolute necessity because of high prices. Manufacturers have long realized this situation and governed themselves accordingly. As the result our industry is resuming a healthy era. It took more than a year to bring it about.

"It is my opinion that where interests have held back from price reductions they will soon be convinced that the buying public has a consistent unwillingness to buy anything except at prices which they think are right. In the automotive industries 'rock bottom' prices have restored buying confidence. A generous increase in sales of Milwaukee dealers in the last two weeks proves this to be true."

## Obenberger Forge Will Go On Under Receiver

MILWAUKEE, WIS., Sept. 21—The John Obenberger Forge Co., of Milwaukee, which is going through the bankruptcy courts, will continue to operate as a going concern under the direction of J. Frank Gerdis, trustee, until Oct. 31, according to an order issued by the referee in bankruptcy. The plant was re-opened June 12 on a three months' permit, and creditor banks advanced additional funds to finance production.

At the expiration of the term, Trustee Gerdis requested authority to continue operations until Jan. 12, stating that it would be "disastrous to the interest of the creditors" if the plant was closed now. No new financing is required. The referee, however, granted permission to operate until the close of October, stating that consideration would then be given the matter of future conduct of the company, particularly whether it will continue to operate.

## Division of Tests Plans Experiments

First Will Study Widening of Bituminous Surfaces Caused by Truck Traffic

WASHINGTON, Sept. 17—The Division of Tests of the Bureau of Public Roads has under way a number of new investigations at its experimental station at Arlington, Va. One investigation is the study of the shoving or waving of bituminous surfaces caused by truck traffic.

A circular 15-ft. roadway on a 90-ft. radius is being built. The roadway will be composed of a number of sections of various kinds of bituminous pavement. A driverless truck will be guided by a mechanical arrangement in a varying path so as to cover all parts of the surface in the course of its successive trips around the roadway. A study will be made of the resulting effect on the sections of paving.

Another investigation will be made to determine the distribution of pressure through a slab to the subgrade when a load is applied to the surface. Soil pressure cells are being used in experiments with slabs of different thickness and various subgrade materials. At the same time an opportunity is afforded to compare rock fills with concrete slabs. A report is expected about the end of the year.

In connection with experiments to determine the effect of impact on various types of paving, 120 new slabs are being constructed. An investigation has been started to determine the warping effect of weather conditions, mainly temperature, on concrete slabs. Slabs are being placed to study the effect of slab vibration on the capillary movement of moisture in the subgrade.

An autographic strain gage which will probably be known as a strainoscope, has been developed to use in connection with the determination of stresses in bridges and other framed structures subjected to impact. The first instrument has been tried out and found satisfactory. It gives a photographic record of the change in length of any member it is attached to and there seems to be no practical limit to its accuracy. Its special advantage is that it will record the effect of any blow, no matter how quickly it may be delivered.

## FEDERAL LABOR REPORT

WASHINGTON, Sept. 19—While there was a slight increase in production of motor vehicles in August as compared with July, the number of workers in 47 automobile factories which report to the Department of Labor, declined from 78,908 in July to 74,283 in August. The pay rolls for these plants fell from \$2,620,015 to \$2,522,602. Per capita earnings for the workers in August increased 2.3 per cent.



## G. M. C. Export Models to Be Made in Canada

**Includes All Lines With Exception of Cadillac and Truck— Adds Efficiency**

NEW YORK, Sept. 19—Manufacture of all export models, with the exception of the Cadillac car and the General Motors truck, will be concentrated by the General Motors Corp. at its Canadian plant at Oshawa, Ontario. It is stated that concentration of such production at a single point will place one executive in charge of all export production, with a better realization of export needs. Its purpose is to produce a line of cars more reliable and more thoroughly tested, which for these reasons will be better fitted for foreign trade. Another purpose is to give greater flexibility to the manufacture of such cars, not only because of changes in the manufacturing program but because of details necessary to meet export needs.

### Changes in Personnel

In connection with the concentration of foreign trade manufacturing in Canada, Paul Fitzpatrick, who is now vice-president in charge of operations for the General Motors Export Co., will be transferred from that organization and made assistant to Alfred P. Sloan, Jr., with duties pertaining to the transfer of operations to Oshawa and the study of all problems incident to them.

P. S. Steenstrup, vice-president in charge of sales, will exercise full authority in the export organization, subject to the president, and all personnel heretofore reporting to Fitzpatrick will report to Steenstrup.

### Employees Get Notice

A notice sent to all employees of the export company, says:

"In order to make still more effective the operations of the export company, it is desirable to place all functions in one place, and it is believed that all sales work should be as closely adjacent to factory operation as possible. Such a method of procedure eliminates the organization necessary to maintain contact between two offices located at a distance and enables direct dealing and quicker results and, therefore, better service to our customers. For that reason it is considered desirable to remove the export selling organization, as an organization, to Oshawa at the earliest possible moment. It is recognized in carrying out this program that there will be some functions of the export work which it may not be possible to locate in Oshawa. It is impossible in this statement to determine what functions will remain in New York and what will not. Every effort will be made to concentrate all functions in Oshawa that it is possible to concentrate at that point for the very good reason that as long as the move is to be made everything should be in the one place.

"It is recognized that the above change of program is of vital interest, both personally and otherwise, to the various members of the export organization. The management recognizes this and will be very glad to do the best it can at all times to advise the members of the export organization as to how this change of program will affect his or her status. There must be full appreciation on the part of the organization, however, of the fact that these plans are not fully matured in detail, and this early notice is given in order that as little inconvenience as possible may be incurred on the part of the organization in connection with this future program."

## Hoover Will Address N. I. V. A. Annual Meeting

CHICAGO, Sept. 19—Several men of national prominence will address the annual meeting of the National Implement and Vehicle Assn., which will be held at the Congress Hotel here Oct. 12 to 14. The speakers will include Secretary of Commerce Hoover, Secretary of Agriculture Wallace, W. P. G. Harding, governor of the Federal Reserve Board; James R. Howard, president of the American Farm Bureau Federation, and W. W. Atterbury, vice-president of the Pennsylvania Railroad. The vital problems facing business generally and the farm equipment industry in particular will be considered. C. S. Brantingham of the Emerson-Brantingham Co. will speak on "Can Farm Machinery Business Methods Be Better Controlled."

## Belsize Motors Defers Payment of Dividend

LONDON, Sept. 6 (*By Mail*)—The Belsize Motor Co. of Manchester, one of the best managed and most enterprising plants in Great Britain, has decided to defer payment of a dividend on its preferred stock although the earnings have been sufficient to more than cover the amount needed. An interim dividend of 4 per cent was paid in May and it had been intended to declare another payment for the half year ending this month, but it was deemed wiser to husband resources.

The company has been in production since 1912 on a light model which sold for \$900 complete, and it has enjoyed a much better business than most of its rivals. A new light car will be produced next season with a two cylinder diagonal oil and air cooled engine as well as other more or less novel features designed by Granville Bradshaw.

### TAX RECEIPTS ANNOUNCED

OLYMPIA, WASH., Sept. 21—Completion of the first monthly report of receipts by the State from the liquid fuel tax, or so-called gasoline tax, which became effective July 1, was announced this week by the department of licenses, showing 8,628,192.7 gal. of liquid fuel sold during the month.

## Ten More States Add Gas Tax to Revenues

**Returns in Fourteen States Will Add at Least \$6,000,000, Report Says**

NEW YORK, Sept. 19—Ten new States, bringing the total to 14, added taxes on gasoline consumption to their revenues at the 1921 sessions of their legislature. A report on this subject, compiled by Harry Meixell, secretary of the Motor Vehicle Conference Committee, shows that this action will add at least \$6,000,000 to the taxes paid by motor vehicle users.

When the present year began, the four States which had a gasoline tax were Colorado, Kentucky, New Mexico and Oregon. The States which added the tax this year were Arizona, Arkansas, Connecticut, Florida, Georgia, Montana, North Carolina, Pennsylvania, South Dakota and Washington. The tax is one cent a gallon in all States except New Mexico where it is two cents.

The chief objection to the imposition of a gasoline tax is that it is discriminatory and adds another impost to the "stigma taxes" which have been inflicted on the industry. The tax also discriminates against motor vehicles propelled by internal combustion engines in favor of those driven by steam or electricity. It is probable that agitation over a gasoline tax will be taken up in several other states at the coming sessions of their legislature.

## Indiana Truck Owners Caught in License Net

INDIANAPOLIS, IND., Sept. 21—Following a ruling in court here recently in which the Indiana motor vehicle law was held constitutional, the prosecutor of Marion County is demanding that 200 defendants failing to obtain State license for trucks be adjudged guilty. He says that about 200 truck owners who did not take out State truck licenses were awaiting the outcome of the recent decision.

William P. Frye, the defendant in the test case, is the proprietor of the William P. Frye Transfer Co., and at the time he was ruled against he was given thirty days in which to file an appeal. Several days in which to perfect an appeal have passed, but it has not been filed. The county prosecutor is demanding action on the 200 other defendants.

### BRITISH PIONEER DIES

LONDON, Sept. 5 (*By Mail*)—C. Vernon Pugh, managing director of the Rudge Whitworth Co., Coventry, and also director of the Lanchester Motor Car Co., Birmingham, and the Rudge Whitworth Wire Wheel Co., died unexpectedly last week while on a brief holiday. Pugh was the foremost advocate in Britain of the wire wheel for cars.

## Metropolitan S.A.E. Discusses Fuel

### Papers Read at Summer Meeting of Society Are Reviewed

NEW YORK, Sept. 21—A review of the fuel paper read at the Society of Automotive Engineers' summer meeting was presented by H. L. Horning at the first meeting of the Metropolitan Section held this season at the Automobile Club of America.

Horning passed by the Dorris manifold paper with the remark that Dorris in the device described by him had produced a remarkable piece of apparatus. He had driven a Dorris car fitted with it on and knew that it gave excellent results. He then turned to the paper of Dr. James and commended it highly. He drew attention to the fact that the loss in the gear box and rear axle due to the use of heavy lubricants is surprisingly high, as one will find by filling the transmission case and axle with heavy lubricants and noting how sluggish the car is in coasting. We should not, he said, overlook the advantage of the soft cord tire, for such tires may add 15 per cent to the mileage of the car.

#### Air Cycle Efficiency

The term air cycle efficiency was discussed and its values for different compression ratios were given. It was explained that this is an ideal efficiency and is never obtained in practice, one reason being that the specific heats of the gases of combustion increased at high temperatures, causing a loss of about 15 per cent, and another that at high temperatures there is a loss of about 13.5 per cent due to direct radiation. There is also a loss of about 1 per cent due to the fact that the gases do not burn instantaneously but have to be ignited a moment before reaching the dead center and kept on burning for some time after the piston starts on the down stroke, so that the pressure in the combustion chamber does not reach the full value that might otherwise be expected. There is a further loss of about 2 per cent due to the lead given to the exhaust valve opening.

This leaves 68.5 per cent, which is approximately the relative efficiency obtained in a good engine. The relative efficiency had a tendency to go up with the compression ratio, displacement, rotational speed and load. The volumetric efficiency is affected by the inlet temperature, design of passages, character of fuel and the timing.

#### Crane Opens Discussion

H. M. Crane, who opened the discussion, said that he has recently been using the overhead valve type of engine because the compression chamber of such an engine is easiest to machine and easiest to clean. He has found, however, that, owing to the absence of turbulence

in the flat cylindrical combustion chamber, it is necessary to give the ignition an advance of 65 deg. in order to obtain the maximum power, but by the use of two-point ignition it has been found possible to reduce the required ignition advance to 35 deg. There is also much trouble at idling speeds. In fact, on very small throttle openings the engine in question could be kept running only by using two-point ignition or by increasing the richness of the mixture from 15 to 20 per cent. On the other hand, the combustion chamber forming substantially an extension of the cylinder bore, has less flame-swept area, and a higher compression ratio can be used. Two point ignition also results in much better pick-up of the engine. By providing four spark plug bosses per cylinder and trying the plugs in various positions it was possible to find the best locations.

#### Depends on Cylinder

Crane said that in his engine he depends largely upon the cylinder for the vaporization of the fuel, as in the cylinder all the factors required for this process—the area, the temperature and the time—are present. This latter statement was taken exception to by W. P. Deppe, who said that in order to insure homogeneity of the gaseous charge in the combustion chamber, vaporization of the fuel must take place before the fuel entered the cylinder.

## S. A. E. Members to Make Trip to Proving Grounds

NEW YORK, Sept. 17—Arrangements have been completed for the trip of members of the S. A. E. to the Aberdeen Proving Grounds on Oct. 7, and an announcement concerning it was made at the Metropolitan Section meeting on Thursday last. A B. & O. train will leave the Pennsylvania depot in New York at midnight and will arrive at Aberdeen about 9 o'clock next morning. The use of a motor omnibus had been offered to the society for the use of members who might wish to go by road. The plan was to leave S. A. E. headquarters about 10 o'clock in the morning on the 6th and make the entire trip down to Aberdeen, as well as the return journey, by bus. However, since this would take three business days instead of one, there did not seem to be much interest in the proposition, and it was dropped. An alternative plan is to go down to Wilmington in the afternoon or evening of the 6th and stay there over night.

#### CHINA PLANS FIRST SHOW

SHANGHAI, CHINA, Aug. 31 (*By Mail*)—China's first automobile show will be held in Shanghai in November. The show will become an annual event and great preparations have been in progress to make it one of the most striking demonstrations the Republic has known. The good roads movement in China is actively supporting the show.

## Ford Business Good in Des Moines Field

### One Dealer Reports August Biggest Month—Accessory Sales Fall Off

DES MOINES, IOWA, Sept. 21—The Herring Motor Co., long established Ford dealers, report that the month of August, in so far as car sales was concerned, was the largest that company has ever known. Another Ford dealer reports sales of 144 cars in Des Moines during the month.

Other dealers, while they report business has held up to a point even with or above the expectations, admit that many of them will do well if they "stick it out" through the winter.

The unusual Ford business referred to cannot be entirely attributed to price cut stimulation, as the last Ford cut did not come until late in August. Ford business seems to be better in Des Moines than it is in some other cities in Iowa, and this may be accounted for partially by the fact that Des Moines has been without street car service since Aug. 3. It is also admitted by dealers that many prospective buyers who in normal times would buy higher priced cars want transportation, and are therefore buying Fords.

#### Business Stimulated

There is little question but that price cuts have served to stimulate business among all dealers. A dealer who sells one of the higher priced cars advised the writer that prospects for a fairly good enclosed car business during the fall were good.

There is no improvement in the condition of the business among farmers, and dealers do not anticipate any until freight rates come down and the retailer takes a greater portion of his losses.

C. L. Herring of the Herring Motor Co. stated that the accessory business during the past sixty days had not held up to the car business. Repairmen and garagemen report the biggest business in their history, which is taken to mean that car owners are making major repairs with the idea of making cars go the full limit.

#### ELECTRIC TRUCKS AT SHOW

NEW YORK, Sept. 19—Displays of electric trucks will feature the electrical show which will be held at the 71st Regiment Armory beginning Sept. 28. Figures compiled by the managers of the exposition show that nearly 800 electrically driven trucks have been sold in the boroughs of Manhattan and Bronx in the last three years. The total in operation in the two boroughs at the beginning of the year was 3142, and there were 4362 in the metropolitan district which had been in operation for a year or more. Wholesale and retail bakers lead in the number of trucks operated with 485.

## Depression Holds Up Trade in Far East

### Returned Paige Representative Says General Business Must First Pick Up

DETROIT, Sept. 16—Revival of automotive business in Australia and the Far East is dependent entirely upon the revival of general business in that part of the world, and revival of general business there means a renewal of its commercial intercourse with the United States and the great industrial nations of the world.

To Alfred B. Peacock, representative of the Paige Motor Car Co. in that territory, there can only be prosperity in those countries of limited sources of wealth when the rest of the world resumes its normal stride. With a demand for their products, these countries will be in a position to buy not only automobiles but all sorts of merchandise. Without an opportunity to sell they will not be able to buy.

#### Brings Home Report

Peacock is back in the United States after a prolonged absence in these countries, to study new automotive ideas for adaptation there. He is optimistic of the possibilities for business in those countries after reviewing conditions intimately here, and looks for a steadily increasing business after the first of the year.

There should be good business in the Antipodes and the Far East, he declared, for American cars ranging up to what is the middle priced car class here. For trucks and tractors, the Australian market is limited, owing to the excellence of the draught horses bred in that country and owing to the high operating costs of motor driven vehicles, as compared to the low costs of keeping horses.

American passenger cars have a good hold upon the regard of Australian car buyers, owing to low operating costs and fuel economies, though there are a number of British and Italian cars of low horsepower in use in the cities. As a general rule, however, Peacock said, the more powerful and more economical American car finds great favor.

#### Fuel Costs High

Fuel costs are extremely high in Australia, there being no production of oil on the continent itself, and the fields of Borneo and the Dutch East Indies being several weeks away by steamer. Explorations for oil are now under way in many parts of the continent, but as yet there have been no strikes in quantities to warrant commercial exploitation.

Servicing of cars is about on a par with service in the United States, manufacturers requiring that ample stocks be carried to insure owners continuous use. Dealers maintain adequate stations, and most of the farmer owners are mechanics enough to make repairs and parts replacements as required.

Manufacture of parts for cars is carried on to a considerable extent in Australian machine shops. There are also a number of tire producers who are finding much favor with local buyers. Two makes of cars are being assembled in Australia entirely of American units, both of these being just introduced and finding favor because of the desire to promulgate home industries.

Body manufacture is carried on to a high degree of perfection throughout the entire territory, Peacock asserted. Japanese body makers and Australian artisans vie with the best of American builders in this work. Japan is an especially good market for enclosed body sales, owing to the severe winters and dusty summers. In India there is much custom built body work, but in India's case, only the finishing touches are given the work by native artisans, the body building being done by the car maker before shipping.

## Cord Tire Is Becoming More Popular Abroad

WASHINGTON, Sept. 19—Statistics furnished the Bureau of Foreign and Domestic Commerce by R. L. Palmerton, chief of the rubber division, show that the cord tire is becoming increasingly popular with European owners. According to the reports of 63 tire manufacturers there were exported in this country during July, 48,840 automobile casings and 46,322 inner tubes.

Palmerton says that in the larger and straight-side sizes the popularity of the cord tire has increased until its sales surpass those of the fabric, while in the small sizes and clincher type the fabric tire is still supreme. It is also interesting to note that there were exported during the month four clincher cord tires, size 37 by 5; four clincher fabric tires, size 32 by 4; four clincher fabric tires, size 33 by 4; and two clincher fabric tires, size 33 by 4½.

Of the 48,880 casings, representing all sizes, types, and constructions, 10,469 casings, or 21.4 per cent, were of the inch-size cord construction; 24,652, or 50.4 per cent, were of the inch-size fabric construction; and 13,759, or 28.2 per cent, were in clincher-type millimeter sizes, this latter class not divided as to cord and fabric. The principal interest to be found in the figures is the disclosure of the export demand as to sizes.

#### THOMAS GETS SPEED RECORD

PARIS, Sept. 19 (*By Cable*)—An average speed of 72 miles an hour was made by Rene Thomas driving a Talbot-Darracq in winning the race at LeMans for cars equipped with engines not exceeding 91 cu. in. piston displacement. This speed established a new world's record for cars of that class. Guinness was second in the race and Segrave third, both driving Talbot-Darracqs.

The race for cycle cars with engines of 67 cu. in. piston displacement was won by Lombard with a four-cylinder Salmson, who averaged 54.7 miles.

## Automotive Trade Leads Retail Line

### Ohio Bankers Say It Is in Better Shape Than Any Other Due to Prices

CLEVELAND, Sept. 20—The retail automobile business here is in better shape than is any other retail line, according to expressions heard at the annual meeting of Group 9 of the American Bankers Assn., which was held last week at Chippewa Falls.

Bankers throughout the northern tier of Ohio counties attended the gathering, and all practically reported that the retail automobile dealer was giving less trouble with financing demands than the other lines of merchandising. Trade is brisker with automobile dealers than it is with the average retail merchant in other lines, according to reports from this city, Akron, Ashtabula, Sandusky and Lorain.

#### Price Reductions a Favorable Factor

The large reductions that were made in the prices of all makes of cars were said to be responsible largely for the condition in the trade and credit also was given for smart advertising and keen merchandising methods. Bankers were urged to do what they can to continue reductions in the prices for material and labor, and also to encourage buying. This appeal was made by H. K. Ferguson, of the H. K. Ferguson Co. of this city. F. C. VanCleaf, of the B. F. Goodrich Co., Akron, said that while the rubber industry has experienced its share of trouble, yet it has not gone through an experience more trying than has the average industry. Tire sales the first seven months of the present year were an annual 5,000,000 unit basis as compared to 33,000,000 units in 1920. On July 31, the industry had less than one and a half months' supply on hand, while consumption was going on undiminished. Railroads have been light purchasers of belts and hose and the mechanical goods department has been very quiet. The rubber boot and shoe business is prepared for a severe winter following the mild one of last year.

In the steel industry, W. E. Manning of the Youngstown Sheet & Tube Co. said that production reached its low ebb last July and that since then there has been a slight increase on account of buying to meet actual needs.

#### RECEIVER FOR HINKLEY

DETROIT, Sept. 22—An involuntary petition in bankruptcy has been filed by creditors against the Hinkley Motors Corp., and the Security Trust Co. has been appointed receiver. Acts of bankruptcy are alleged in the payment of several creditors' claims while insolvent. The liabilities are said to total approximately \$1,500,000 while the fixed assets amount to less than \$1,000,000. The company has many unfilled orders on its books.

## Back to Normal Plan Offered by Reeves

N. A. C. C. Official Suggests "Re-adjustment Week" Followed by a "Buying Week"

NEW YORK, Sept. 19—Contributing to a symposium in which the views of representatives of various industries are given, a novel proposal for hastening the return of business to normal is made by Alfred Reeves, general manager of the National Automobile Chamber of Commerce.

"People must be convinced that prices have been stabilized," says Reeves. "Why could not we have a great 'readjustment week' when everyone would readjust prices, to be followed by a great 'buying week' that would tend to speed up the wheels of commerce?"

"The Administration at Washington is, I believe, doing everything possible to bring about these readjustments in orderly fashion. You cannot legislate yourself into heaven, however, and the country's situation was so bad that even so great a leadership and so great an array of men as we have at Washington at the present time cannot bring the readjustment except at a slow and orderly rate.

"Let us have faith in our Washington officials until they prove unworthy.

"Let us take a greater interest in our local municipal affairs, where much trouble is brewing because of extravagances.

"Let us have that abiding faith in the future of America that has always been the keystone of our progress, and, above all, let us work."

Referring to taxation, Reeves says:

"Instead of looking for new sources of revenue, there is a general feeling that we should find new sources of economy."

On the subject of tariff, his view, which is that of the automotive industry, is:

"Let us have a tariff that will produce a fair revenue, but not one that will simply place the burden of the increase on the American public. This country with great productive capacity needs trade. We must expect to buy from foreign countries if we plan to sell to them."

## Corn Prices Expected to Aid Fall Business

DECATUR, ILL., Sept. 21—Better corn prices will mean 100 per cent increase in the automobile business, according to one Decatur dealer, who added that he had four prospects on his list ready to buy when corn hits 50 cents.

Dealers throughout this territory agree that prospects for winter business are bright. "We have learned that we must earn every order we get," explained another, "but people are buying once more. Never have we had such a bunch of live prospects."

A third summed up the outlook: "Cars are fairly easy to get and we can handle all the business coming in. As might be expected, sedans are most popular jobs now and the person ready to buy a car can usually get the difference between an open car and a closed one."

## UNEMPLOYMENT CONFERENCE WILL INCLUDE ONLY ONE AUTOMOTIVE MAN

WASHINGTON, Sept. 19—Only one man directly connected with the automobile industry has been selected by the President as a member of the unemployment conference which will be held here beginning Monday next. James Couzens, mayor of Detroit and vice-president of the Ford Motor Car Co., has been named as a representative of the city and of the automobile industry. An effort will be made by the automobile trade and highway officials to show that the resumption of highway construction would alleviate unemployment conditions and at the same time improve the transportation facilities of the United States. It is hoped that Couzens and others interested in the automobile industry will keep this subject before the conference.

## Passenger Car Sales Show Drop in New York

NEW YORK, Sept. 21—New passenger cars numbering 4566 were sold in August in 10 counties in and around New York, as compared to 5843 in July. The August sales included 4216 in the class approximately below \$2,500 and 350 in the class above that price. For the eight months ending Sept. 1, the total registrations were 34,991.

Registrations, equivalent to sales, in the 10 counties, month by month throughout the year, were:

	Approximately below \$2,500	Approximately above \$2,500	Total
January .....	483	146	629
February .....	1,409	210	1,619
March .....	3,396	488	3,884
April .....	4,811	575	5,382
May .....	5,468	584	6,052
June .....	6,522	490	7,012
July .....	5,457	386	5,843
August .....	4,216	350	4,566

(The registrations compiled by Sherlock and Arnold of New York cover all of New York City and five counties outside).

## Moreland Truck Resumes on Limited Schedule

SAN FRANCISCO, CAL., Sept. 21—The Moreland Motor Truck Co. has resumed manufacturing on a limited schedule at its plant here, which has been closed for some weeks. This plant was one of the last of the truck manufacturing plants of the country to suspend and is one of the first to resume. The stock of trucks completed when the factory suspended has been practically sold out, and manufacture will be held at the amount of sales for some time to come, according to Watt L. Moreland, vice-president and general manager of the company.

## Resignations Do Not Affect Hares Motors

Company Will Continue to Offer to Trade Complete Line of Trucks

NEW YORK, Sept. 20—Although Emlin S. Hare has resigned as president of the Kelly-Springfield Motor Truck Co., and the other representatives of Hares Motors who were officers of the truck company have resigned, the two corporations have renewed their relations in the sales field and Hares Motors will continue to offer a complete line of trucks ranging from 1½ tons to 6 tons capacity, with a wide selection of wheel bases, frame lengths and gear ratios. Charles Willard Young of Emerson McMillin Co. has been elected president of the truck company to succeed Hare.

Edward O. McDonnell of this city, who has been appointed general manager of the Kelly-Springfield plant at Springfield, Ohio, is a graduate of Annapolis and during the World War served as personal representative of Admiral Sims in procuring the material and personnel for the North Sea mine laying project which involved an expenditure of \$40,000,000 for material.

A statement by Hares Motors in reference to its future plans, states that abrogation of the Locomobile and Mercer contracts will not interfere in any way with its original plans, which call for the production and marketing of passenger cars to sell for \$1,700, \$2,500 and \$4,500.

Hares Motors of New England has taken over the distribution of the Saxon car, but no arrangements have been made for handling this line in other sections of the country.

## Heavy Registrations Expected in Columbus

COLUMBUS, OHIO, Sept. 21—Stimulated by the general reduction in prices and also by the Atwood law, which requires the registration of bills of sale on all used cars, when ownership is changed, registration with the Ohio Automobile Department so far this year has been far in excess of the totals for 1920.

Up to Sept. 15 of this year the department registered in excess of 604,000 gasoline passenger cars, 4000 electrics, 97,000 trucks and 3700 dealers and manufacturers. The total registration in the various classifications in 1920 were: Gasoline passenger cars, 533,000; electrics, 4000; trucks, 83,000; dealers and manufacturers, 3700. Thus there is a big increase in the number of gasoline passenger cars and in trucks.

It is predicted by Registrar W. A. Snow that there will be about 617,000 gasoline passenger cars registered in 1921.

## Receivers Appointed for Accessories Firm

### Assets of Former Times Square Auto Supply Co. in Excess of Liabilities

NEW YORK, Sept. 21—D. W. Kahn, of 120 Broadway, Robert B. Baird and A. J. Cohen have been appointed receivers under a bond of \$50,000 by United States Judge Charles M. Hough for the Consolidated Distributors, Inc., in an equity proceeding.

The company operates 39 different stores for the distribution of automobile accessories and has its main office in Long Island City. The petition was filed by Chester D. Ireland, of Ridgewood, N. J., who alleges claims of \$24,000. The petition states that liabilities approximate \$2,500,000 with assets in the neighborhood of \$3,500,000.

At its incorporation, the Consolidated Distributors, Inc., acquired the business of the Times Square Automobile Co. of New York, Pennsylvania and Missouri. It has an authorized capital of 300,000 shares of common without par value, and for the year ended Dec. 31, last, its net sales aggregated approximately \$5,456,000. Its balance sheet as of Dec. 31, last, showed inventories of \$4,178,000 and notes and accounts payable of approximately \$1,828,000.

Consolidated Distributors was incorporated in New York in September, 1916, as the Times Square Auto Supply Co. and the present name was adopted in March of this year. Included among the companies it took over was the Times Square Automobile Co. of New York, a Missouri corporation which in March of 1916 acquired the automobile supply and accessory business of Froelich, Mansbach & Froelich, which was engaged in the wholesale and retail distribution of accessories. When the name was changed this year the company separated its wholesale from its retail business. The wholesale business for the Eastern States is located in Long Island City, where the company has a plant. There also are wholesale plants in Los Angeles and San Francisco.

The Times Square Auto Supply Co. of New Jersey conducts the retail business. Stores are located in New York, Philadelphia, Pittsburgh, Chicago, Minneapolis, Kansas City, Cincinnati, Columbus, Des Moines, Milwaukee, San Francisco, Brooklyn, Baltimore and Yonkers. The New York salesrooms are located in three steel and concrete buildings erected by the company at Broadway and 56th Street on land leased for 21 years with option for renewal for 21 years.

The Consolidated Distributors has an authorized common stock capital of 300,000 shares of no par value of which 190,396 shares are outstanding. An issue of 7 per cent cumulative preferred stock previously outstanding was redeemed in July, 1920. Dividends on the preferred were paid regularly until it was re-

deemed. Dividends on the common began in April, 1920, and were paid regularly until April of 1921, when the dividend was passed, although the dividend paid Jan. 27 of this year was in scrip.

The general balance sheet as of Dec. 31, 1920, showed assets of \$6,628,347. The working capital at that time included: Cash, \$211,010; notes receivable, \$17,211; accounts receivable, \$861,485; inventories, \$4,178,605. Notes payable were listed at \$1,577,880 and accounts payable at \$250,871.

William H. Durval of this city is chairman of the board and Jesse Froelich is president. The directors, besides these two, are H. A. Weatherbee, C. D. Ireland, C. Stanley Mitchell, G. A. Graham, Darwin A. James and O. R. McDonald of New York and Will A. Innes of Los Angeles.

### BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Sept. 21—The trend of the money market was toward still easier money last week, while renewal rates for call money stood around 5 per cent new loans were made at as low as 4½ per cent. Time money was offered at 5 per cent for 30-day maturities, with a nominal quotation of 5½ per cent for 30-, 60- and 90-day maturities, while 4, 5 and 6 months' maturities were quoted at 5½ per cent against a range of 5½ to 6 per cent the previous week. These quotations were surprising in view of the large mid-month financial operations of the Treasury. The commercial paper market was quite featureless with rates of 6 per cent for prime bills and 6½ per cent for secondary names for all maturities up to six months.

"The New York Reserve Bank announced a reduction in its rediscount rate from 5½ per cent to 5 per cent on Sept. 21."

The large amount of money seeking highly liquid investment was evidenced by the subscription of \$1,587,838,900 to the recent Treasury offering of about \$600,000,000 combined of 3-year 5½ per cent notes, 1-year 5½ per cent certificates of indebtedness, and 6 months' 5 per cent certificates. \$698,149,100 were allotted, leaving \$889,689,800 which did not secure investment. The offerings and allotments were as follows: To the 3-year 5½ per cent notes \$785,082,900 were subscribed and \$390,706,100 allotted; to the 1-year 5½ per cent certificates of indebtedness \$339,938,000 were subscribed and \$124,572,000 allotted; to the 6 months' 5 per cent certificates \$462,818,000 were subscribed and \$182,871,000 allotted. By offering current interest rates and an easy method of subscription, the Treasury has built up an excellent market for its floating and short-term debt, with a result that Secretary Mellon's plan for spreading the nearby maturities of Government obligations over the period ending in 1928, is making rapid progress.

## Motor Wheel Plans Merging of Units

### Push Arrangements for New Building—Company Expects to Extend Operations

DETROIT, Sept. 21—The Motor Wheel Corp. at Lansing will push forward at once new building plans which will permit consolidation of units and place the company in a position to extend its operations. Although business for the next few months is expected to slow down somewhat, officials are convinced that a revival is inevitable with the turn of the year.

In addition to the operations at Lansing, the company will erect several new buildings and increase its railroad facilities at the woodworking plants in Memphis. The original plans of the company had fixed the new construction and consolidation programs for 1922, but the addition of new business in the past 60 days, coupled with the desire to provide assistance in employing men during the fall and winter, prompted the decision to proceed with this work at once.

Among the construction details are a new rim plant to take care of contemplated increase requiring additional steel rim and steel felloe output. This will be in operation before the first of the year. The hub shops of Prudden and automobile wheel plants will be consolidated into a modern hub machine shop of greatly increased capacity. The main office of the company at the Prudden factory will be doubled in size and all the Lansing offices will be consolidated there.

## Durant to Use Ansted Engines in New "Six"

NEW YORK, Sept. 20—Announcement is made by Durant Motors, Inc., that the Ansted motor, manufactured by the Ansted Engineering Co. of Connersville, Ind., has been adopted for use in the Durant six cylinder car, formerly the Sheridan, which will be placed on the market about Nov. 1. A contract has been placed for the manufacture of a large number of these motors.

Although the Ansted Engineering Co. is controlled by the United States Automotive Corp., which also is the holding company for the Lexington Motor Co., the Connersville Foundry Corp. and the Teetor-Hartley Motor Corp., it is stated at Durant headquarters that no significance was to be attached to the use of the Ansted motor in the Durant car beyond the belief by Durant that it is the best motor of its kind available. The motor designed by Durant engineers for use in his four cylinder car will continue to be made by the Continental Motors Corp. Experimental work on the redesigned Sheridan, which will be transformed into the Durant Six, is still under way at the Long Island City plant.



# Unit Parts Makers Revising Prices

## Want to Cut Cost of Assembled Vehicles

Believe Reductions Will Stabilize Car and Truck Sales and Equalize Competition

DETROIT, Sept. 20—Important price revisions by some of the leading unit parts makers, announced to the industry in the past week and effective almost immediately, are expected to place the assembled car and truck business upon the firmest price foundation that it has known since 1917.

In the opinion of the unit makers, their concessions will be followed at once by reductions in the prices of assembled cars and trucks, and the prices so announced will be stabilized for a long time to come. Car and truck makers whose present prices have anticipated the new concessions, will show a smaller reduction than in the case of products which have awaited definite action by the parts makers, but it is regarded as certain that there will be general revisions all along the line.

There is a feeling that the reductions in the assembled products will bring, at least temporarily, an era of competition between the all-factory built and the assembled product, which will bring the industry as a whole immediately to a point where hesitancy in buying on the part of the public will be eradicated as a factor in withholding business.

In announcing the price revisions to the trade, the parts makers are doing so with the knowledge that comparison with the basis of prices in 1917 will show not only that they have again reached that level, but in many instances are actually below them. In return, the revision of prices by the assemblers is expected to show the buying public a similar favorable comparison, and restore buying confidence.

In fixing their new price schedules, the parts makers have based them entirely upon present day material and labor prices, and a production cost determined as accurately as possible on business which the reductions should bring about. The new prices will mean further heavy inventory losses, but these will be taken as necessary to restore confidence to the buying public.

It has been taken for granted that a considerable time must elapse before sufficient business will have resulted to compensate for the inventory losses. Getting past this time will be the period of greatest trial for the industry. With it safely passed, a firm business footing will have been established, and that is the aim of the movement.

## Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for August and Seven Previous Months

	Month of August				8 Months Ending August			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes .....			5	\$47,185	41	\$381,204	35	\$240,940
Airplane parts.....		\$2,120		15,005		507,358		128,578
Commercial cars.....	2,034	3,375,263	381	434,052	20,367	31,557,829	5,473	8,232,959
Motorcycles .....	1,365	397,221	215	60,146	24,739	6,706,170	8,613	2,859,906
Passenger cars.....	11,154	13,789,684	2,237	2,265,328	99,794	111,848,746	21,703	24,507,842
Parts, not including engines and tires.....		6,115,945		1,786,886		55,114,920		28,555,593

### ENGINES

	Month of August				8 Months Ending August			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas.....	2,067	\$327,142	226	\$60,999	27,053	\$4,378,452	6,038	\$1,256,919
Marine, gas.....	505	162,746	171	47,600	6,971	2,206,442	3,394	1,214,451
Stationary, gas.....	2,158	511,701	435	104,147	19,704	3,552,853	7,529	1,826,099
Tractor, gas.....	1,497	1,122,940	2	7,930	15,331	14,696,750	2,625	3,289,916
Total.....	6,227	\$2,124,529	834	\$220,670	69,059	\$24,834,497	19,586	\$7,587,385

## Automotive Exports Show Slight Gains

### Increases Shown in Passenger and Commercial Cars and Airplane Parts

WASHINGTON, Sept. 20—Statistics of automotive exports for August, compiled by the Bureau of Foreign and Domestic Commerce to-day, show a slight increase in the value of passenger and commercial cars and airplane parts, as compared with the previous month. This gain is more than offset, however, by declines in other automotive commodities offered for export. The figures show that exports of automotive products were from two to eight times greater during August, 1920, than for the same period this year. A smaller ratio obtains on the total exports for the eight months ending in August.

Though the number of trucks has declined 18, the value of commercial cars exported during August was \$119,815 greater than the previous month. Exports of passenger cars increased by only 14 during August, but the value exceeded that for July by \$381,960. The notable increase was in the value of airplane parts, the gain amounting to \$12,561 for August, 1921, as compared with the previous month.

Shipment of parts, not including engines and tires, fell off approximately \$200,000 during August. Compared with August, 1920, the decline amounted

to \$4,329,059, and the value for the eight months' period ending August, 1921, was about half the amount for the same period last year.

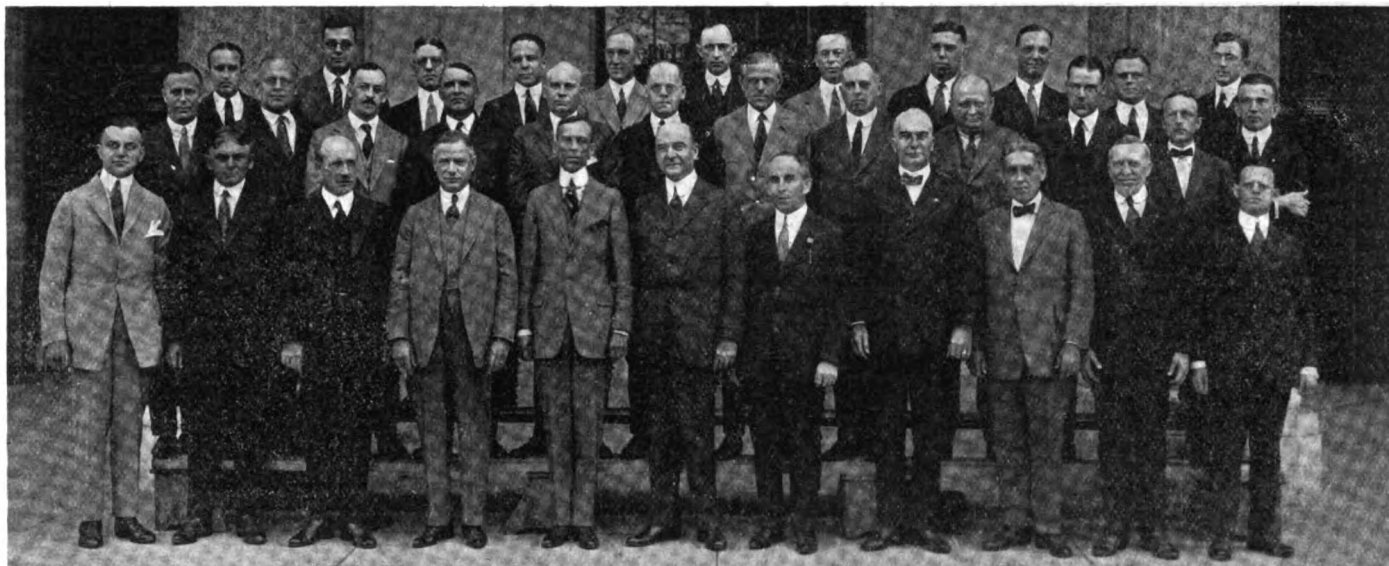
There has been a marked decline in the volume of tractor engines exported, as the shipments for August of this year amounted to two, as compared with 1497 engines valued at \$1,122,940, for August, 1920. The number of gasoline engines exported during August, 1920, amounted to 834, with a value of \$220,670, as against 6227 engines and a value of \$2,124,529 for the same month last year.

## Lincoln Business Better Than Any Previous Month

DETROIT, Sept. 22—President H. M. Leland of the Lincoln Motor Car Co. told his dealers who had assembled here this week for a sales conference, that the company had definitely turned the corner and that its business now was at a higher mark than at any time heretofore. He predicted that general business conditions would brighten in the near future.

R. C. Getsing, general sales manager, said that September business was running far ahead of any previous month. Ninety cars were shipped in the first week, which was a record, and it is expected the total for the month will reach 400. October is expected to exceed September. The company is behind in deliveries of certain models.

An unusual condition reflected in the sales was the growth of business in the South because of increased popularity of the high priced cars in that section.



### General Motors Executives at Detroit Conference

Lower Row: Lawrence P. Fisher and Fred J. Fisher, Fisher Body Co.; G. W. McLaughlin, General Motors of Canada Group, Oshawa, Ontario; K. W. Zimmerschied, Chevrolet Motor Co.; A. P. Sloan, Jr., vice-president; P. S. du Pont, president; J. J. Raskob, vice-president; C. S. Mott, chief of advisory staff, General Motors Corp.; H. H. Rice, president Cadillac Motor Car Co.; J. A. Craig, Samson Tractor Co., Janesville, Wis.; J. H. Newmark, advisory staff

Middle Row: J. H. Beaton, McLaughlin Motor Co.; Ross MacKinnon, General Motors Co. of Canada; J. W. Wheeler, General Motors Export Co.; C. J. Nephier, Oakland Motor Car Co.; H. M. Craig, Samson Tractor Co.; E. M. Young, advisory staff; Norval A. Hawkins, director of sales, advertising and service, advisory staff; L. McNaughton, Cadillac Motor Car Co.; H. T. Hickey, advisory staff; V. H. Day, General Motors Truck Co., Pontiac; L. R. Beardslee, New York office; H. G. Weaver, advisory staff

Top Row: R. B. Kayser, Chevrolet Motor Co.; A. L. Deane, General Motors Acceptance Corp.; L. D. Haas, Scripps-Booth Corp.; J. T. Ardis, New York office; T. S. Merrill, secretary, General Motors Corp.; C. E. McTavish, General Motors of Canada; E. T. Strong, Buick Motor Co., Flint; G. H. Peasley, Olds Motor Works, Lansing; R. D. Kerby, Olds Motor Works of Canada; J. H. Voorhees and F. G. Eastman, advisory staff

## Two G.M.C. Meetings a Month in Detroit

### Executives Will Confer to Perfect Close Contact on General Policies

DETROIT, Sept. 17—To bring the units of the General Motors Corp. into the closest possible contact on general policies, meetings of the executive committee will be held twice monthly at the big G. M. C. Building here, with either President Pierre S. du Pont or one of the executive vice-presidents, presiding.

Attending each of these executive committee meetings will be executives of the particular units whose operations are affected by discussions set for the particular meeting. Executives not attending will be apprised of developments by personal letter and code message. Members of the advisory staff, which operates under the executive committee as the contact point for all units, will attend each meeting.

The operations committee of the corporation, which comprises the manufacturing executives of all units and the executive officers of the corporation, will meet monthly. Complete details of operations, sales and general policies of the many units have been practically definitely worked out at the meetings held to this time and are being made effective at once.

On the occasion of the meetings held here this week a dinner was tendered President du Pont and visiting executives by the advisory staff.

### MUTUAL CREDITORS MEET

SULLIVAN, IND., Sept. 21—A resolution adopted at a meeting of the creditors of the Mutual Truck Co., against which receivership proceedings recently were instituted, indicates that common stock in the corporation may be accepted by creditors in the payment of claims. If the property of the company is disposed of at a forced sale, the creditors will receive less than 10 cents on the dollar.

### SHOW DRAWING OCT. 6

NEW YORK, Sept. 21—The annual members' meeting of the National Automobile Chamber of Commerce, at which space is drawn for the New York and Chicago shows, will be held at headquarters in this city Oct. 6. Prior to the luncheon which will precede the space drawing, Magnus Alexander of the National Industrial Conference Board will address the members. A convention of truck manufacturers represented in the chamber will be held Oct. 7, at which the problems of that branch of the industry will be discussed.

### ROAD APPROPRIATION SOON

WASHINGTON, Sept. 22—No action will be taken on the highway appropriation bill until the House reconvenes on Oct. 4. The House met Wednesday but under a gentlemen's agreement will take three day recesses until October, when it will settle down to business. It is expected that differences between Senate and House bills will be smoothed out without delay because practically all highway construction dependent on Federal funds will be held up until these appropriations are available.

## Wood Wheel Group Latest in M. A. M. A.

### Will Dissolve Old Organization and Members Will Join Larger Association

DETROIT, Sept. 20—The Automotive Wood Wheel Manufacturers Assn. will be dissolved and its membership will be reorganized as the Wood Wheel Group of the Motor and Accessory Manufacturers Assn. following action taken at a convention of the association in Lansing. Plans for consolidating with the M. A. M. A. were made through the co-operation of M. L. Heminway, general manager of the association.

The last annual meeting of the Wood Wheel Assn. will be held in New York during the National Automobile Show week there. At this time the present association will be formally dissolved and its membership will be enrolled in the roster of the accessory association.

A report was read at the convention by Cornelius T. Myers, engineer of the Wood Wheel Assn., on developments in the methods of waterproofing wood. As a result of this report the convention passed resolutions asking Congress that appropriations for continuance of this work by the Government's forest products division be increased.

Standardization work, in which the association has been active since its organization, was brought nearer to realization by discussions at the convention, but definite action was deferred for a later meeting.

## METAL MARKETS

It was to be expected that the change which has come over the sheet market would be misinterpreted in many quarters as an indication of enduring advances in steel prices generally. Such a deduction, however, appears utterly devoid of logic, when the situation is subjected to rational analysis. In fact, the steel market is sailing its course toward readjustment, according to the chart which governs all such economic changes. Every downward curve in commodity values shows here and there a bulge that temporarily halts the trend, but after a brief interval only serves to quicken it. There has been no change in basic conditions to justify a change in the course. The steel industry is still working at a rate that would have been considered unsatisfactory before the war, so that, taking conditions as a whole, the potential supply continues considerably in excess of the actual demand. Such a condition furnishes no support to the view that prices in the steel industry have turned the corner. Of the demand for some steel products, not of the price, it may be said that it has turned the corner, i.e., it has improved from a rate that was insufficient to keep mills in operation even on the lowest production schedule to one that permits of a modest scale of output, although still far from occupying anywhere near total plant capacity. The latter condition prevails in the sheet industry. It was brought about by the incentive to buying furnished by the keen competition that prevailed among rollers up to the middle of the month. When the "independents" cut under the Corporation's sheet prices the chief interest announced it would meet all price cuts and warned some of the smaller producers that they were losing money at the price levels which they were quoting. As the result of the attractive prices offered to consumers, a relatively fair tonnage of sheet orders was placed on producers' books late in August and early in September, and they feel that the momentum of buying has reached a point where they can afford to abrogate the concessions which they made so as to bring their operations up to a point where the overhead would not devour all possible profits. They figure that enough business will now come out without the necessity of coaxing it out with price concessions, to "sugar" the low-price orders they have on their books. In these circumstances it seems hardly to meet the situation to speak of a "\$5 per ton advance in the sheet market." At the present prices of sheets, so inclusive an advance would indeed be spectacular.

**Pig Iron.**—Middle West automotive foundries are buying slightly increased tonnages of malleable. The melt of automotive foundries is reported as on the upgrade. The market has a more settled appearance.

**Steel.**—Cold-finished steel bars are lower as the result of hot-rolled being available at 1.65c. Cold-finished bars are obtainable at as low as 2.30c. with most mills quoting 2.40c. The strip steel market is still unsettled. Some automotive consumers are inquiring for quotations on October deliveries. The general quotation heard for the cold-rolled is 4.25c., Pittsburgh, but every order appears to be a law unto itself according to desirability, and a Cleveland report named as low as 3.50c. being quoted in one instance. The stiffer market for ordinary sheets does not seem to have affected 22 gauge auto body stock, which is quoted at 4.45c. Relatively low prices on full-finished sheets are ascribed to the pressure resulting from the downward revision in the prices of passenger cars.

**Aluminum.**—Somewhat more activity is noted in ingot metal, but prices appear to have been pared to make this change possible. There have been offers of 98 to 99 per cent pure ingots at 18c., duty paid, emanating chiefly from importers who are not regular handlers of aluminum.

**Copper.**—The market is firmer, although there has been no increase in buying by consumers.

**Tin.**—Consumers appear to be covered and speculators have the field to themselves.

**Lead.**—The lead market is fairly steady. Battery interests, however, show only slight interest, most of the buying coming from the paint and pigment industries.

## FINANCIAL NOTES

**Republic Rubber Corp.** receiver's statement as of June 22, last, shows net assets available for the \$6,753,200 of first preferred stock (\$100 par value) equivalent to \$62.08 a share and no equity for \$1,467,900 of second preferred stock (\$100) and 478,000 shares of no par value common stock. The statement takes into consideration only about 10 per cent of the crude rubber and fabric claims against the company aggregating over \$2,000,000. The net worth of the company is given at \$4,192,219. Aggregate acknowledged liabilities are \$2,909,000, of which \$2,237,038 are notes payable. Liquid assets include \$280,404 of cash and \$500,826 of notes and bills receivable. A merchandise inventory of \$1,391,938 brings the aggregate quick assets to \$2,174,169. Plant, property and equipment at the depreciated value are listed at \$4,498,452.

**Long Manufacturing Co.'s** issue of \$300,000 in 8 per cent first mortgage serial gold bonds is now being offered for public sale in Detroit. The bonds are callable at 105 on 60 days' notice after Jan. 1, 1922. Company's plants and equipment are shown as appraised at \$695,717.45 and its quick assets as \$694,681.27. The proceeds of the bond sale are to be used for retirement of current bank loans. Annual business is shown to have averaged over \$2,880,000 for the past six years. Unfilled orders on hand July 30, 1921, are declared to total \$1,500,000.

**Rubay Co.,** Cleveland, maker of automobile bodies, has declared the regular quarterly dividend of 1½ per cent on preferred stock, payable Oct. 1 to stockholders of record Sept. 20. The company has current assets of \$685,000, as against current liabilities of \$134,010, and has sufficient orders on hand to keep the plant operating on a profitable basis until next March or April.

**Fisk Rubber Co.** will increase its capital stock from \$5,000,000 to \$25,000,000 in first preferred and from \$7,000,000 to \$10,000,000 in second preferred, and from \$20,000,000 of stock of \$25 par value to 1,250,000 shares of common no par.

**Sedan Body Co.** of Union City, Ind., has increased its capital stock from \$125,000 to \$250,000.

**Autocar Co.,** Ardmore, Pa., has issued \$1,500,000 in 6 per cent serial gold notes.

## M. A. M. A. ELECTS CLARK

**NEW YORK, Sept. 20**—Ezra W. Clark, advertising manager of the Clark Equipment Co., Buchanan, Mich., has been elected chairman of the executive committee of the advertising managers' council of the Motor & Accessory Manufacturers Assn. He succeeds E. C. Tibbetts, formerly advertising manager of the B. F. Goodrich Rubber Co.

\$10,000,000 Chinese  
Truck Order Made

**Shanghai Motors Buys 3300  
Vehicles from Multnomah Com-  
pany—New Field Seen**

**SAN FRANCISCO, CAL., Sept. 21**—The Shanghai Motors Co. of Shanghai, China, has placed an order with the Multnomah Motor Co. of Vancouver, B. Co., for 3300 especially-designed motor trucks. The order is subsidized heavily by the Chinese Government, according to reports of the deal received by truck distributors in San Francisco, and the purchase is the largest made in one order from the Orient since motor vehicles were introduced there.

The order calls for an expenditure of \$10,000,000 by the purchasers. It is understood that the trucks are to be used in Government-aided transportation systems operating out of Shanghai and Hongkong, China. It indicates that road building is proceeding rather more rapidly in China than has been reported hitherto, and that the Government is taking a considerable interest in the problems of transportation and distribution.

More important than this, it shows a rapidly opening field for the sale of American automotive vehicles in the Orient. The Multnomah Motors Co. sent a motor truck expert to China, while this order was being negotiated, to survey the field for which the trucks are wanted, and as a result has built a narrow-gauge, 1½-ton truck, capable of traveling, with rugged endurance, the narrow trails beyond the completed roads in that country. The narrowness of construction is said not to interfere with ease of handling on narrow turns, or with freight carrying capacity.

The company's plant at Vancouver is being enlarged to accommodate rush construction of the trucks, shipment of which to China is to begin Dec. 1, and proceed at the rate of 150 a month, for 22 months. Robert E. Cavette is president and founder of the Multnomah company, and the man largely responsible for the big sale of trucks in China is M. J. Briggs, general sales manager.

Durant of Canada Will  
Be Incorporated Soon

**NEW YORK, Sept. 20**—Durant Motors of Canada, Ltd., will be incorporated in the near future with a capital of \$2,000,000. Until the formal organization is completed W. C. Durant will serve as president. The active head of the corporation will be one of the leading men of Canada in the automotive field but his identity has not yet been disclosed. Temporary executive offices have been opened in the Royal Bank Building in Toronto. Further details of the organization and personnel are expected to be announced in the near future.

## MEN OF THE INDUSTRY

E. C. Morse has been appointed sales manager of C. H. Wills & Co., Marysville, Mich., manufacturers of the Wills Sainte Claire motor cars. Prior to his entry into the motor car business Morse was for a period of seven years a director and manager of the foreign department of the National Cash Register Co. of Dayton, Ohio, beginning his career in the motor car business as commercial manager of the E. R. Thomas Co. of Buffalo, N. Y., at that time marketing both the product of the E. R. Thomas Detroit Co. and the product of the Buffalo plant. Morse later, and upon organization of the Hudson Motor Car Co. of Detroit, was made sales manager of that company. Subsequently Morse was made vice-president and general manager of the Chalmers Motor Co. of Detroit. In 1917 Morse became associated with the Willys-Overland Co. as its Washington representative. At the end of the war Morse was made vice-president and general manager of the John N. Willys Export Corp. in New York.

Percy Frost Smith has resigned as joint managing director of Tilling-Stevens Motors, Ltd., a widely known British concern. For the past seventeen years he has been associated with Tilling-Stevens' interests, first with Thos. Tilling, Ltd., of London, and since 1915 to Aug., 1921, with Tilling-Stevens Motors, Ltd. Jointly with W. A. Stevens, Smith evolved the noted Tilling-Stevens gas-electric drive for motor-buses and motor-trucks, and since the resignation of Stevens, in 1915 from Tilling-Stevens, Ltd., he has been solely responsible for the further developments and evolution of this type. Smith is prepared to enter into negotiation with any American interests desirous of manufacturing or using gas-electric vehicles.

H. E. Rice has resigned as commercial manager of the Atwater Kent Mfg. Co., Philadelphia. He will immediately become associated with the American Bosch Magneto Corp. as assistant to Arthur T. Murray, president of the corporation. Rice has been associated with Kent in the Atwater Kent organization for nearly twelve years and has been in active charge of both contract and replacement sales, service, promotional work, advertising and sales engineering.

Charles B. Tamm of Milwaukee, for several years chief purchasing agent of the LeRoi Co., manufacturer of passenger and commercial car and tractor engines, has resigned to accept the position of assistant general manager of the Hydro-Holst Co., which is affiliated with The Hell Co., Milwaukee, manufacturing motor truck dump bodies, truck tanks, etc. Mr. Tamm was associated with the Hell company prior to joining the LeRoi company.

L. K. Rittenhouse has succeeded L. I. Ris as eastern district manager of The Star Rubber Co., Inc., New York. Rittenhouse has had fourteen years of experience in the tire industry as salesman, branch and district manager with the Diamond, Goodrich and Firestone companies.

Peter Entringer, for three years secretary of the Johnson Motor Co., Fond du Lac, Wis., has resigned to form new connections. He is a pioneer dealer of Wisconsin, having been for twelve years in business at St. Cloud, Wis., before joining the Johnson company.

H. L. Corey, advertising manager, Champion Spark Plug Co., Toledo, will enter the advertising business in Utica, N. Y., Oct. 1, going with E. B. M. Wortman. The name of the agency will be Wortman & Corey.

Fred Wilson, well known in the selling end of the automobile industry, has been named general sales manager of the Stutz Motor Car Co. of America, Indianapolis, and has assumed his new duties.

Earl F. Berry, formerly of the sales staff of the Reeke-Nash Co., Milwaukee, has acquired an interest in the Milwaukee Oldsmobile Sales Co. and becomes secretary and treasurer.

J. W. Stannard has resigned as president of the Industrial Cost Assn. Horace S. Peck, comptroller S. K. F. Industries, Inc., New York, has been elected to fill the vacancy.

Kansas City Looks  
for Big Truck Year

KANSAS CITY, Sept. 20—With more than \$100,000,000 to be spent in Kansas for good roads and with Missouri standing ready to spend \$60,000,000 for the same purpose, prospects for a big truck year with Kansas City dealers are very bright, according to C. D. Cook, local dealer in Master trucks.

The two States will furnish plenty of truck buyers, Cook says, and already the orders are beginning to come in as the contractors prepare for the building of these highways.

Cook says the truck business in Kansas City and the district is better in general than the automobile business proper.

The road building programs in the two States make necessary the use of numberless trucks and while the contracts have not as yet been awarded, contractors who know their "eggs" are now placing orders so that they will be prepared to take up the work the minute the contracts are signed.

Contractors from all parts of Missouri and Kansas are taking time to study trucks, Cook declares. They call along motor row and collect data and specifications and many are already buying.

## SIAM GETTING BUSY

LONDON, Sept. 5 (*By Mail*)—The recent strike of oil in the north of Siam has made that country realize that motor transport has advantages over elephants and rafts. The result is that a highway capable of bearing teak-drawing tractors and rice-laden trucks is projected. This road will be 600 miles long and will run north to the boundary from Bangkok. Already 125 miles of this road is ready for traffic. Go-ahead exporters might be well advised to establish agencies at Bangkok.

## LARGEST MECHANICS' LIEN

DAVENPORT, IOWA, Sept. 21—The largest mechanics' lien ever filed in Scott County was filed by Blunk & Joenke, contractors, for \$26,666.33 against the Sears Tire Equipment Co., formerly the Altenburg Tire & Equipment Co. R. B. Altenburg, former president and general manager of the company, and H. M. Rose, former vice-president and sales manager, have filed suits against the company to collect salaries alleged to be due. Altenburg's claim is for \$1,250 and Rose's for \$276.

## INDUSTRIAL NOTES

Mason Tire & Rubber Co., Akron, announces that capacity of the tire department will be doubled by the first of the coming year. Contracts for the installation of new machinery to provide for the increased production have been let. After the new machinery is installed the company will have capacity for 4000 tires and 4000 tubes a day.

B. F. Goodrich Rubber Co. is maintaining its volume of sales. In August and, in fact, in the whole period since last May, it has sold at least as large a volume of merchandise—measured in units—as in any similar period in history. By liquidation of inventories the company has substantially reduced its bank loans from the \$15,000,000 at which they stood a month ago and \$29,000,000 on Dec. 31, last.

Gramm-Bernstein Motor Truck Co., Lima, Ohio, has shipped the first ten trucks of the large order received from its English representative. The factory force is being increased gradually, although the demands for the Speed Truck and the heavier models have not as yet increased sufficiently to require the addition of the full working force.

American Motors Corp., Plainfield, N. J., which is now in receivers' hands, was declared amply solvent by the United States Court, which authorized the continuance of the business with Proctor W. Hansl, formerly vice-president and treasurer, and James Kerney of Trenton acting as receivers.

H. H. Franklin Mfg. Co. reductions in prices have been followed by a marked increase in sales. Shipments for eight working days following the announcement of the cuts exceeded by 94 per cent shipments for the same period preceding the decrease.

Oshkosh Tractor Co. has started excavation work at Oshkosh for the new works of the company, which was organized some time ago with \$1,200,000 capital to take over the entire business of the La Crosse Tractor Co., and will transfer it to Oshkosh.

Fisher Body Ohio Co. has begun production of parts for stock. By Nov. 1 the plant will be turning out a complete line of closed bodies for shipment. Open bodies later will be turned out. Before Jan. 1 more than 1000 men will be at work.

Stowell Co., South Milwaukee, Wis., maker of malleable castings, has acquired the entire business of the Pelton Steel Co., Milwaukee. The Stowell company will continue under the Pelton name.

McClure Mfg. Co.'s plant in North Marion, Ind., has been leased by the Guttman-Rawley Furniture Mfg. Co. of Shirley, Ind. The company will make automobile tops in addition to furniture.

Fisk Rubber Co.'s August production ran up to 230,000 tires, or 5000 in excess of maximum estimates at the opening of the month. This is the high water mark for the year.

Gem Gasoline Lock Co. is a new Columbus, Ohio, concern which manufactures a patented lock for the gasoline line for motor vehicles. Oscar Redmond is manager.

Quaker City Rubber Co., Philadelphia, will move into a new home Nov. 1. It has been located in its present place for a quarter of a century.

Gardner Motor Co. shipments for the first six months of this year amounted to 2084 cars and the sales in July totaled 700 cars.

Timken Roller Bearing Co., Columbus, Ohio, has announced a 10 per cent reduction for hourly and piece work employees.

# Calendar

## SHOWS

Sept. 28-Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association. Fourth Regiment Armory.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Grand Central Palace Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Jan. 30-Feb. 4—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment. La Pabellon de las Rosas. Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery. Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Oct. 10-22—Olympia, England, Truck Show. Nov. 4-12—Car Show. Nov. 23-Dec. 3—Motorcycle Show.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhib-

its in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 17-20, 1922—Chicago, American Road Builders Association.

## S. A. E. MEETINGS

Detroit, Sept. 23, Oct. 21, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.

Dayton, Oct. 1—First Fall Meeting.

New York, Jan. 10-13, 1922—Annual Meeting.

## VanZandt Was Freed from Revere Liability

INDIANAPOLIS, IND., Sept. 21—A document purporting to release Newton VanZandt, ex-president of the Revere Motor Car Corp., from any liability in connection with the affairs of the company, has come to light in preparation of the evidence to be submitted to the Cass County Grand Jury, now in session, and which will investigate the affairs of the Revere corporation, which is in the hands of a receiver.

The record of meetings of the Revere corporation directors is in the hands of prosecutor and will be taken before the grand jury. An examination of this record shows a copy of the document entered under date of Jan. 20, 1921. Van Zandt holds the original copy of the document.

The record of minutes also shows the directors passed a resolution at the same meeting absolving from liability C. H. Wilson, one of the directors and officers of the company. Attorneys interested in the case declined to say what effect the document probably would have.

Following is a copy of the document:

"For valuable consideration delivered to the undersigned, Revere Motor Car Corp., by Newton VanZandt, receipt of which by Revere Motor Car Corp., is hereby acknowledged, the undersigned corporation hereby releases the said Newton VanZandt from any and every claim of any and every nature whatsoever which the undersigned may or might have against said VanZandt arising out of any transaction of any nature whatsoever from the beginning of the world to the day and date of these presents.

"This release to be binding upon the successors and assigns of the undersigned corporation and to inure to the benefit of the heirs, executors, administrators and assigns of the said Newton VanZandt.

"In witness whereof the undersigned corporation has by direction of its board of directors set its hand and the official seal to these presents this 20th day of January, 1921.

"REVERE MOTOR CORP.,

"By Allen Seagraves, vice-president.

"Attest: E. R. Mattingly, secretary  
"Corporate seal."

VanZandt also contends that the stock issued to him was entirely separate from that alleged to come under the "blue sky" law.

## Seiberling Reported Still After Republic

CLEVELAND, Sept. 21—It is understood here that F. A. Seiberling, former president of the Goodyear Tire & Rubber Co., has resumed his negotiations for the purchase of the plant of the Republic Rubber Co. of Youngstown, which is now in the hands of a receiver. Some time ago, it was stated, Seiberling made an offer of \$2,500,000 for the factory. This proposal is said to have been satisfactory to the stockholders, but the creditors did not think the sum adequate. Since that time a new creditors' committee has been named.

Seiberling recently visited the plant of the Portage Tire & Rubber Co. at Barberton, which is in bankruptcy. This would seem to lend additional weight to the report that he proposes to establish a chain of rubber plants through the Middle West.

## WILLS DEALERS MEET

DETROIT, Sept. 22—Reports at the first meeting of distributors for C. H. Wills & Co. held at Marysville, indicated that business would show steady gains. E. C. Morse, the new sales manager of the company, was introduced to the distributors and outlined the policies which would govern him in his handling of the business.

## Ford Nitrate Matter Again Before Weeks

WASHINGTON, Sept. 20—Negotiations for the purchase of the Muscle Shoals establishment by Henry Ford are still pending. W. B. Mayo, chief engineer of the Ford organization, conferred to-day with Secretary of War Weeks and his advisors but he was not authorized to submit a new proposition in behalf of the Detroit automobile manufacturer.

Mayo discussed the possibilities of developing the power plant in Alabama. There have been many protests to the War Department from farmers and others, but it is known that Secretary Weeks is disposed to take the Ford offer as the best proposition. The Government cannot afford to operate the plant either independently or by a subsidy. It is reported that the offer submitted by a southern promoter had been considered, but a question had developed whether or not sufficient capital could be raised to make the necessary payment.

A report will be submitted to Ford at an early date, together with Mayo's recommendation. It is believed that Ford himself will conduct the final negotiations with the War Department.

Secretary Weeks stated that one point of difference between Ford and War Department engineers relates to the cost of finishing the Wilson and No. 3 dams. Ford proposed repaying \$28,000,000, which he assumed would be the cost of completing the Wilson dam. Secretary Weeks estimates that the work would cost twice that amount and is seeking further information which is to be supplied by engineers who now are making an investigation. Another point of difference relates to the demand of the guarantee by the Government of a certain horse-power. However, this point is not to be an important obstacle in view of reports that Ford claims there never was any such demand made.



# AUTOMOTIVE INDUSTRIES

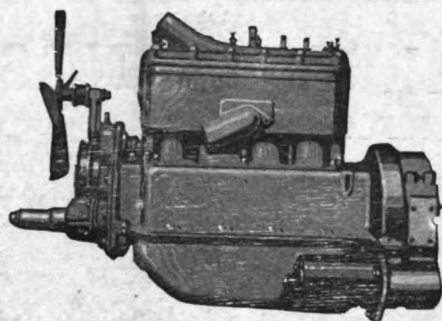
## The AUTOMOBILE

Vol. XLV  
Number 13

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, SEPTEMBER 29, 1921

Thirty-five cents a copy  
Three dollars a year

### The Best Proof of the Four Cylinder Motor Is Its Place in the Truck Field



Trucks are now actually doing 15% of the total land haulage of the country. This is a splendid tribute to the four-cylinder engine, since fully 94% of all truck models are equipped with four-cylinder motors.

To be profitable, truck performance must be as nearly uninterrupted as possible; it must entail low maintenance and must be economical of

gasoline, oil and tires.

The importance of the engine is paramount. It must be steady and powerful, simple of construction and well made to endure in truck service.

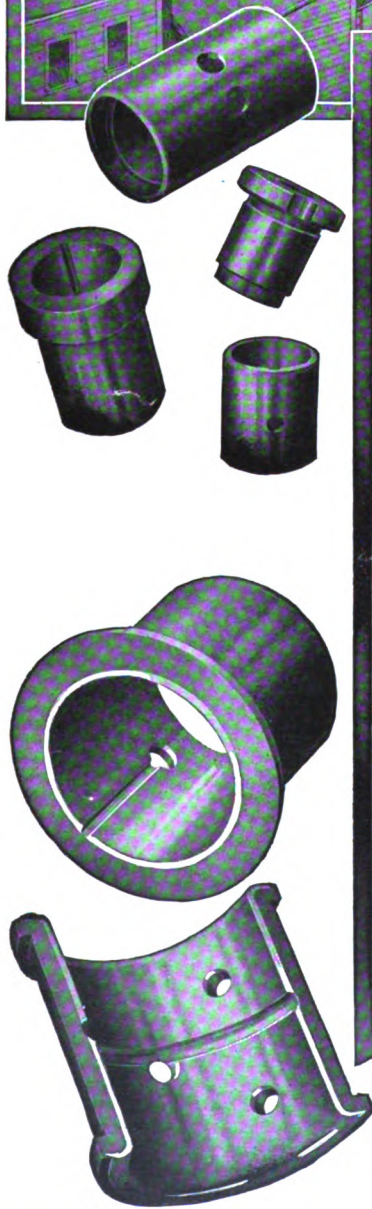
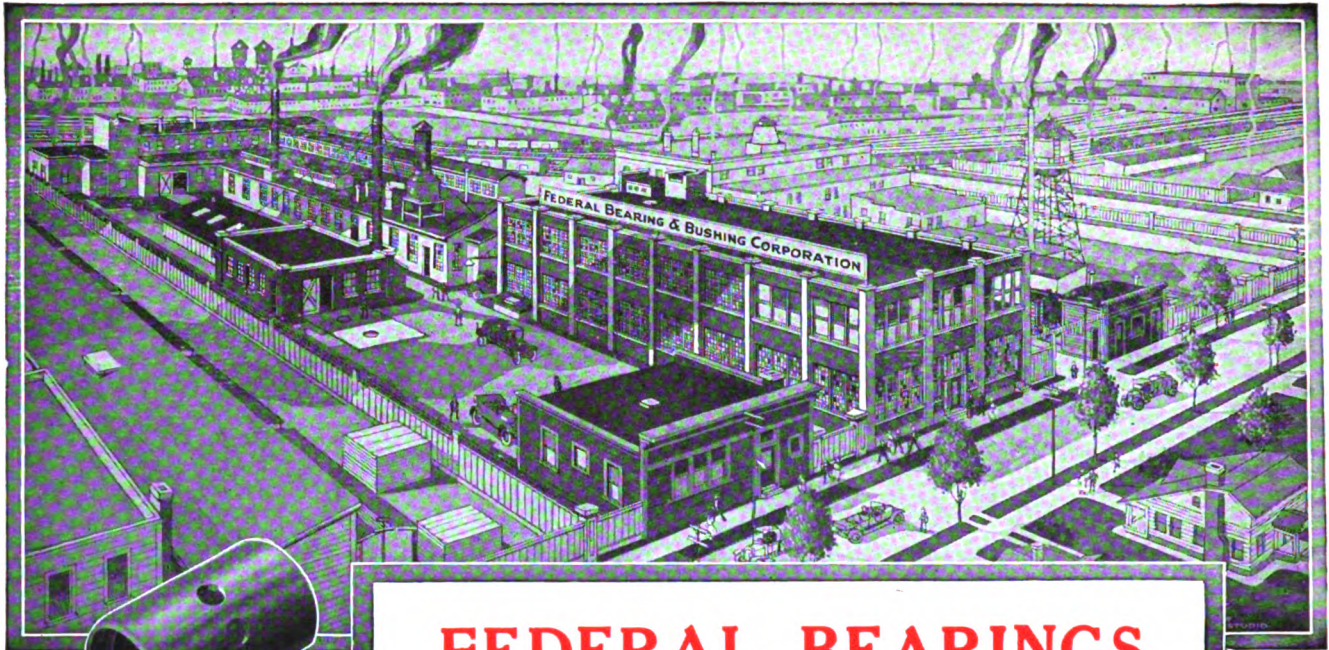
Particularly is this true in the speed-truck, where in addition to load, it must cover the ground quickly.

The Lycoming Motor has a well established place in the speed-truck field, because its sturdiness, its dependability and its ability to give consistent service under all reasonable conditions have made of it an equipment asset to both manufacturer and owner of a speed-truck. Write for booklet describing Model "KB" and giving specifications.

**LYCOMING MOTORS CORPORATION**  
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**DETROIT - MICHIGAN**

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, SEPTEMBER 29, 1921

No. 13

## Getting the Best Out of the Dealer Organization

A loyal dealer organization is an important selling asset. Dealers' problems are especially acute now. The manufacturer who is constructively helpful at this time can build a sound basis for future sales

By Norman G. Shidle

**T**HE necessity for more intensive selling effort has been met in various ways by different manufacturers. Some are making strong efforts to study their marketing problems in a scientific manner; to analyze sales possibilities in various territories. In many cases, a kind of economy in sales expense has been achieved by simply cutting off certain appropriations and activities. In others, however, it has been recognized that true economy lies rather in rendering sales effort more efficient so that the same results may be produced at less cost.

The whole problem of marketing and merchandising costs and methods is due for some very careful study. Friction anywhere along the merchandising line means just so much greater selling cost and just so much lost profit.

Of all the angles concerned in the problem, however, none is more difficult and important than that of dealer relationships.

Manufacturers have undoubtedly done a great deal for their dealers. Some, of course, have done more than others, but all have done something. During a period of selling difficulties like the present a closely knit, harmonious dealer organization is more necessary than at any other time. The life and success of the dealer and manufacturer are so strongly interdependent that both must pull in the same direction.

But the primary object of the manufacturer, of course, is to sell more automobiles. He is developing good dealers when he is handling them in such a way as to enable them actually to sell a greater number of cars.

In the desire to mold a closely knit dealer organization, however, there is sometimes too strong a tendency toward centralization. There are certain phases of merchandising effort in which the manufacturer must necessarily take an active part, both for his own good and that of the dealer. The territorial analysis work being done by certain companies, for instance, is a necessary step in the development of sound merchandising policies and plans. The scope of such work, the fundamental factors involved and the extensive research necessary make it too difficult of performance for the average dealer. Sales helps and plans of various kinds devised and sent out by the manufacturer often give very valuable aid to dealers in making sales to the consumer.

But a point may be reached where the desire of the manufacturer to help becomes paternalistic or despotic. The average intelligence and capability of the dealer may be underestimated. Measures may sometimes be adopted for this reason or because of lack of confidence in dealer personnel that definitely tend to lower the dealer's efficiency, increase his dis-



content and create that friction which means greater selling costs.

Some dealers claim, for example, that manufacturers object to having the dealer build up his personal prestige in his territory; that the manufacturers insist that the dealer advertise only the car and that he refrain from institutional advertising designed to tie up the customer with the dealer himself. In certain cases, it is said, this objection has even reached the strength of a prohibition which left the dealer no alternative except to comply or give up the agency.

The objection to the dealer building his business on his personal reputation and ability, of course, comes largely from the fear of the manufacturer that the dealer, if successful in such a plan, would hold the whip hand over the manufacturer so far as the given territory is concerned. The dealer might so build up his personal prestige that he could dictate to the manufacturer in certain instances, because he could switch to another make of car and carry his customers with him. This has been done in the past, and it is doubtless the cause for the fear in some cases that it will be done again.

This is just one sample of the tendency sometimes manifested toward a dictatorial attitude in an attempt to develop a highly centralized dealer organization. The whole discussion concerning the justice or injustice of certain clauses in the usual dealer contract reveals numerous other similar difficulties.

The perfect dealer organization is not that in which the dealer is so tied up that he must do just as he is told in every

case. Such dealers do not sell a maximum number of cars. It must be recognized in this matter, as in any other involving organization of human beings, that as individual responsibility is decreased, the necessity for supervision is increased. As the incentive for individual effort is removed, the permanent efficiency of the individual and, consequently, the organization is lessened.

No man can function at maximum efficiency unless he has a constant opportunity for growth and development. He must be enthusiastic and loyal. It must be admitted that a dealer who builds for himself and his business a place of high esteem in his community and who is personally popular and respected will sell more cars than the one who is a nonentity in his community. Suppose that such a dealer is thoroughly sold on the car which he is handling; that he has entire confidence in the company which manufactures it; that he has always had a square deal from his manufacturer in every way. This dealer is the greatest asset a company can have. But such a dealer is not developed by submerging his own business personality entirely in that of the car.

He is worth infinitely more to the manufacturer than ten dealers who are dissatisfied because they do not like dictatorial policies; who stay with the manufacturer because they are involved too heavily financially to be able to make a change, and who feel that they are making money in spite of the treatment accorded to them by the factory.

But all dealers are not like the excellent one pictured. Taken as a class dealers are just about the same sort of human beings as manufacturers. Some are

worthy, dependable and trustworthy. Others are not. It is against the latter class that the manufacturer often feels it necessary to protect himself. But in so doing he may develop his organization along lines that do not make for ultimate efficiency.

One large manufacturer said recently, "If I could go all over the country and have my pick of any dealers that I wanted and could choose for my own organization any 10 per cent from all the dealers I could select men whom I could trust implicitly, never have any trouble in regard to contracts and give them every leeway with perfect confidence. I wouldn't care whether I had any contract or not.

"On the other hand, if the dealer had a similar free choice, he could readily select a group of 10 per cent of the manufacturers in whom he would have similar confidence."

The real task of the manufacturer is to enlarge the percentage of this trustworthy class of dealers, rather than to attempt to entirely control and dominate those in whom he has little confidence and those who have little confidence in him. To do this is no easy task. It requires sincere effort and an attempt to see the other man's point of view all along the line.

There is much talk of the necessity of educating the dealer. Considerable progress along this line has been made by many manufacturers. Education, however, consists in aiding the dealer to develop himself, to develop his own capabilities, his own business and his own responsibilities. If a dealer has been honestly treated in all his relations with the manufacturer and feels himself to be an integral

part of the organization whose cars he is selling, he is not nearly so likely to turn his back on that manufacturer should the opportunity to do so arise, as is the dealer who has retained an agency simply because of necessity.

The best dealer—for himself and the manufacturer—is the one who is self-confident, prominent and respected in his community and a real sound business man. Such dealers cannot be obtained and held by a factory which adopts dictatorial policies, attempts to get the better of its dealers in contracts, attempts to shift burdens of depression entirely on to the dealers and which delivers cars in an unsatisfactory condition.

The much discussed dealer contract is a matter for psychological rather than legal settlement ultimately. The perfect dealer contract—entirely satisfactory to manufacturer and dealer—can never be written. The spirit behind the contract in both cases will always be the determining factor in making for satisfaction or dissatisfaction.

A prominent lawyer who has as clients a number of large automobile dealers and distributors said the other day that the matter of the dealer contract could never be settled by both the manufacturer and dealer trying to write into it protective clauses. To approach the question from that angle he considers is hopeless. In his estimation the only way out is through a better understanding between the two parties in each case, an honest attempt by both to see the other fellow's point of view and to give him a square deal in every way.

At the present time some companies are in a position

temporarily to dictate to their dealers. The dealer must either knuckle under or throw overboard a business and an investment which means his bread and butter. Business will return to normal. The handling of the dealer situation just now should be especially directed with an eye to the future.

The manufacturer who does his best for his dealers during a time of depression will be in an exceptionally strong position when business again starts up. The manufacturer has an obligation to fulfill. He cannot afford in any case to expect the dealer to bear more than his fair share of the burden of industrial depression.

One manufacturer, for instance, has tied his dealers

to him very strongly by his actions before the depression set in. This manufacturer saw the dark cloud coming. He warned his dealers of it; kept them from overstocking, reduced his production and took his loss in the beginning. When good times come again this manufacturer's dealer organization can be expected to show a loyalty and an enthusiasm for the particular car that will be unusual.

There is an old saying that he who gives most gets most. Until this is generally accepted, business difficulties will continue to arise and become complicated, human relationships in business will continue to generate friction and inefficiency and relations between dealers and manufacturers will not be satisfactory. It is the spirit behind the dealer contract that counts.

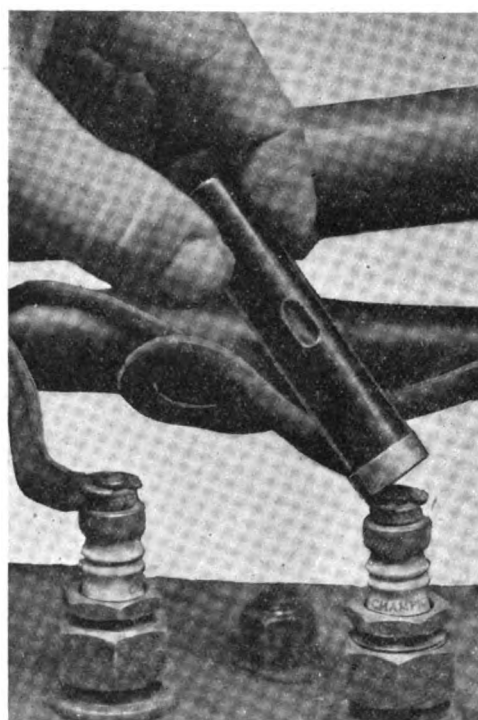
## Neon Filled Tubes for Ignition Circuit Tests

NEON, one of the gases which exist in extremely small proportions in the earth's atmosphere, has, as compared to air, a very slight resistance to the passage of electric current. The passage of a current through the gas causes it, under certain conditions, to emit an orange-red light, the intensity of which varies with the difference in potential, causing the discharge of current through it. This property is made use of in a special instrument designed for use in testing ignition systems.

The body of the gage is formed by a hard rubber tube closed at one end and sealed at the other by a brass cap. A small sealed glass tube containing the neon gas under a pressure considerably less than atmosphere is positioned within the rubber tube between two plugs of fine steel wool which fill each end of the outer tube and give it considerable electrical capacity. The glass tube is coated over the greater part of its external surface with silver, but a band about 3/16 in. wide and a spot opposite the window in the rubber tube is left uncoated. The silver coating remains in contact with the steel wool at each end, but the uncoated band forms a gap in the electrical circuit between the two ends of both tubes.

The gage functions in the following manner: When the metal cap is placed in contact with or close to a conductor, such as the terminal of a spark plug, which is receiving an electrical charge, the end of the gage adjacent to the conductor is also charged since the gage forms a portion of the capacity of the circuit, and this induces a charge of opposite polarity in the opposite end of the gage. The steel wool and the metal coating on the glass tube then become condensers (of relatively small capacity). In assuming this charge a current is induced in the neon gas column, the positive ions of the gas flowing toward the negative pole of the tube and the negative ions toward the positive pole. This flow of current causes the gas to glow, the intensity of the glow increasing as the potential increases.

When placed in contact with a spark plug terminal there is a flash of light each time the plug fires. The narrower the gap the lower the potential required to jump it and the duller the glow, and vice versa. If the electrodes of the plug are too close or the gap between them partly filled with carbon, the glow is dim. If the gap is too wide the flash is extremely brilliant, while for a correctly set and properly functioning plug the flashes are of intermediate brilliance. If the plug is shortcircuited the charge passes directly to ground, the tube is not charged, since no potential is built up, and no flash occurs. It is thus a simple matter to locate plugs which are missing or giving too weak a spark.



The Airco neon filled spark indicator



By passing the end of the tube along a high-tension wire, leaks are easily located, for the tube will glow brightly at a point where the insulation leaks, whereas, it will not glow at all or only very dimly at other points.

Since the body of the indicator is of rubber it can be held in the hand without the charge passing to ground through the body of the observer. The Airco spark indicator is manufactured by the Air Reduction Co., a concern producing air products from the distillation of liquid air. In making the liquid air the temperatures attained are not sufficiently low to liquify the helium and neon content. These two gases, together with some nitrogen, are trapped off and later separated by other means.

STAINLESS steel is being extensively used for the inlet and exhaust valves of internal combustion engines of all kinds. It is also being used in at least one instance for piston pins, and for the bolts and nuts of exhaust pipes and mufflers. As usual, the best results are obtained by polishing the objects to a high degree.



# Refinements in Control Characterize the New Hudson

Clutch and brake controls and the steering gear have been redesigned to facilitate ease in handling. Carbureter air is pre-heated and the cast-in manifolding changed to afford better fuel vaporization.

By J. Edward Schipper

**T**HE new Hudson Super Six model is now in production and being delivered to dealers. The principal changes are those intended to effect ease of control. In carrying out these changes, the front compartment has been redesigned and the details of the control mechanism have been so improved as to provide easier steering and easier pedal and control lever action. Changes have been made in the clutch and transmission, resulting in a lighter clutch pedal action as well as an easier gearshift. The brake linkage has also been altered to render the brakes more responsive.

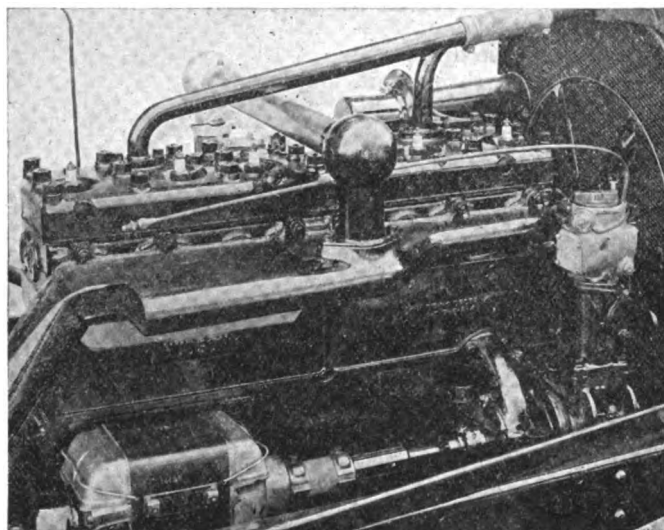
There have been some changes which affect the external appearance of the car, particularly in the adoption of new fenders and front apron and some body fittings have been improved.

The engine, which has been in use since 1916, has been continued without any fundamental alterations. A change has, however, been effected in the air intake and manifolding. It has previously been Hudson practice to use cold air; on the new car, all of the air for the carburetor is pre-heated. Globe elbow joints are used to give a large sectional area to the piping at the turns and at the entrance to the carburetor. The air is heated

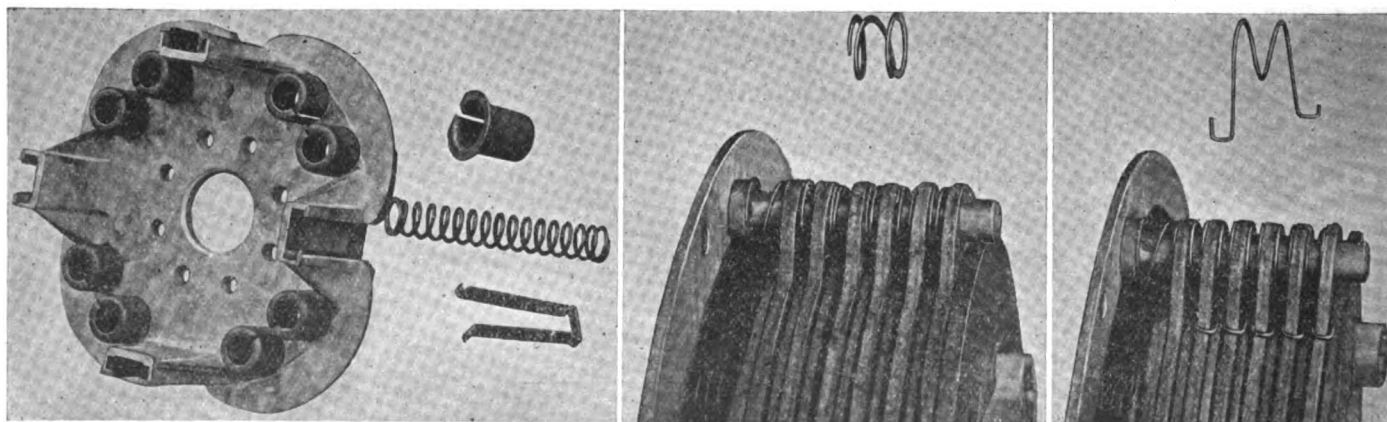
in a stove which is integral with the exhaust manifold on the right side of the engine and is led over the top of the engine to the carburetor, on the opposite side. The carburetor is attached to a vertical flange at about the center of the block. The air pressure at the carburetor inlet is balanced with that in the float chamber by a compensating tube which connects the float chamber with the air intake. This is said to conserve gasoline on quick throttle opening.

Internally, the manifolding has also been so altered that a modified form of a hot-spot is provided between cylinders 1 and 2 and 5 and 6. The intake manifold at these two points is brought into close proximity with the exhaust. Liquid fuel which collects in the pocket aids materially in shortening the warming-up period.

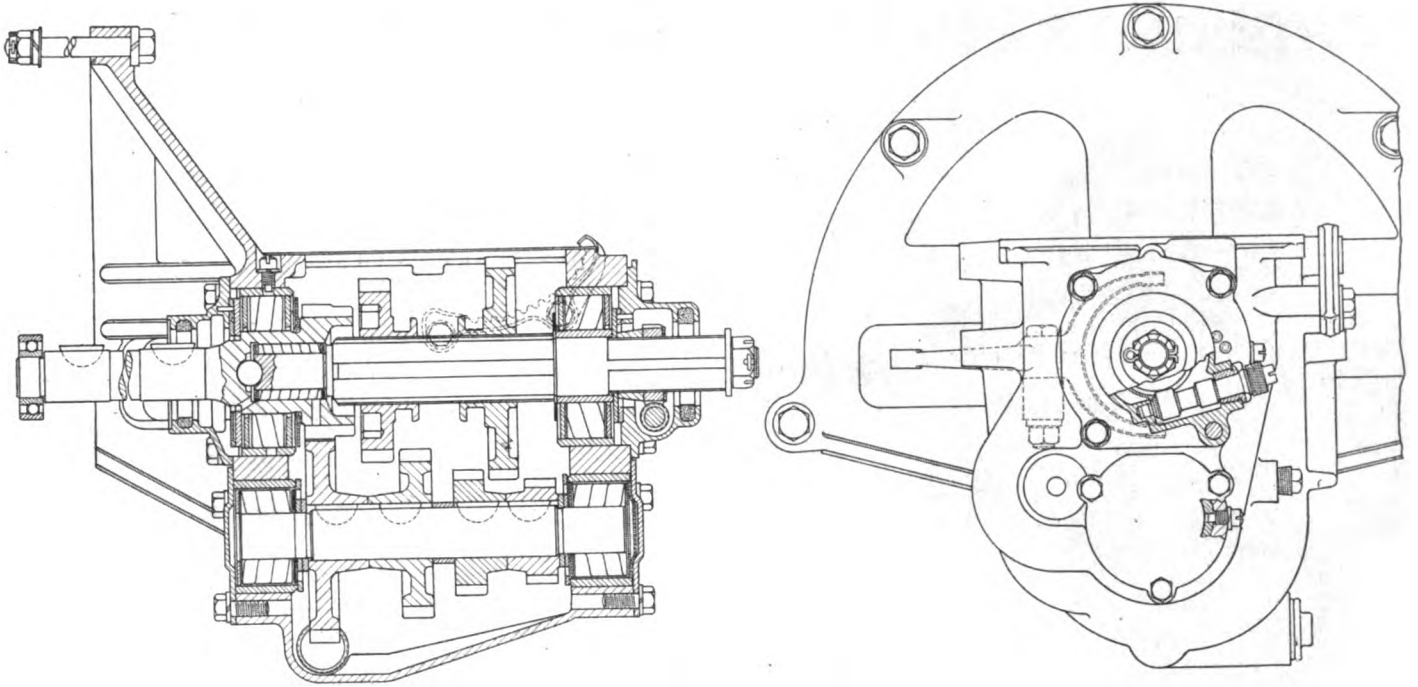
While the clutch employed in the new Hudson is fundamentally the same as that in older models, lighter-driven parts are employed to facilitate gear shifting. In the new construction, the transmission shaft is continued forward and forms the clutch shaft, eliminating the three-jaw slip joint used formerly as a connection between the clutch and transmission shafts. This shaft



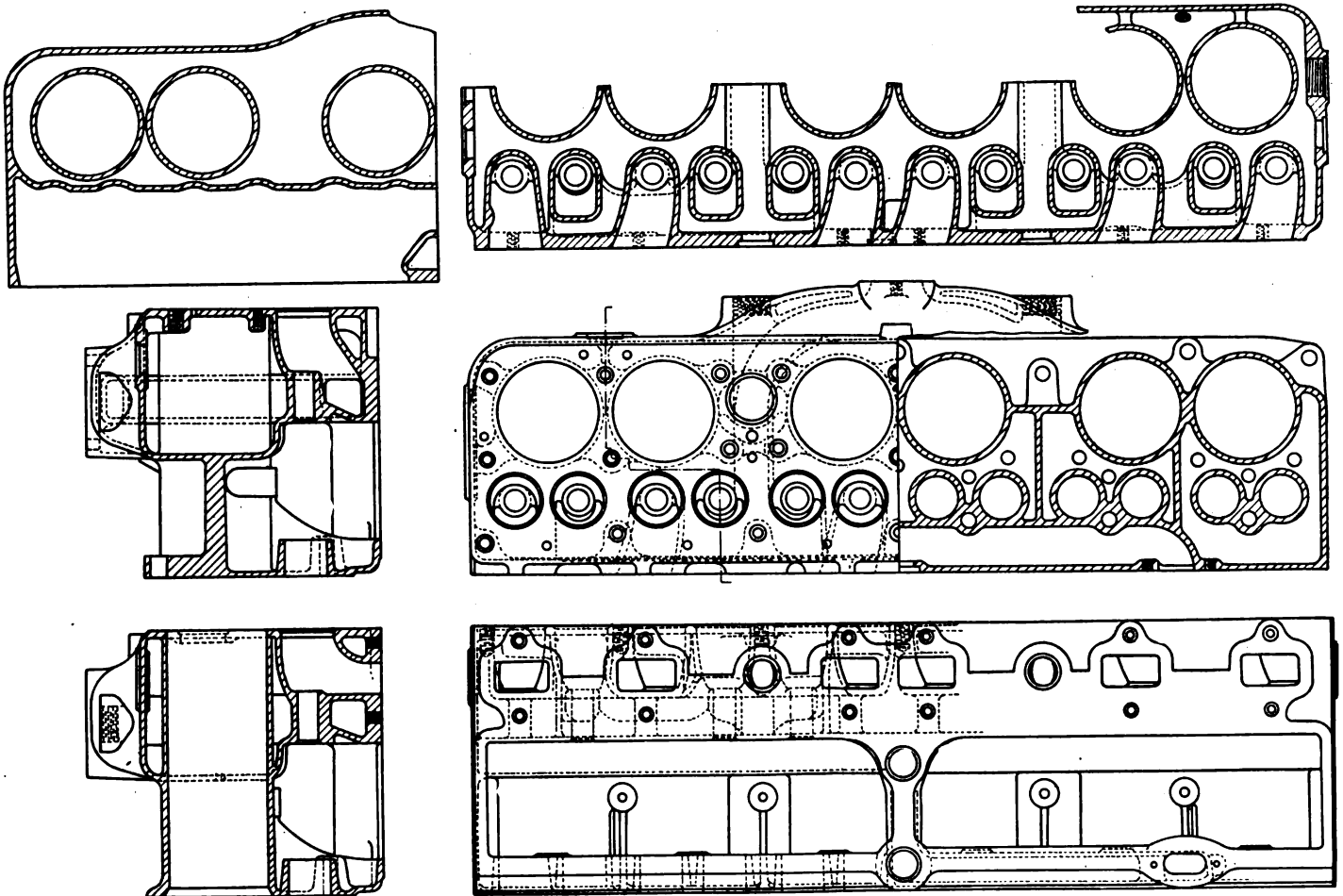
The Hudson engine, showing new air heating and piping



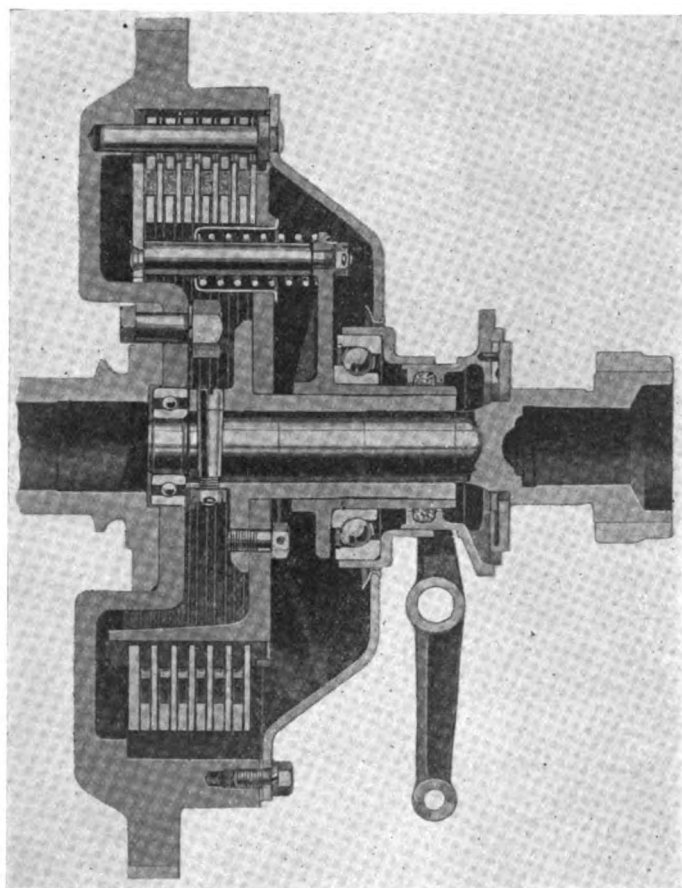
Left—Die-cast clutch spider with pressed metal spring cups and steel insert forming bearing surface for driven plate lugs. Center—Springs used to separate plates on disengagement. Right—springs used to prevent rattle when clutch is disengaged.



Sectional and end views of Hudson transmission



Views of new cylinder block, showing changes in cast-in manifold



The new Hudson clutch assembled

has a pilot bearing in the flywheel and carries the driven disks on a die cast aluminum drum. These driven disks are light, thin disks and do not carry the cork inserts which are now in the driving disks. Formerly, the driven disks carried these cork inserts and were the heavier of the two sets. This drum also carries cup-shaped inserts which act as the clutch spring retainers. There are eight clutch springs spaced equally about the aluminum drum, giving a uniform pressure on the bearing surfaces of the disks. The clutch release spider depresses these clutch springs during disengagement. A more positive separation of the clutch plates is insured by small springs placed between the clutch disks. The use of these springs prevents any tilting of the disks. There are also anti-rattle springs placed between the disks so as to prevent noise when the clutch is disengaged.

The clutch thrust bearing grease cup used in previous models has been eliminated. A large annular ball throw-out bearing, automatically lubricated by the oil in which the clutch runs, is now employed. The die-cast drum and the extensive use of stampings gives a balanced clutch which is manufactured at a reasonable cost and without an exceptional amount of machining work.

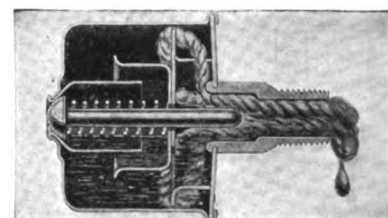
The new gearset is not materially different from the old. The shifter mechanism is now mounted in a sub-assembly with the top cover plate. The speedometer drive has been enclosed and is now incorporated with the gearbox. The gear shifter lever has been lengthened and the ball handle placed closer to the driver's hand than formerly.

Another change which affects the ease of operation of the car is in the emergency brake lever. In addition to greater leverage, the ratchet has now been made heavier and the ratchet teeth larger. In order that this change does not affect the number of positions in which

the brake lever may be placed, there are now two pawls employed which come into action alternately and give the effect of twice the number of teeth on the ratchet.

Ease of steering has been secured by changing the ratio of the steering gear from  $7\frac{1}{2}$  to 1 to  $9\frac{1}{2}$  to 1. This also results in a heavier worm wheel with consequent longer life. The drag link is now a one-piece tube instead of being welded in the usual way. The accelerator pedal is now placed to the right of the brake pedal and is designed to prevent a cramped foot position.

The lubricating points on the chassis are taken care of by a new type of oiler which does away with the old-

Wick feed oiler  
used in new Hud-  
son model

fashioned grease cups. The oiler contains a reservoir and a wick feed. A new pump type of oil can is provided with the car to fill the oil reservoirs.

In exterior appearance the Hudson is changed but little. Deep crown fenders which, because of the increased depth of flange are more efficient as mud guards, have replaced the previous type. The front fenders now have aprons which extend to the extreme front end of the spring hangers. A splash apron placed between the spring horns improves the appearance of the car and affords further protection.

The wheelbase of the car remains the same, as do all of the major specifications. The tire size is unchanged but the tires now provided are cord in place of fabric. In the detail work of the body, there have been a few changes, although the body lines remain the same. The door jambs are now of pressed steel in place of wood and, consequently, more durable and solid. There is also an improved type of side curtain provided giving better weather protection. The windshield is now fitted with a metal strip with a rubber interlining between the two glasses. The price of the car remains unchanged.

## Germans to Hold a Grand Prize Regularity Race

A GRAND Prize regularity and speed contest is to be held in Germany this fall under the auspices of a committee of which C. O. Fritsch is chairman. Only stock cars manufactured in Germany or Austria are eligible for entry, and these must have piston displacements corresponding to the German tax horsepower ratings of 6 and 8 (95.6 and 127.5 cu. in.). Cars of each rating will run in a separate class, and there will be subdivisions according to whether the engine has the valves in side pockets (standing valves, as they are called in Germany) or valves in the head (hanging valves). The minimum weight for the 8 hp. cars without fuel and tools is 1760 lbs. and the minimum weight for the 6 hp. cars 1430 lbs. The minimum tire sizes are 33 x 4.8 in. and 33 x 4.2 in. respectively.

Only manufacturers and dealers can enter cars, and no more than three cars of any one make can be entered. Bodies for the competing vehicles must be built in accordance with designs furnished by the race management. Grand Prize will be awarded to the contestant whose circuit times show the least variation. There will also be speed prizes in each class. Minimum speeds of 46.7 and 40.4 m.p.h. are required in the two classes.

# A New Swiss Magneto of the Inductor Type

Newcomer in American market incorporates many ingenious ideas. Rotor is a bell-shaped magnet forged integral with driving shaft. Both windings are stationary, hence no collector ring is required. One feature is accessibility of interrupter which is found by lifting a cover.

**A**N interesting design of magneto of Swiss manufacture, the Scintilla, has recently been introduced on the American market. It is of the inductor type, without movable windings, and while it comprises the same parts as any other magneto, considerable ingenuity has been displayed in the arrangement of details, whereby a number of advantages in manufacture, care and maintenance are secured.

The rotating part, or rotor, as it is usually called in electrical parlance, is a bell-shaped permanent magnet which has the driving end shaft forged integral with it. The pole pieces of this magnet are laminated, the laminations being slipped over extensions of the forging and held in position by two screws on each leg of the magnet, which screws also hold in place a bronze ring over the ends of the poles with which the shaft at the interrupter end is formed integral. The rotor is supported in ball bearings at both ends.

The magnetic circuit is completed by two laminated pole shoes set into the die-cast aluminum alloy housing and a laminated core extending through the stationary coils. The core is of substantially square section with rounded corners; its ends are slotted and it is fastened to the pole shoes by a machine screw at each end, passing through the slot and into the pole shoe. Both the primary and secondary coils are wound on this core, and the condenser is also incorporated in this unit. As both windings are stationary there is no need for a collector ring with its attendant difficulties. One primary lead is grounded to the core and the other is brought out to a strip brass connector which extends half way around the coil. At the top this connector makes contact with the low tension terminal from which connection is made to the ignition switch, by means of which the primary winding of the magneto can be short-circuited and the operation of the machine stopped. At the interrupter end there is a similar connection to the insulated block of the interrupter. This is a sliding contact, the interrupter block moving relative to the connector when the timing of the spark is changed. One part of each of these two

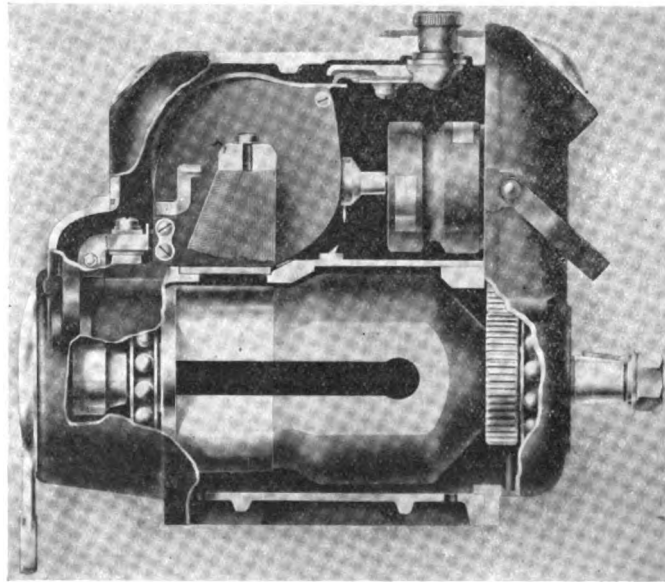
connections is spring supported, so that a good, firm contact is obtained under all conditions.

One of the most interesting mechanisms of the magneto is the interrupter. This consists of a cylindrical frame which fits into a corresponding seat in the housing and is locked in place by means of a bayonet lock. The timing lever is formed integral with a cap over the interrupter, this cap being held in place by means of a centrally located machine screw and a pair of dowel pins. There are eight equally spaced holes in a circle in the in-

terrupter frame, and the timer lever, therefore, can be placed in any of eight different angular positions, permitting of adapting the magneto with ease to different engines. There is a special locking ring on the interrupter, with a radial lever which, when it is desired to insert the interrupter in position on the magneto, must be turned relative to the frame, against the torsion of a spiral spring. When in the proper position the interrupter can be pushed into place in the direction of the rotor axis. The lever on the locking ring is then released and the ring is snapped back by the spring, locking the interrupter in place.

For a four or six cylinder magneto a two-lobed cam is mounted on the rotor shaft and co-acts with a bell crank-shaped interrupter lever fitted with fiber cam follower and a fiber bushing. The contacts of the interrupter are always located on top, where they can be easily inspected and are protected from oil accumulations. A feature which is found on few if any other magnetos is that the timer is under the influence of a coiled spring which tends to bring it back to the retarded or late ignition position, so that if the driver is careless in looking after his controls there is little danger of the engine racing due to advanced spark.

To get at the interrupter it is only necessary to remove a cover, known as the interrupter cover. This is clearly shown in one of the illustrations, which also shows the method of felt-packing the housing in order to make it waterproof. This cover can be removed by hand, being held in place by two spring catches, whereas the magneto cover, over the coils and distributor, is held in place by



Cut-away view of Scintilla magneto



two screws. A safety gap is provided on the secondary winding, one of the points of the gap being on the secondary terminal and the other on a brass strip laying on top of the rotor cover and grounded through the housing. A second safety gap is provided by the distributor, as in case of excessive secondary pressures, due to a disconnected cable or similar cause, the spark can jump from one of the distributor sectors to the rim of the distributor gear.

The distributor also is of quite original design. Contrary to conventional practice, it is located at the driving end. This is rendered possible by the fact that the high tension terminals are not at the end of the magneto but on top of it. An eccentric adjustment is provided on the distributor gear so that the center distance of the gears can be closely adjusted for correct mesh and quiet running. The distributor shaft is made integral with a disk which sets into a circular recess in the end plate of the housing and is held in place thereon by two machine screws passing through arc-shaped slots. The shaft or stud is eccentric with relation to the disk, and by loosening the retaining screws and turning the stud and disk through a small angle and then tightening the screws again, the distributor gear can be brought closer to or moved farther away from its pinion.

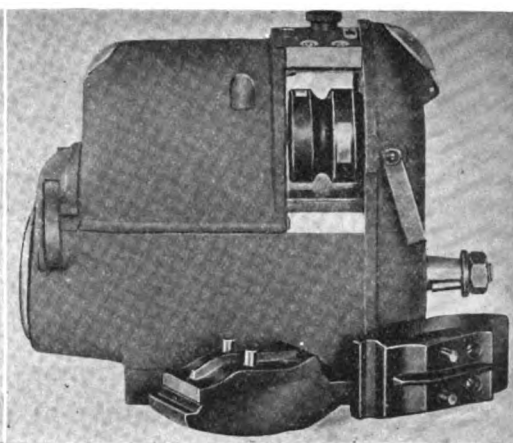
#### Two Distributor Sectors Offset

The distributor itself is in the form of a drum with two metal sectors embedded in a piece of molded insulation. The contact sectors are offset from each other in an axial direction and are spaced 90 deg. circumferentially. There are four carbon brushes (in a four-cylinder magneto) bearing on the surface of the distributor drum, two being carried side by side in each brush holder. The two pairs of brushes are mounted at 90 deg. with each other. One advantage claimed for this construction, in which the brushholders and brushes do not revolve, is that the pressure of the brushes on the distributor is not affected by centrifugal force, and consequently is uniform and comparatively light under all operating conditions, hence the wear of the brushes should be slight. The two sectors of the distributor are integral with a central plug or core of brass, against which the high tension terminal brush bears. It will be noticed that the high tension connection from the coil to the distributor is exceedingly short. The brush holders can be removed without the use of tools.

One of the illustrations herewith shows plainly the con-



Six-cylinder magneto complete



Distributor brushes removed

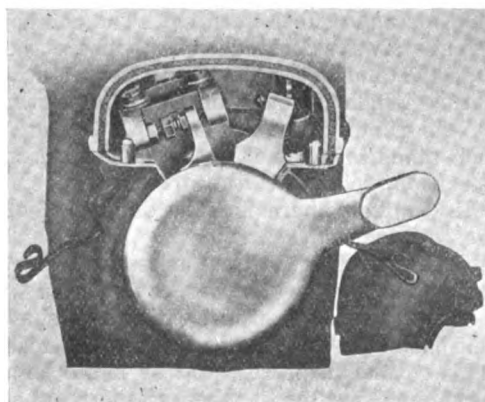
struction of the primary and secondary connectors. The secondary cables are forced into holes in the molded brush holder and pointed screws are screwed into the blocks from the end, right through the strands of the cable. These screws do not screw in threads in the insulation but in metal blocks molded in same.

#### Injury From Overoiling Impossible

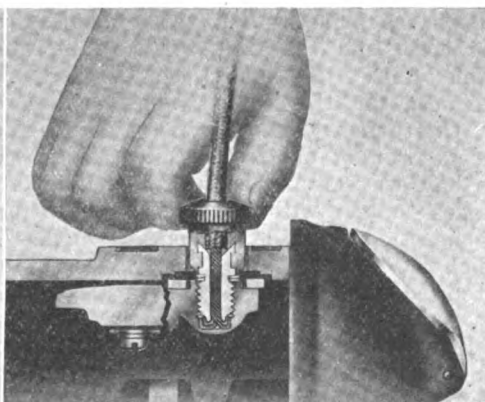
There are oil holes with snap covers at both ends. Owing to the location of the coils and the interrupter points it is impossible to injure the machine by overoiling. The snap cover over the oil hole at the driving end also covers a timing window. In timing the magneto, the rotor is turned until a figure 1 appears centrally in this window; then the engine crankshaft is turned until the piston in No. 1 cylinder is in the top dead center position at the beginning of the firing stroke, and with the rotor and crankshaft in these positions the gears are fastened to their shafts. All of the secondary terminals are plainly marked as to the cylinder to which they are to be connected, and the direction of rotation is indicated by an arrow on top of the magneto.

These magnetos are manufactured in one, two, four, six and eight cylinder types, the eight cylinder type having a four pole magnet. They are made to S.A.E. standard dimensions. It is claimed that they give a spark of sufficient intensity to fire the charge at a very low speed, and also permit of operation at exceedingly high speed, owing to the fact that the revolving masses are of simple and robust form.

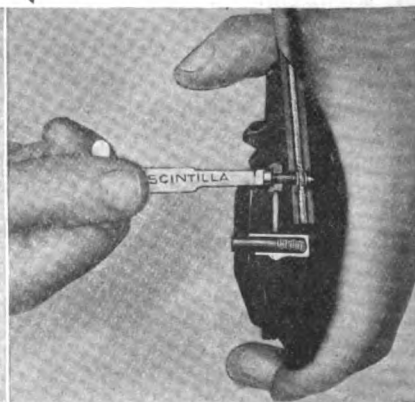
The manufacturing concern in Switzerland is a subsidiary of the firm of Brown, Boveri & Co., which has been engaged in the manufacture of electrical machinery practically since the beginning of that industry.



Interrupter cap removed



Section of low tension connector

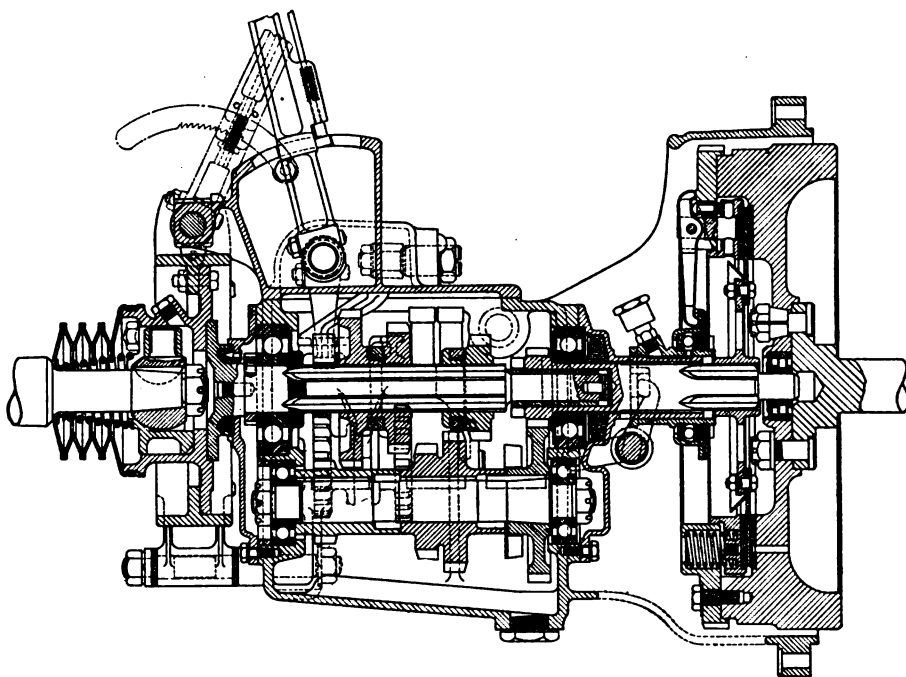


Section of high tension connector

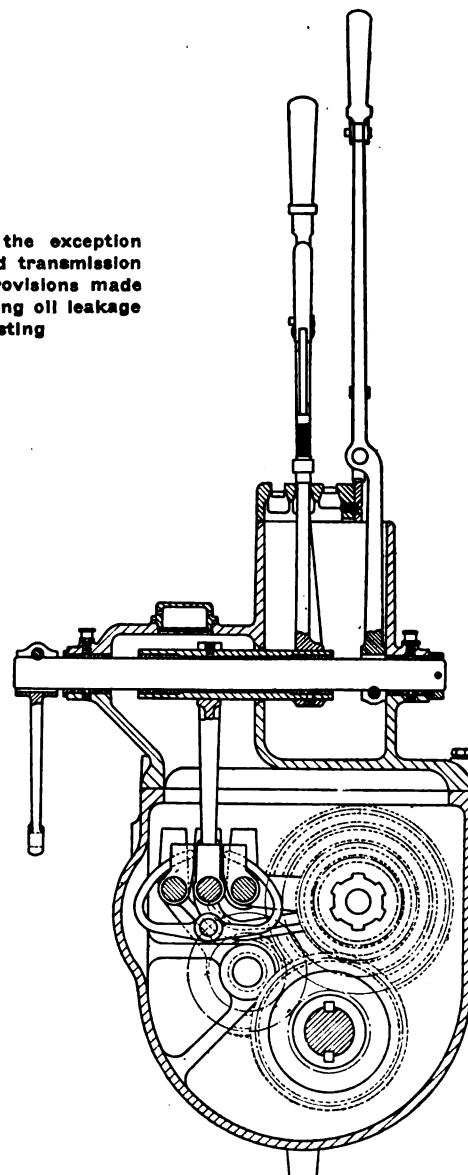
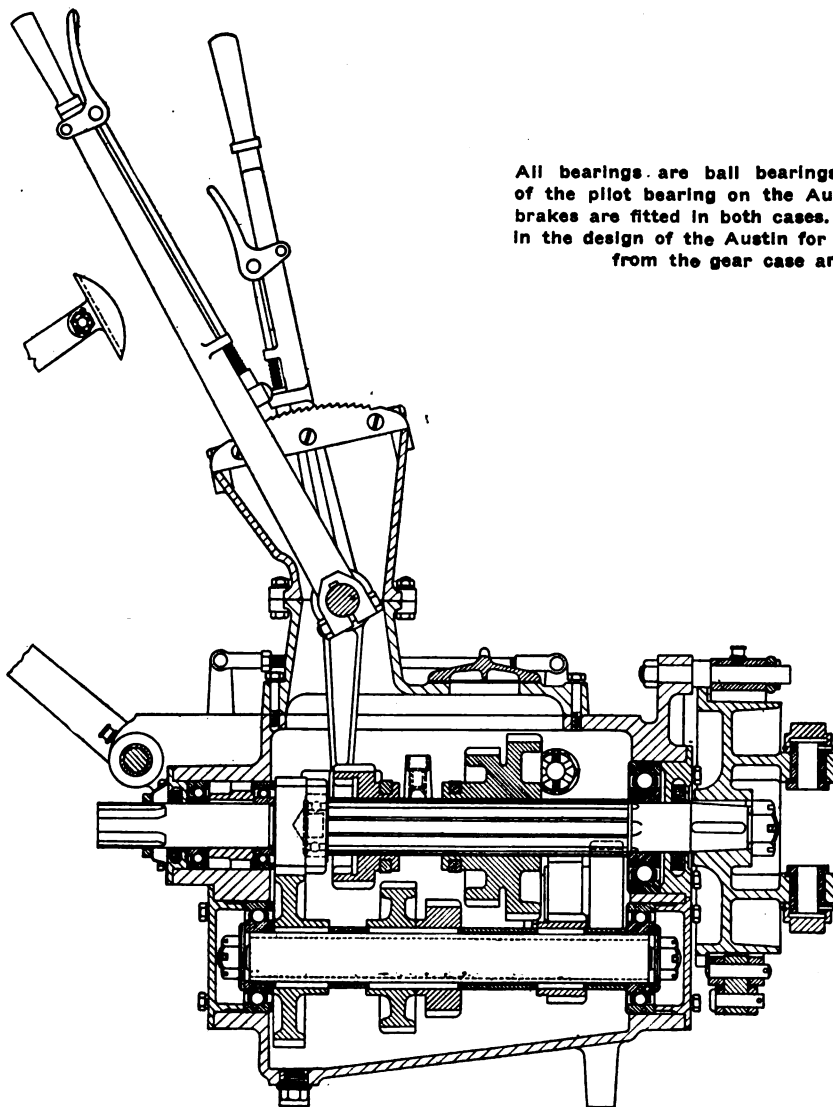


## Examples of Recent British Transmis- sion Design

The drawings on this page show two four-speed transmissions of British design—the Austin (above) and the Vulcan (below). It will be noticed that both are arranged for center control, a feature only recently incorporated in British practice. The so-called enclosed gate, which has long been characteristic of British cars, is retained in the new position



All bearings are ball bearings, with the exception of the pilot bearing on the Austin, and transmission brakes are fitted in both cases. The provisions made in the design of the Austin for preventing oil leakage from the gear case are interesting



# The Effect of Mixture Ratio and Temperature on Power and Economy

Review of tests conducted at Purdue University shows that marked gains in economy with but trifling loss in power result from proper heating of charge and correct mixture proportions, while smoother performance and less dilution of lubricant are accompanying advantages.

By C. S. Kegerreis\*

THE object of this paper is not to develop something entirely new, but to stimulate interest in a few points which have a large bearing on the cost of operating gasoline engines. Large amounts of data have been published, and many improvements have been made the last two or three years, but the public is not getting either the performance or the mileage from the cars that is possible. Who is to blame for the poor operation and short life of the accurately machined car? Is it the manufacturer or is it the driver? Perhaps it is the result of a combination of circumstances.

To operate a car of the present type it is necessary to purchase the commercial fuels sold on the market. Ten years ago the fuel was so volatile that no great attention was required in its preparation for good combustion. Now the carburetion problem has grown to be of such magnitude that it occupies a prominent place in the automotive world.

The troubles experienced are poor operation due to faulty manifold distribution, sooted plugs and combustion chambers, oil dilution, excessive wear on bearings and pistons and low mileage. These factors not only affect the depreciation of the engine but result indirectly in excessive wear on the other parts of the machine.

\*The author is connected with the Engineering Experiment Station, Purdue University.

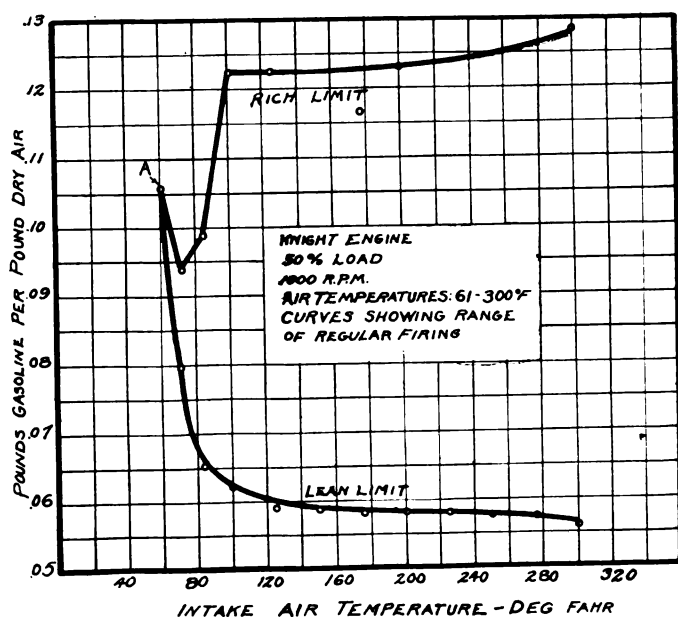


Fig. 1

To remedy the faults the trouble must be removed at the very foundation. Obtaining good performance means research on fuel preparation. Once this problem is solved, then the correct fuel-air ratios can be determined and the exact requirements for mileage ascertained. The Engineering Experiment Station at Purdue University has been working on these problems for the last few years. A portion of the results have been published in bulletin form. The data published in this article is taken from some of the tests, which have been checked, and show the requirements necessary for good performance. Once this is attained, then the question of economy can be solved. The data is based on one grade of gasoline (Table 1) of 56.6 deg. Baumé density. The tests run were made on a four-cylinder engine of modern design and all data taken with great care.

TABLE I.

Distillation Data—56.6 deg. Baumé Gasoline

Initial boiling point		Baumé
Per cent off	98 deg. F.	Reading
10	178	79.8
20	210	73.6
30	248	64.2
40	275	58.6
50	288	55.8
60	306	53.2
70	324	51.0
80	348	49.6
90	374	47.7
98	415	43.3

The data presented all refer to operation at half load at 1000 r.p.m. This approximates car conditions at a medium speed. The various points on all the charts represent at least one separate test and in many cases a long series of tests.

Some means of preparing the fuel for good combustion must be used. Different methods have been tried and heat has shown great possibilities. Fuel cannot burn readily without first being converted into a gas. The carburetor, by atomization, aids in tearing the fuel into small particles, presenting a large surface for vaporization. The decreased pressure in the intake manifold lowers the fuel boiling point, and the fuel is dried to some extent by absorbing heat from the intake valves. The quality of fuel we are now using is too heavy to be sufficiently gasified, even on compression, to give uniform and complete combustion. Thus some additional means of furnishing more heat is necessary. Heat may be added by raising the temperature of air entering the carburetor. Fig. 1 shows the results obtained in

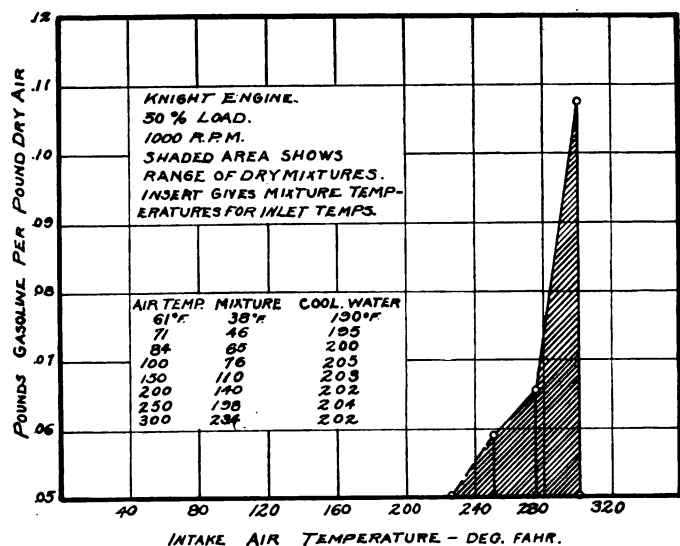


Fig. 2

a series of tests with an inlet air temperature of 61 deg. Fahr. to 300 deg. Fahr. Distributing a very wet mixture is difficult. The curves show that at a lower temperature the quantity of liquid at the end of compression is so great that irregular firing will result. Hence the range is very limited. An inlet temperature of 61 deg. Fahr. is so low that one mixture ratio only will give a semblance of regular firing. This mixture, 0.106 lb. gasoline per pound of dry air, is excessively rich. A large portion is being burned in the exhaust manifold. An increase of 25 deg. in the inlet air temperature to 84 deg. Fahr. creates a big change. The range has widened and the limits are 0.065 to 0.985 lb. gasoline per pound of dry air. The engine fires regularly, but the speed is not constant. There is a tendency to surge and the exhaust is not clean in all cases. A temperature of 100 deg. Fahr. or above gives nearly the maximum firing range.

The boundary at the rich end does not follow any definite line. This is due to the excess fuel in the mixture, which causes irregular combustion. The lean limit shows that once 160 deg. Fahr. is reached a much leaner ratio will cause missing or backfiring. It may be of interest to show that if the carburetion is poor some assistance can be obtained by raising the cooling water outlet temperature. On the tests at 61 and 71 deg. Fahr. a low, cooling water temperature would cause the engine to stop. If the temperature was reduced to 160 deg. Fahr. the engine would backfire; if reduced to 120 deg. Fahr. the engine backfired very frequently and at 100 deg. Fahr. the engine would barely run. Even on the 84 deg. Fahr. test series the speed was difficult to control with any mixture.

As the temperature is increased the mixture gradually grows more dry. A glass section was inserted in the manifold so the character of the mixture could be observed at any time. The mixture became quite dry at 225 deg. Fahr. with the leanest ratio used (Fig. 2). The range widened to 0.059 at 250 deg. Fahr. and to 0.1075 lb. gasoline per pound of dry air. The shaded area in Fig. 2 shows the limit of dry mixtures in the ordinary inflammable range. The manifold showed foggy mixtures at lower temperatures. On the same figure will be found the various mixture temperatures for the corresponding inlet air temperatures.

In all cases in the temperature tests at half load and 1000 r.p.m., 160 deg. Fahr. was found to be the minimum desirable temperature for good performance. The engine runs smoothly with no surging, all cylinders firing

regularly. Later tests have proved that the combustion is quite complete, and research on other engines shows 160 deg. Fahr. to be the minimum temperature to give a mixture just dry enough to distribute well and burn readily on ignition. Some portions of the fuel may be gasified after ignition. Oil dilution is not entirely eliminated and a warmer mixture is recommended to eradicate this trouble.

The temperature necessary for good performance for this fuel being ascertained, the question regarding power and thermal efficiency arises. Do the mixture requirements for high power change with the temperature of the air? It is a common belief that the colder mixtures give the greater power, as there is a gain in volumetric efficiency. The facts may be studied in Fig. 3. A low temperature requires an excessively rich mixture for high power. With an air temperature of 61 deg. Fahr. a ratio of 0.105 lb. gasoline per pound of dry air is necessary for maximum power development. The absolute value of the power developed is low compared to the higher temperatures. The richness decreases as the temperature increases until 125 deg. Fahr. is attained. Above this point the ratio is constant, 0.0775 lb. fuel per pound of dry air. The peak of the power curve is a bit too rich. A curve labeled good performance is also shown. This plot represents the mixtures that can be used to develop at least 95 per cent of maximum power and give good acceleration. Thus a bit leaner mixture can be used that will pull well, yet give very high efficiency. The fuel consumption can thus be cut 10 per cent and give very good operation. The power loss will not be high; in many cases it is not over 2 per cent.

The inlet air temperature also affects the thermal efficiency. When using low temperatures the efficiency does not peak until the 0.0975 ratio is reached (Fig. 4). At a temperature where good operation is assured the curve peaks at 0.064. There is little improvement above 160 deg. Fahr. In all cases the big improvement occurs between 60 and 125 deg. Fahr. As the mixture for highest efficiency changes with the inlet temperature, the absolute value of the thermal efficiency increases from 7.50 per cent at 61 deg. Fahr., to 18.60 per cent at 84 deg. Fahr. This is a great improvement for so small a temperature increase as 23 deg. Fahr. Above 84 deg. Fahr. the efficiency remains constant up to the temperature corresponding to a dry mixture and then the decrease is small.

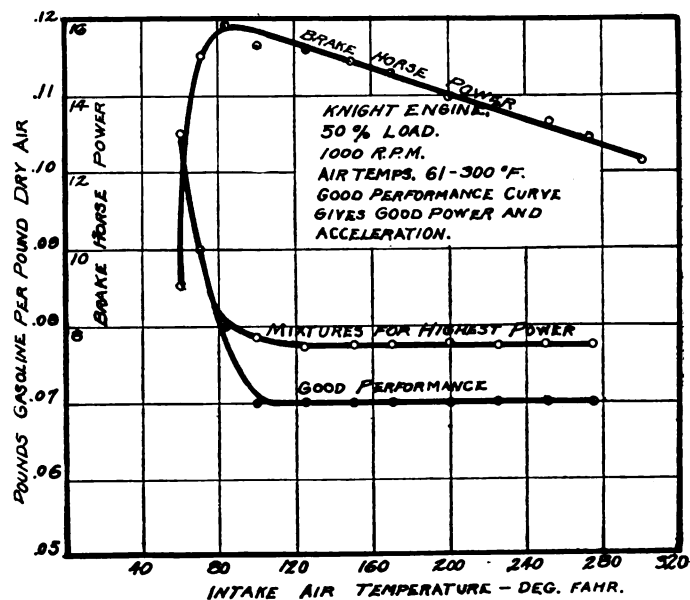


Fig. 3

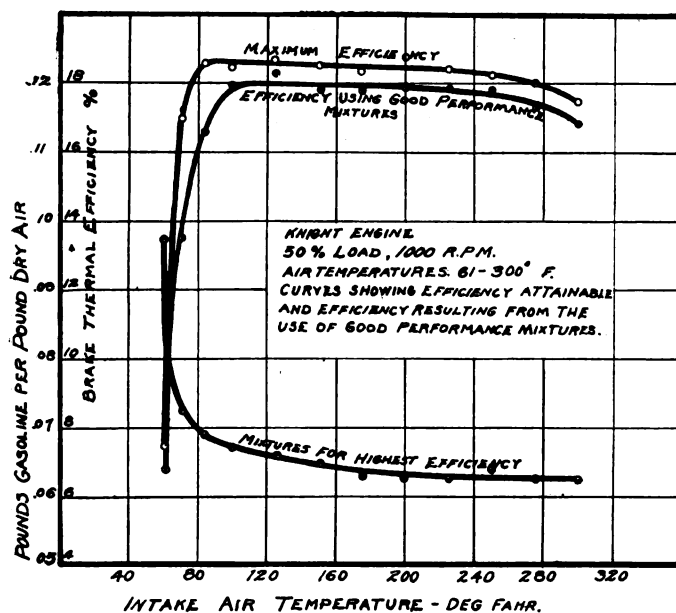


Fig. 4

In Fig. 3 is plotted the relation between temperature of inlet air and the proportion of mixtures that will give good performance. By using these mixtures a thermal efficiency within 1 per cent of the maximum can be attained. This means high mileage per gallon plus good and smooth running.

The preceding data establish the limits of good operation, power and efficiency as affected by the inlet air or mixture temperature. With the engine running properly the relation between power and thermal efficiency, as effected by the mixture ratio, can be accurately determined. The curves shown in Fig. 5 are the results of run at half load and 1000 r.p.m. In this series a constant throttle opening was used for all tests, and the carbureter adjustment changed throughout the mixture range. The engine fired every cylinder regularly for all ratios between 0.0576 and 0.1275 lb. gasoline per pound of dry air. With leaner mixtures the engine would miss and backfire.

The power peaks at 0.0775 and the thermal efficiency at 0.065. It can be clearly seen in this figure that 0.07 represents a mixture giving negligible decrease in power from the maximum. By using 0.07 instead of 0.0775 a gain in efficiency of 1.5 per cent is made. The ratio 0.0672 represents the chemically perfect mixture with no excess of oxygen and no carbon monoxide in the exhaust. In this series of tests this ratio gave maximum

efficiency with satisfactory operation.

It often happens that two cars of the same manufacture, both in good mechanical condition and using the same air intake temperature, show widely different mileages; one may make 12 miles and the other 20 miles per gallon. It will be seen from the data represented herewith that both may develop the same power and climb the same hills and yet the economy may be very different. Fig. 5 shows a range in performance varying from a 0.07 fuel ratio and 18.3 per cent thermal efficiency to a 0.105 mixture ratio and 12 per cent efficiency.

An engine, to deliver its maximum efficiency, must first have the fuel prepared correctly and then be fed the required mixture for all conditions. Medium or low-priced fuels will not be available long. Even without increase in consumption, the price would be sure to rise and the volatility to decrease. Thus it behooves everyone from the driver to the engineer or capitalist to endeavor to prevent waste of fuel.

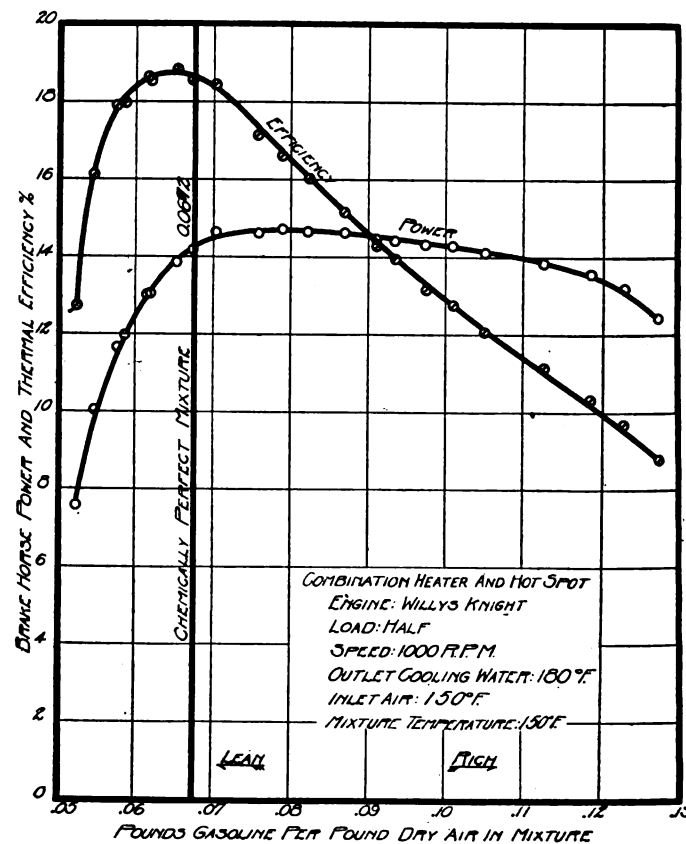


Fig. 5

## Diminutive Ignition Apparatus

SINCE the war there have been developed in Germany a whole series of exceedingly small internal combustion engines, some with as small a bore as 40 mm. (1.575 in.), which at 3000 r.p.m. develop from 1 to 1½ hp.. It is practically impossible to mount magnetos of normal dimensions on these engines, and in view of this fact the German ignition industry has produced new ignition devices of corresponding size.

About a year and a half ago the firm of R. Bosch bought out a small rotary ignition device or flywheel magneto which weighs only 2.2 lb., and is intended for small single and twin cylinder engines of either the two or four-stroke type. The permanent magnet is of ring form, which

makes it possible to mount the instrument directly on the crankshaft instead of on the flywheel, thus effecting a saving of weight. Bosch has also brought out a very small spark plug, which has an overall height of only 1½ in. The thread has a diameter of 12 mm. (0.473 in.) and a pitch of 1.25 mm. (19.5 threads to the inch). The weight of the plug is only one ounce. A wire clip connector is used with the plug.

METALL-TECHNIK reports that the addition of 1/5 per cent of metallic beryllium to aluminum results in a light alloy of far better properties than the well-known alloy, magnalium (magnesium-aluminum).

# Experiments With a Reversible Propeller at McCook Field

New device appears to be capable of improving airplane performance through use of variable pitch feature, and promises also to facilitate landing in limited space, and thus aid in solution of landing field problem.

**T**HE invention of the Hart reversible and variable pitch propellers has opened a new field of development for aviation, and appears to be a big step in the improvement of airplane performance, as well as a step toward the solution of the landing field problem.

This propeller was invented by Seth Hart of Los Angeles, Cal. Several propellers were built by Mr. Hart at his own expense in California, and a number of flights were made there by several pilots. The California flights showed such promise of success that Mr. Hart determined to bring the invention before the Government's Airplane Engineering Division at McCook Field early in 1918, and since that time the Army has made many tests and worked out a number of new applications.

The first propeller delivered was given a destructive whirling test to determine the strength of the device. The construction employed proved to have such remarkable strength that the propeller, with a few modifications, was installed on the JN-4-H airplane for flight tests.

The flights with this original propeller extended over a period of about 8 hr. in the air. The principal advantages brought out by these tests were the following: As compared with the fixed pitch propeller, the variable pitch propeller showed an increase in the rate of climb of about 40 per cent, an improvement in ceiling of about 20 per cent, and great gain in the time required for take-off.

Ten of the Hart propellers have been built for such engines as the Liberty 12, Hispano-Suiza, 300-hp. and Hispano-Suiza 150-hp. engines, but to date the reversible feature of the Hart propeller has been tested only on the JN-4-H airplane.

The airplane fitted with this propeller has been flown and landed by different pilots in order to determine the difference in the distance required for landing with and without the reversible feature. The average of fourteen landings was taken. The result of this test determined that approximately 430 ft. was required to land the plane without the use of the reversible propeller, while a distance of only 120 ft. was needed to land the plane with the reversible propeller. While this comparison on the JN-4-H shows a remarkable reduction in the distance required for landing, it is probable that a greater decrease in landing distance will be found with some of the faster planes.

The further development of this propeller suggests many possibilities; such as landing on roofs of buildings or on platforms erected on shipboard.

The use of reversible propellers on dirigible balloons has been developed by a number of foreign nations, and they are considered essential to airships of very large size. The Hart propeller, on account of its light weight, strength and adaptability, is considered a great improvement for this service.

It should be borne in mind that the reversible feature

of the Hart propellers is always combined with the variable pitch feature, and it is possible to adjust the propeller during flight at any angle from a full reverse position to an angle several degrees greater than the normal full ahead position.

In actual operation the Hart propeller is set at low pitch for take-off and climbing. The low pitch gives a good ratio of thrust to torque on the ground, and consequently gives a high thrust and rapid take-off. After leaving the ground the low pitch allows the engine to turn up as fast as desired, giving a very rapid climb. After reaching the desired altitude the propeller may be adjusted to a somewhat greater pitch in order to allow the engine to turn at the proper speed and give the highest airplane speed in level flight.

When it is desired to cruise for long distances the pitch of the propeller is increased still further, holding the engine down to considerably slower speed without appreciable loss of plane speed. The advantages of adjusting the propeller to very high pitch in cruising and throttling the engine only slightly are two-fold over the fixed pitch propeller, in which the engine is greatly throttled: (1) The high pitch ratio obtained considerably increases the propeller efficiency; (2) by throttling only slightly, the gasoline consumption of the engine in pounds per horsepower hour is approximately as low as at full throttle. In the case of the fixed pitch propeller, however, where the engine is greatly throttled, there is considerable loss in fuel economy.

The use of variable pitch propellers will probably be essential for airplanes fitted with steam engines or steam turbines, Diesel type engines and engines with superchargers or other devices for maintaining the power at high altitudes. The difficulty encountered with the fixed propeller for this service is as follows: If the propeller is designed to operate at the normal revolutions near the ground the engine will turn it altogether too fast at high altitudes, resulting in racing the engine on account of the lower resistance of the less dense air. On the other hand, if the propeller is designed for operations at high altitudes, it will turn so slowly near the ground as to seriously impair the performance of the airplane when leaving the ground. In the case of the variable pitch propeller, it is possible to set the blades at such a pitch near the ground as to give a proper speed of revolution to the engine and to increase the pitch as higher altitudes are reached, thus preventing the engine from over-speeding.

Many destructive tests on these propellers have been made at McCook Field, and they have shown an ample factor of safety.

The method of computing the rate of retardation of the propeller when landing with and without reversible propeller and when the propeller is reversed in flight has been worked out at McCook Field.





transversal will give a set of values of  $x$ ,  $y$  and  $z$  which will satisfy the equation.

### When the Coefficients Are Negative

If we wish to form an alinement chart for

$$w = -5u + 4v,$$

there are two methods of procedure.

In the first method we consider the negative sign as being united with the variable  $u$ , so that

$$w = 5(-u) + 4v.$$

Here  $a = +5$  and  $b = +4$ , but the positive values of  $u$  must be found on  $UU'$  extended below  $U$ . That is, the same alinement chart may be used for

$$\begin{aligned} w &= 5u + 4v, & w &= -5u + 4v, \\ w &= 5u - 4v, & w &= -5u - 4v, \end{aligned}$$

if  $a$  and  $b$  are the numerical values of the coefficients of  $u$  and  $v$ , and if the positive values of a variable whose coefficient is negative are found below  $UV$ .

In this method  $WW'$  is always between  $UU'$  and  $VV'$ .

In the second method we consider the negative sign as being united with the constant, so that, if

$$w = -5u + 4v,$$

we have

$$a = -5 \text{ and } b = +4.$$

In this method the value of  $D_u$  or of  $D_v$  or of  $t$  may be negative. Fig. 1 shows the relative positions of the lines  $UU'$ ,  $VV'$  and  $WW'$  when  $a$  and  $b$  are positive; that is,  $D_u = UW$  is positive when measured from  $U$  toward  $V$ , and  $D_v = VW$  is positive when measured from  $V$  toward  $U$ . The notation in Fig. 1, and eqs. (1), (2) and (3) are applicable, not only when  $a$  and  $b$  are positive, but also when either  $a$  or  $b$  or both are negative, using the algebraic values of  $a$  and  $b$  and remembering that  $WW'$  is to the left of  $UU'$  when  $D_u$  is negative and to the right of  $VV'$  when  $D_v$  is negative, and that, if  $ra + sb$  is negative, the positive values of  $w$  are found below  $W$ .

Thus, if

$$w = -5u + 4v$$

and  $r = 20$  and  $s = 30$ , and  $m = 2$  inches, we find

$$t = ra + sb = 20(-5) + 30(4) = +20,$$

$$D_u = +12 \text{ inches and } D_v = -10 \text{ inches,}$$

so that  $WW'$  should be drawn 10 inches to the right of  $VV'$ , and 1 inch on  $WW'$  should represent 20 units in  $w$ , the positive values of  $w$  being above  $UV$ .

The two methods may be combined so that various alinement charts may be formed for the same equation. Thus we may write

$$w = 5u + 4v$$

in the form

$$w = 5u - 4(-v)$$

so that  $a = +5$  and  $b = -4$ , and the positive values of  $v$  will be found below  $UV$ . Since

$$t = 20(5) + 30(-4) = -20,$$

the positive values of  $w$  will be found below  $W$ .

### Logarithmic Scales

To form an alinement chart for

$$z = x^a y^b$$

we write

$$\log z = a \log x + b \log y$$

which is in the form

$$w = au + bv$$

if  $\log z = w$ ,  $\log x = u$  and  $\log y = v$ , and therefore, in Fig. 1, we use logarithmic scales, instead of scales of equal parts, on  $UU'$ ,  $VV'$  and  $WW'$ .

Construct a logarithmic scale on  $UU'$ , with the scale\*  $r$ , such that each distance  $UU_1$  shall equal  $\frac{1}{r} \log x$ , and mark the corresponding value of  $x$  at the point  $U_1$ . Also, construct a logarithmic scale on  $VV'$ , with the scale  $s$ , marking the points with the corresponding values of  $y$ . The notation in Fig. 1, and eqs. (1), (2) and (3) are applicable. A logarithmic scale, with the scale

$$t = ra + sb,$$

should be constructed on  $WW'$ , the points being marked with the corresponding values of  $z$ . Then a transversal  $U_1W_1V_1$  will give a set of values of  $x$ ,  $z$  and  $y$  that will satisfy the equation

$$\log z = a \log x + b \log y$$

or

$$z = x^a y^b$$

Note that the points  $U$ ,  $W$  and  $V$  will each be marked 1, since  $\log 1 = 0$ , and that the logarithms of numbers less than one are negative so that they should be found below  $UV$ .

If

$$z = cx^a y^b$$

so that

$$\log z = \log c + a \log x + b \log y,$$

we have

$$\log \frac{z}{c} = a \log x + b \log y.$$

Construct the alinement chart as before, but place unity on  $WW'$  below  $W$  at a distance corresponding to  $\log c$  on the scale

$$t = ra + sb,$$

that is, at a distance

$$\frac{1}{ra + sb} \log c.$$

When, in the equation

$$\log z = a \log x + b \log y,$$

either the coefficient of  $\log x$  or that of  $\log y$  or the coefficient of both  $\log x$  and  $\log y$  are negative, the alinement chart may be formed by methods the same as those used for

$$w = au + bv$$

but using logarithmic scales on  $UU'$ ,  $VV'$  and  $WW'$ . Thus, if

$$z = x^{1.3} y^{-2.4},$$

we may write

$$\log z = 1.3 \log x - 2.4 \log y$$

where  $w = \log z$ ,  $u = \log x$ ,  $v = \log y$ ,  $a = 1.3$ ,  $b = -2.4$ . Or we may write

$$\log z = 1.3 \log x + 2.4 (-\log y)$$

where  $a = 1.3$  and  $b = +2.4$ , the positive values of  $\log y$  being laid off below  $V$ .

If

$$z = x^m y^n$$

we have

$$\log z = m \log x + n \log y$$

which may be written in the form

$$\log z = 1 (m \log x) + 1 (n \log y),$$

so that  $w = \log z$ ,  $u = m \log x$ ,  $v = n \log y$ ,  $a = 1$ ,  $b = 1$ . Assume a value for  $x$ , compute the value of  $m \log x$ , lay off the corresponding distance from  $U$  on  $UU'$  using the scale  $r$ , and mark the point with the assumed value of  $x$ . Form the  $VV'$  scale in a similar manner. The  $WW'$  scale is a logarithmic scale with  $t = r + s$ .

\*If 4 in. on  $VV'$  represents  $\log 10 (= 1)$  then 1 in. represents  $\frac{1}{4}$  or 0.250. So that  $r = \frac{1}{4} = 0.250$ .

## The Z-Diagram

This diagram is used to obtain, without the use of logarithmic scales, the solution of the equation

$$v = ck u$$

where  $v$ ,  $k$  and  $u$  are variables.

Consider the construction of the alinement chart for

$$w = -au + bv \dots \dots \dots (4)$$

by the first method, in which the negative sign is used conjointly with  $u$ , while  $a$  is considered positive, the positive values of  $u$  being below  $U$  while the positive values of  $v$  are above  $V$ . Then, if  $UV = m$ ,

$$UW = \frac{sb}{ra + sb} m$$

and the point  $W$  is fixed, if  $a$  and  $b$  are constant quantities.

If  $w = 0$ , the transversal  $U_1V_1'$  is drawn through  $W$ , and the value of  $u$  at  $U_1$  and the value of  $v$  at  $V_1'$  satisfy the equation

$$0 = -au + bv$$

$$\text{or } v = \frac{a}{b} u.$$

Comparing this with

$$v = ck u,$$

we have

$$\frac{a}{b} = ck$$

or

$$a = bck$$

$$\text{and, therefore, } UW = \frac{s}{rck + s} m.$$

A third scale, the  $k$ -scale, may now be constructed on the line  $UV$ . Thus, if  $r = 2s$  for example, we have

$$UW = \frac{1}{2ck + 1} m.$$

Compute the values of  $UW$  corresponding to different values of  $k$ , and mark the corresponding points on  $UV$  with the proper value of  $k$ . Then a transversal through any value of  $u$ , found on  $UU'$ , and through any value of  $k$ , found on  $UV$ , will pass through the corresponding value of  $v$ , found on  $VV'$ .

## Two Straight and One Curved Scales

An alinement chart for

$$w = au + bv,$$

where  $w$ ,  $a$  and  $b$  are expressions each containing a single variable  $z$ , may be constructed as follows:

For example, let

$$z^2 = u(1+z) + v(2+z)$$

where

$$w = z^2, a = 1+z, b = 2+z.$$

Construct the  $UU'$  and  $VV'$  scales as in Fig. 1. The straight line  $WW'$  is replaced by a curve, each point on which is determined as follows: Assume a numerical value of  $z$ , compute the corresponding values of  $w$ ,  $a$  and  $b$ ; then compute the values of  $D_u$  and  $w_1$  from the formulas

$$D_u = \frac{sb}{ra + sb} m \quad \text{and} \quad w_1 = \frac{w}{ra + sb};$$

and then locate the point  $W_1$  by using these values of  $D_u$  and  $w_1$ .

Thus, if  $r = 20$  and  $s = 30$ , and if we assume  $z = 6$ , we find  $w = 36$ ,  $a = 7$ ,  $b = 8$ ,  $D_u = \frac{12}{19} m$ ,  $w_1 = \frac{9}{95}$ ; locate

the point  $W_1$  by using  $D_u = \frac{12}{19} m$  and  $w_1 = \frac{9}{95}$  of an inch;

and mark the value of  $z$  ( $= 6$ ) at  $W_1$ .

The same method may be used when any one or more of the three quantities  $w$ ,  $a$  and  $b$  is constant.

## Demonstration of Fig. 1

Let  $u'$  and  $v'$ , and  $u''$  and  $v''$ , be sets of values of  $u$  and  $v$  which, substituted in

$$w = au + bv \dots \dots \dots (a)$$

will produce the same value of  $w$ ; that is,

$$w = au' + bv' \dots \dots \dots (b')$$

$$w = au'' + bv'' \dots \dots \dots (b'')$$

On  $UU'$  (Fig. 3) lay off

$$UU_1 = u_1 = \frac{u'}{r} \quad \text{and} \quad UU_2 = u_2 = \frac{u''}{r} \dots \dots \dots (c)$$

since one inch on  $UU'$  represents  $r$  units in  $u$ ; and on  $VV'$  lay off

$$VV_1 = v_1 = \frac{v'}{s} \quad \text{and} \quad VV_2 = v_2 = \frac{v''}{s} \dots \dots \dots (d)$$

since one inch on  $VV'$  represents  $s$  units in  $v$ .

We wish to find the point  $W_1$  where the straight lines  $U_1V_1$  and  $U_2V_2$  intersect.

Considering the line  $U_1V_1$ , we have

$$WW_1 = u_1 + \frac{v_1 - u_1}{m} UW \dots \dots \dots (e)$$

Considering the line  $U_2V_2$ , we have

$$WW_1 = u_2 + \frac{v_2 - u_2}{m} UW \dots \dots \dots (f)$$

$$\therefore u_1 + \frac{v_1 - u_1}{m} UW = u_2 + \frac{v_2 - u_2}{m} UW$$

$$UW = \frac{(u_2 - u_1)m}{v_1 - v_2 - (u_1 - u_2)} = \frac{s(u'' - u')m}{r(v' - v'') - s(u' - u'')}$$

But, subtracting  $(b'')$  from  $(b')$ ,

$$v' - v'' = -\frac{a}{b}(u' - u'')$$

$$\text{and } \therefore UW = \frac{sb}{ra + sb} m \dots \dots \dots (g)$$

Then, from  $(e)$ ,

$$WW_1 = \frac{u'}{r} + \frac{rv' - su'}{rs} \frac{sb}{ra + sb} = \frac{au' + bv'}{ra + sb} = \frac{w}{ra + sb} \dots \dots \dots (h)$$

If  $u'''$  and  $v'''$  is any other set of values of  $u$  and  $v$  which, substituted in equation  $(a)$ , will produce the same value of  $w$ , so that

$$w = au''' + bv''',$$

and if  $UU_3 = u_3 = \frac{u'''}{r}$  and  $VV_3 = v_3 = \frac{v'''}{s}$ , the line  $U_3V_3$

will pass through the point  $W_1$ ; for the distance from  $W$  to the point where  $U_3V_3$  intersects  $WW'$  is

$$u_3 - \frac{u_3 - v_3}{m} UW = \frac{u'''}{r} - \frac{su''' - rv'''}{rs} \frac{sb}{ra + sb} \\ = \frac{au''' + bv'''}{ra + sb} = \frac{w}{ra + sb}$$

as before.

From equation  $(g)$  we see that  $UW$  is a constant, so that the point  $W_1$  must be on a line  $WW'$  parallel to  $UU'$  and  $VV'$ , and from equation  $(h)$  we see that  $WW_1$  depends upon the value of  $w$  and not upon the values of  $u$  and  $v$ .

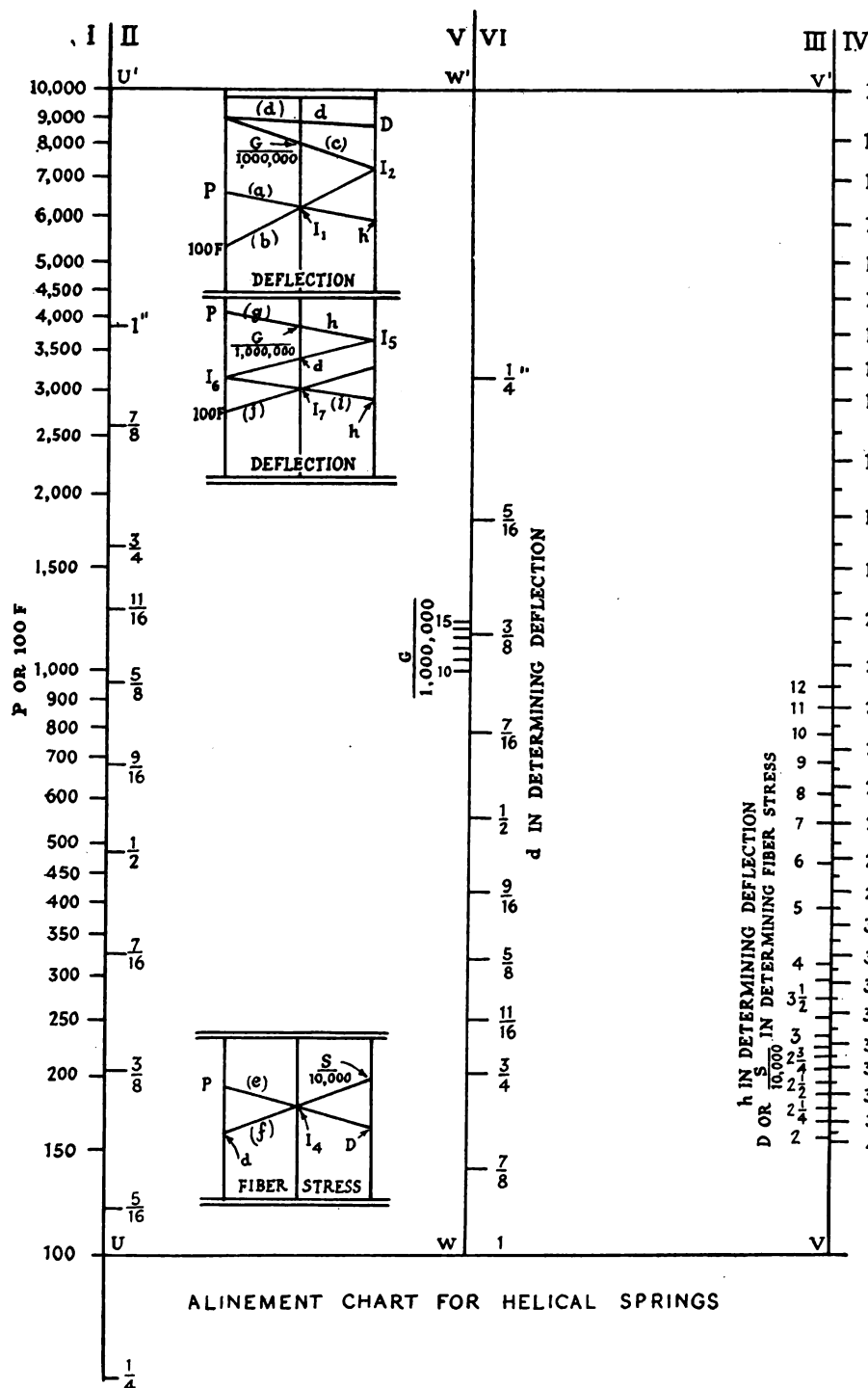
## Alinement Chart for Helical Springs

The accompanying alinement chart was designed to determine the diameter of the wire and the mean diameter of the coil of a helical spring formed of round steel wire, if the amount of compression or extension, the maximum load and the solid height are given, and to determine the extreme fiber stress under that load.

The formulas for helical springs made of round wire are

$$P = \frac{\pi S d^3}{8 D} \dots \dots \dots (5)$$





ALINEMENT CHART FOR HELICAL SPRINGS

shall be placed near each other. The results of the several operations are:

$$(a) \log \frac{P}{100} + \log \frac{8h}{10} = \log I_1;$$

$$\therefore I_1 = \frac{8hP}{1000}$$

$$(b) \log I_1 - \log F = \log I_2;$$

$$\therefore I_2 = \frac{8hP}{1000F}$$

$$(c) \log \frac{10G}{1,000,000} - \log I_2 = \log I_3;$$

$$\therefore I_3 = \frac{FG}{800hP}$$

$$(d) \log \frac{1}{d^2} - \log I_3 = \log \frac{100}{D^2};$$

$$\therefore \frac{8hP}{FGd^2} = \frac{1}{D^2}$$

which is one form of Eq. (6).

$$(e) \log \frac{P}{100} + \log \frac{8D}{10} = \log I_4;$$

$$\therefore I_4 = \frac{8PD}{1000}$$

$$(f) \log I_4 - \log \frac{100\pi d^2}{8}$$

$$= \log \frac{8S}{100,000};$$

$$\therefore \frac{8PD}{\pi d^2} = S$$

which is one form of Eq. (5).

$$(g) \log \frac{10G}{1,000,000} - \log \frac{P}{100} = \log I_5;$$

$$\therefore I_5 = \frac{G}{1000P}$$

$$(h) \log \frac{1}{d^2} - \log I_5 = \log I_6;$$

$$\therefore I_6 = \frac{1000P}{Gd^2}$$

$$(i) \log I_6 + \log \frac{8h}{10} = \log I_7;$$

$$\therefore I_7 = \frac{800hP}{Gd^2}$$

$$(j) \log I_7 - \log \frac{100}{D^2} = \log F;$$

$$\therefore \frac{8hPD^2}{Gd^2} = F$$

which is one form of Eq. (6).

## Heat Treatment of Molybdenum Steel

A REPORT of tests of heat-treated carbon-molybdenum and chromium-molybdenum steels has been completed by the Bureau of Standards.

Among the conclusions reached regarding steel containing 0.20 per cent carbon and 1 per cent molybdenum are the following: For the production of definite tensile strength, water quenching is to be preferred on account of the higher proportional limit, ductility and impact values obtained, and, conversely, better tensile properties are obtained for a given impact resistance.

Raising the quenching temperature from 1670 deg. Fahr. to 1795 deg. Fahr. does not materially alter the mechanical properties of the steel when subsequently

tempered at a relatively high temperature, 1000 deg. Fahr.

In normalizing steel containing 0.27 per cent carbon, 0.9 chromium and 0.5 molybdenum a low limit of proportionality and impact resistance are obtained when using temperatures between about 1450 to 1550 deg. Fahr.

The fact that no material changes in tensile or impact properties are produced by oil quenching the chromium-molybdenum steel from a wide range of temperatures when subsequently tempered at 1000 deg. Fahr. has been confirmed. To produce high impact values in the hardened steel, a tempering temperature in the neighborhood of 1200 deg. Fahr. is required.



# Production of Heavy Truck Banjo-Type Rear Axle Forgings

Working to close tolerances on an exceptionally large forging necessitates unusually large tools and careful heat treating methods. This article describes the machining and heat treating operations employed in making one of the largest drop forgings used in automotive production. Rough forging removes one hundred and fifteen pounds of stock

By Herbert Chase

**W**HAT is believed to be the largest drop-forging used in regular production in the automotive industry is the banjo-type rear axle produced in the Allentown plant of the International Motor Co. and used in the Mack Model AB dual reduction truck. It is a drop forging of chrome-nickel steel, 71½ in. long and 16⅜ in. wide at the center of the banjo, and weighs in the rough about 300 lb.

## Machining Operations

The machining of so large a forging to close limits presents some interesting problems. The forging is heat treated between certain of the machining operations. To straighten it after this treatment requires a 150-ton hydraulic press. Some of the tools used are larger than are ordinarily employed in automotive work. When finished the axle weighs about 185 lb. but is quite light for an axle suited for use in a 2½-ton truck, and is unusually strong because of the high-grade material used. In the accompanying drawing will be found the dimensions of both the rough and the finished forging, together with the tolerances allowed in machining.

The drop forging concerns who furnish the rough forging are given an option of two materials having identical physical properties. The chemical properties of the two materials are:

Alloying Ingredients	Chrome Nickel Steel	3½% Nickel Steel
Carbon .....	0.45 per cent	0.45 per cent
Manganese .....	0.60 per cent	0.60 per cent
Nickel .....	2.00 per cent	3.50 per cent
Chromium .....	0.75 per cent	.....

The physical properties of both materials are:

Tensile strength .....	130,000 lb. per sq. in.
Elastic limit .....	110,000 lb. per sq. in.
Elongation .....	17 per cent
Reduction of area .....	45 per cent
Brinell hardness .....	280 maximum
Forging heat .....	2,200 deg. Fahr.

The forging is furnished annealed by the vendor, and must have a maximum Brinell hardness of 280.

In the first machining operation both ends of the forging are cut off simultaneously by hacksaws set in position to give the desired length. This is not a rapid operation but is in step with other operations. The disks cut off by this means are used for test specimens to check analysis and hardness of the steel.

In the second operation the piece is laid in V-blocks and is gaged roughly to determine whether the metal of the forging is so disposed as to be properly cleaned up in the machining operations. This involves checking the

angle between the plane of the banjo and the plane of the spring seat. While the piece is in this position centers are drilled in each end.

The third machining operation consists in rough turning the outside ends of the tubular portion (now solid). The piece is mounted on lathe centers but is held rigid by the use of a heavy conical casting, the large end of which is bolted to the face plate of the lathe, and the center to the banjo of the axle. When one end has been turned, the piece is reversed and the same operation repeated on the other end. Between this and most of the succeeding operations, the forgings are handled by overhead air hoists on trolleys or cranes.

The fourth operation is accomplished on a Bullard Maxi-Mill (Fig. 1). This vertical boring machine is a 61-in. special type provided with a table about 7 ft. in diameter, a portion of the vertical guides on this machine having been cut away to permit the use of a table large enough to accommodate the full-length axle. In this operation the bore of the banjo and the banjo faces are rough turned, 1/16 in. (⅜ in. diameter) is left for the later finishing operations.

A battery of four Lodge and Shipley 22-in. lathes with long bed, especially rigged for deep drilling, are used for the fifth operation. The work is clamped in a special chuck fixture (See Fig. 2) at one end while the outer end is supported in a steady rest. As the work turns a gun drill, made especially for the purpose and held stationary in a support rest, is fed into the axis of the work with a feed of 9/16 in. per minute. The drill bar or shank is provided with two countersunk brass tubes which terminate in holes drilled in the cutter. Lard oil under 200 lb. pressure is led through these to the cutting edge, and is instrumental in forcing the chips out of the hole. The hole is finished in one operation to 2-1/32 in. dia. The hole is nearly 24 in. long.

## Heat Treatment Principally on Ends

Following this operation, the forgings are taken to the heat-treating room and given a heat treatment, the purpose of which is to remove internal stresses and bring the spindles and outer threaded ends to the required hardness. This treatment is principally on the ends, but is said to improve the structure of the banjo portion to some extent. Each end is raised to a temperature of 1500 deg. F. in a special twin type oil-burning furnace and then quenched in oil. In this quench the axle is suspended vertically to lessen the tendency to warp and distort. This method is commonly employed in heat-treating large guns.

## Various Milling Operations

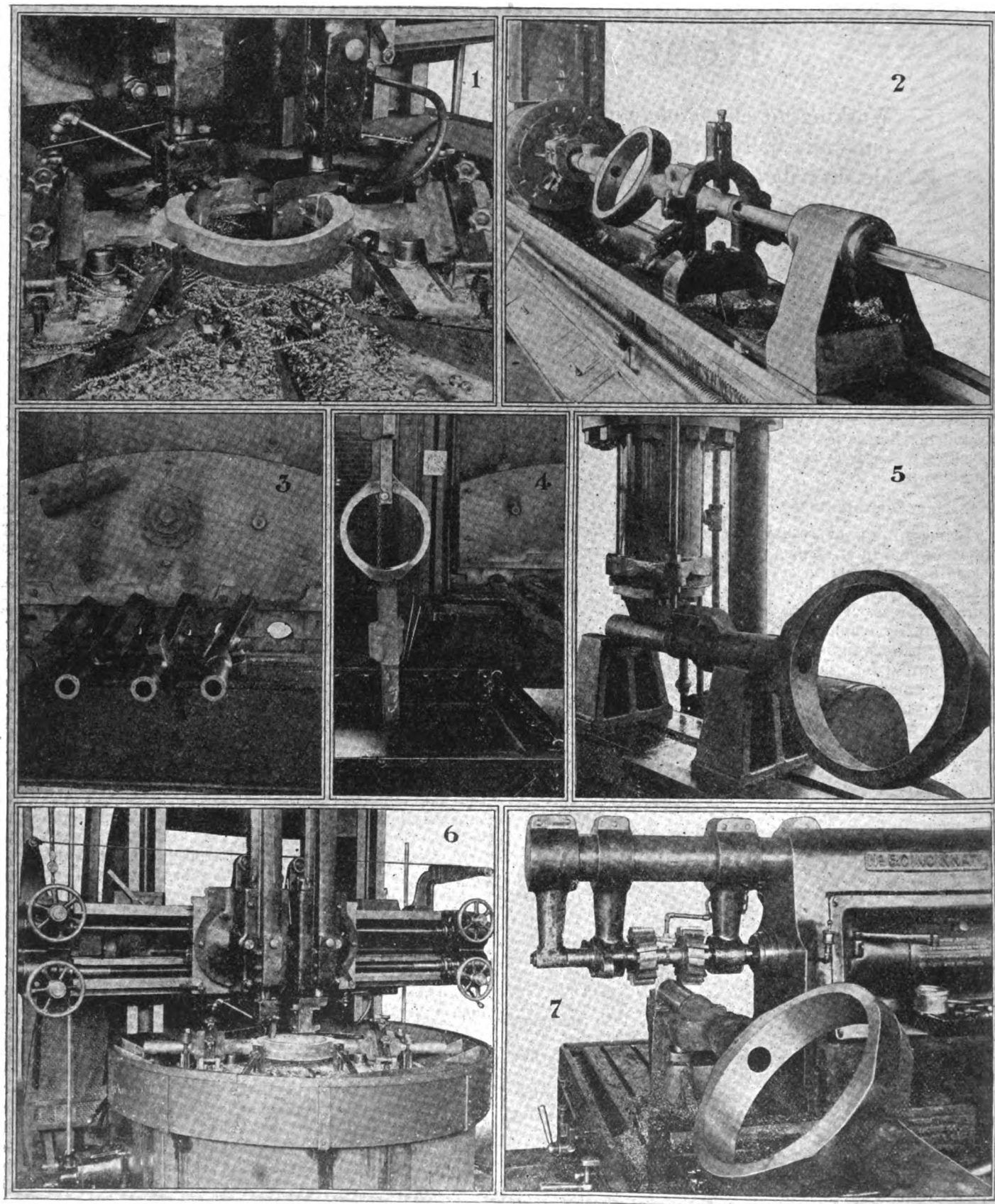
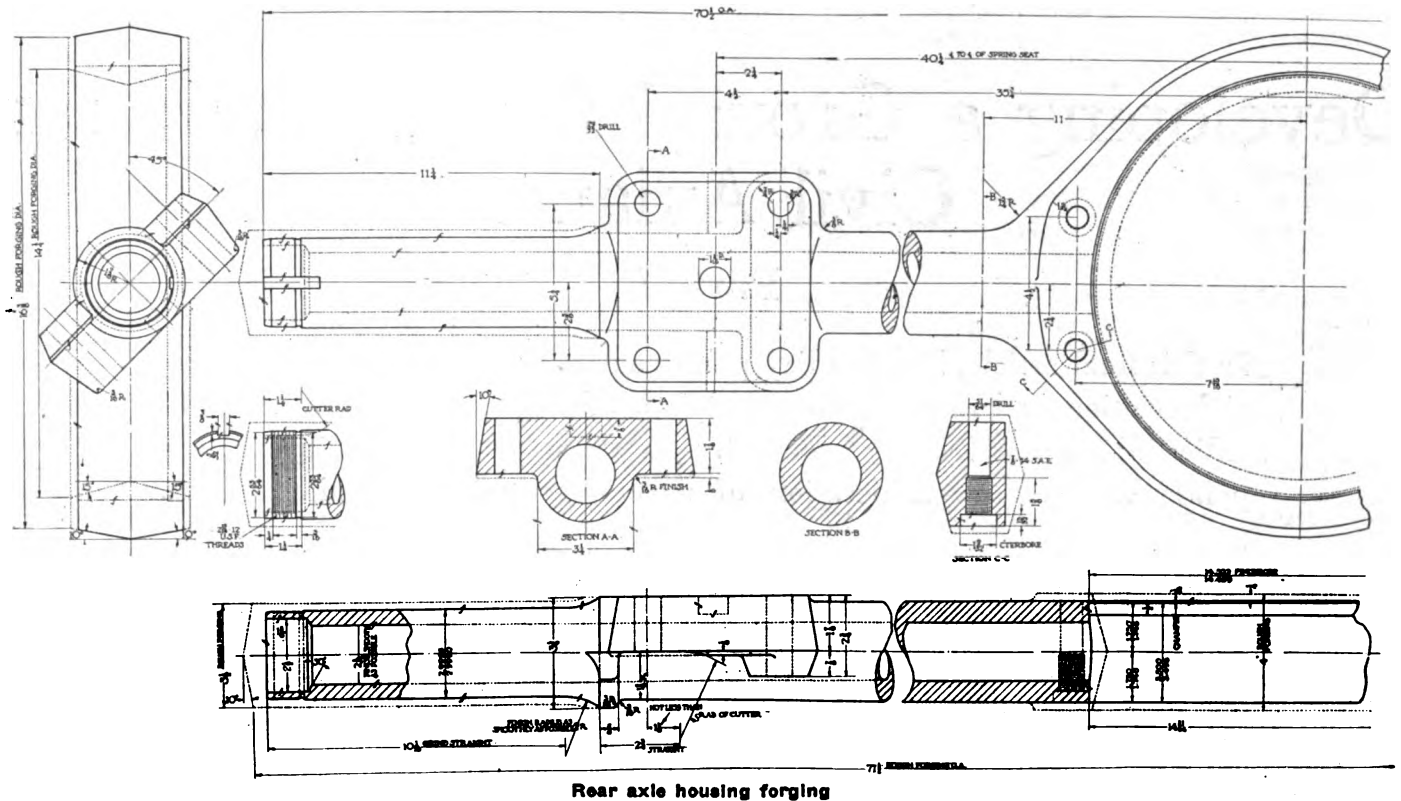


Fig. 1—This Bullard Max-I-Mill effects the rough turning process. Fig. 2—A special chuck fixture clamps the work for drilling. Fig. 3—Internal stresses in the axles are brought out by this heat treatment. Fig. 4—Another view of the heating process. Fig. 5—A 150-ton hydraulic press straightens the axles. Fig. 6—The Max-I-Mill is again shown as it is used in other operations. Fig. 7—Milling the bottom of the spring pad



After quenching one end the other end is placed in the furnace and the same treatment given it. When both ends have received this initial treatment, they are in turn re-heated to 1150 deg. F., to temper.

A view of the axles undergoing heat treatment is shown in Figs. 3 and 4. After heat treatment, the axles are tested for hardness which is held between 260 and 290 Brinell. They are then placed in V-blocks under a 150-ton hydraulic press, shown in Fig. 5, where they are straightened until a test bar, 0.010 in. smaller than hole, can be passed through bore from end to end of axle.

The forgings are then returned to the machine shop where they undergo the sixth machining operation accomplished on a standard American 24-in. lathe with 16-ft. bed. This operation consists of counterboring the axle ends to 2½ in. diameter and a depth of 1⅜ in., and threading the ends on the outside to receive the locking collar. The tail stock of the lathe is used to carry a cutter which counterbores and faces the axle end in one operation. The outside turning and threading are accomplished by four tools carried in a special turret made up for the purpose.

The seventh machining operation consists in turning the outside of the axle spindle and the radius at its inner end. This spindle fits the inner race of the Timken bearings and is held within limits of 2.9995 and 2.9990 in. Prior to this operation, which is accomplished on a LeBlond heavy lathe, the axle is provided with special expanding centers which fit into the counterbore at each end, and is stiffened by heavy steel bars bolted to each side across the faces of the banjo.

The work is returned to the Max-i-Mill, for the eighth machining operation shown in Fig. 6. It is carefully located in the fixture shown after which the following operations are performed simultaneously or in sequence.

1. Turn finishing cut on inside diameter of banjo.
2. Face both sides of banjo in fixed relation to the finishing cut on the spindle.

3. Counterbore banjo to receive carrier flange. This counterbore is held within the limits, 14.502, and 14.499, and is checked by snap and pin gages.

**4. Chamfer entering edge of carrier counterbore.**

The ninth machine operation is accomplished on a No. 5 Cincinnati milling machine. This consists in milling the bottom of the spring pad in fixed angular relation to the finished faces of the banjo. (See Fig. 7.) In this operation the work is held in V-blocks with pin contacts, and the face of the banjo is held in contact with a pin so located as to give the desired angular position. When the bottom of one spring pad has been machined, the piece is reversed for machining the other pad.

The tenth operation consists in milling the keyway through the threaded portion at each end of the axle. This operation is also accomplished on a No. 5 Cincinnati milling machine.

The eleventh operation consists in drilling the spring pads, using a special jig and supporting fixture.

The twelfth operation consists in drilling, counter-boring and tapping four holes in banjo for shouldered through studs to fasten carrier.

The final operation consists in trimming the external surface of the axle by use of a portable emery wheel, and hand cleaning to remove burrs, etc. Following this, the finished piece is carefully checked by special gages, as to bore of banjo, alignment of bore through spindles, diameter of spindles, and angular relation between the faces of spring seats and faces of banjo. The distance between the axis of the piece and the faces of the banjo and spring pads is also checked.

From the dimensions given on the drawing, it will be seen that the tolerances maintained are unusually close for so large a piece.

**A** FURTHER step in the movement toward the standardization of automobile, motorcycle and cycle parts has been taken by the British Engineering Standards Association in the formation of seven sub-committees to undertake the following sections of the work: Nomenclature, steels, small fittings, electrical fittings, shafts and shaft details; wheels, rims and tires, and cast iron. Technical data in regard to the specific subjects to be taken in hand immediately are being collected.

# Developing a Ground Organization for Civil Aviation

## Part II

In this final article, Mr. Bradley points out that the success of commercial aviation in France rests entirely upon the system of government subsidies which has been established. He discusses these and brings out points vital to a consideration of development in the United States.

By W. F. Bradley

**A**LL the commercial aviation lines operating in France at the present time have been created and are maintained in operation by reason of a system of Government subsidies granted to the aerial navigation companies. Half the purchase price of approved types of machines is paid by the State on condition that the owners maintain them constantly in flying condition and fill all the clauses of a well-defined contract.

In addition to the purchase subsidy, public service lines receive special subsidies based on hours of flight and on commercial efficiency. Until recently the subsidies were granted whenever a flight was made under the stipulated conditions, without any consideration of the useful load carried, and were thus an encouragement to fly in ballast. Such an arrangement could only be temporary, but it had its value, for it assured the regularity of trips from point to point even when there were no passengers or freight to be carried, and proved to the public that the airplane could be relied on for regular service.

At the present time the commercial subsidy is only granted when passengers or freight are carried, and when the journey is completely accomplished. If a plane sets out for a given point and has to abandon the trip a few miles from the end, the subsidy for that flight is lost. Also if an average speed of 80 miles an hour is not maintained, no subsidy is paid. When weather conditions are very unfavorable, the subsidy can be granted, on the recommendation of the competent authorities, if the flight shows a gain of 25 per cent on the fastest public service by train or steamer. The chief of the State aerodrome decides whether weather conditions are or are not suitable, and should his decision be in favor of a start and the plane does not leave, the subsidy is lost. Also, if there is a delay at the start, after weather conditions have been pronounced satisfactory, the subsidy is reduced 5 per cent for each quarter hour, or fraction thereof.

### Commercial Subsidies

The French commercial subsidy is 75 centimes a kilometer per passenger, and .005 centimes per kilo of freight carried at a scale of charges approved by the State. Fares are fixed at 80 centimes per kilometer per passenger, while the freight charges must be .015 centimes per kilogram-kilometer. Under this scale of charges the cost of an aerial trip from Paris to London, or Paris to Amsterdam, is 300 francs, or considered at nominal exchange 26 cents a mile. If the present actual value of the dollar is taken into consideration, a long-distance flight in Eu-

rope costs slightly less than 10 cents a mile. The rates now in operation are practically the same as first class fares on the railroad and steamship routes. There is no difference at all if the fact is taken into consideration that the aerial navigation companies pick the traveler up at his hotel in Paris and land him at the door of his hotel in London for the inclusive charge of 300 francs. By the more old-fashioned method of travel taxicab fares have to be paid at each end of the journey, and a certain amount has to be given away in tips at the railroad station and when changing from train to steamer and vice-versa.

### Regularity Encouraged

By reason of the high subsidies offered by the French Government, British firms operating on the London-Paris line have been seriously affected, and for a time all of them abandoned. More recently the Handley-Page Co. has resumed operations, but they undoubtedly are working at a loss in competition with the French. Although they have the advantage of a high subsidy, French firms declare that they are making little money, but there is no doubt that the regularity and the reliability of the airplane having been proved the public will travel by air in far greater numbers, now that the cost is practically the same as by the railroad.

It is recognized that regularity of operation must be encouraged by all possible means, and because of this an additional subsidy is granted when the proportion of trips successfully accomplished is high, and deductions are made when the percentage is low. Regularity is determined by the relation between the number of trips for which the subsidy is paid and the number on the program, the coefficient of variation being equal to the resultant expressed in hundreds, increased by 30 hundredths for the month of December and by 20 hundredths for the other months. As examples, if the regularity is 80 to 100, the coefficient becomes  $100-100 = 1$ , and there is no change in the subsidy. With a regularity of 90-100 the coefficient is 110-100, giving an increase of one-tenth in the subsidy. With a regularity of 60-100, the coefficient is 80-100, corresponding to a reduction of  $2/10$  in the subsidy paid.

In addition to this trip or commercial subsidy of 75 centimes a kilometer per passenger, there is an additional hourly subsidy made up of the four elements, as follows: Amortissement subsidy, crew subsidy, transport subsidy, and gasoline subsidy. For the amortissement the life of a plane is calculated at 200 hours' actual flight, and the price of the machine having been fixed by contract,

the formula becomes:

$$\frac{P \div 1.5}{200}$$

As half the cost of the plane has been paid by the State at the time of purchase, the amortissement subsidy paid by the Government is half the amount found by the above formula.

The crew subsidy is found by the formula

$$0.10 E m \div \frac{n HP}{2} \text{ francs,}$$

in which  $E m$  is the length of the average flight, or when a flight is made in several stages the total distance divided by the number of stages.

The transport subsidy is found by the formula:

$$\frac{K}{1000} V^3 T$$

in which  $V$  is the official speed in kilometers of the plane at an altitude of 6500 ft.,  $T$  the tonnage of the plane after deduction of the weight of the crew, navigating instruments, weight of fuel necessary to maintain a ceiling of 13,000 ft. after one hour's flight, and to cover a distance of 300 miles with a head wind of 10 meters per second.  $K$  is a coefficient which varies from 11 for regular journeys of 125 miles to 19 for trips of 620 miles.

The gasoline subsidy is determined for fixed cylinder engines by the formula:

$$n HP \times \frac{0.250}{0.65} \times \frac{p}{2}$$

in which  $n HP$  equals the number of horsepower, and  $p$  the price of gasoline in liters, this price being determined at the beginning of every quarter. For rotary engines the formula is:

$$n HP \times \frac{0.320}{0.65} \times \frac{p}{2}$$

The object of the subsidy system being the development of French aviation, all foreign elements are eliminated. The president and at least two-thirds of the directors of the subsidized company must be of French nationality; all the planes and engines must be of French design and construction, and the pilots and mechanics must be French citizens, and possess French Government licenses.

### Material Control

A rigorous control is maintained over all the material. No plane can go into service unless it has been approved by the Technical Department of the Air Service; it must constantly be maintained in good flying condition, and after 200 hours' flight it must either be scrapped or entirely rebuilt. A certain amount of discretion is displayed in the application of this latter rule, for a plane may have been maintained in such excellent condition that its life is far from ended after 200 hours in the air. The subsidy, however, for that machine is never continued unless the Technical Department has pronounced favorably on its condition after overhauling, and every three months, or every 50 hours of flight after the first 200 it must be submitted for thorough technical examination.

For engines the normal life is estimated at 100 hours' operation, but here again it is possible for the maintenance to have been undertaken in such a thorough manner that at the end of the hundred hours few of the original parts are left and the engine is in as good a condition as when it went into service. Every month detail reports showing the state of planes and engines, and indicating the work done on them, have to be submitted to the Aerial Navigation Service. Similar reports have to be supplied concerning the flying and mechanical staffs.

Aerial navigation companies must maintain a minimum of one pilot for three planes and at least one mechanic per 300 hp. For any given line the minimum number of planes which must be maintained by the operating company is determined by dividing the total number of hours of flight figuring on the program for the year by 200 and multiplying by 2. The average commercial speed must not be less than 80 miles an hour. Number of planes = 
$$\frac{2 \times \text{daily flights in hours} \times \text{number of days' service}}{200}$$

For a service such as that from Paris to London, the program of which may call for operation 300 days in the year, a minimum of nine planes would have to be maintained by the subsidized company. The general rule regarding the frequency of trips is that a daily service must be maintained when the distance covered is less than 150 miles from the French frontier, and at least three times a week for Northern African and other international lines running at least 150 miles from the French frontier.

### Penalties

While the entire system under which subsidies are granted tends toward regularity of operation, the State imposes penalties when regularity is not kept up to a certain standard. Thus if for any cause the irregularity falls for two consecutive months below 40 per cent during December to March, and below 50 per cent for any other months of the year, the subsidies are suspended until the regularity has risen to more than 40 per cent in the first case and more than 50 per cent in the second case. A period of two months is allowed to re-establish the service on this basis, and if the improvement is not made within this time the subsidy is permanently withdrawn.

The main subsidy is now granted on the number of passengers, or the quantity of freight carried, and not on trips made light or in ballast. But in addition to this the subsidy is suspended if during three consecutive months the number of paying passengers or the quantity of paid freight is less than 30 per cent of the capacity of the planes in service. The subsidy is not given again until the commercial efficiency has risen to at least 30 per cent of capacity.

The end of the war found France with an immense number of aviation grounds, few of which were suitable for commercial services. For military operations the grounds had to be immediately in the rear of the armies, and were therefore most plentiful in the north and the east. There were no aviation routes, as they are understood now, for all flights were from the rear of the Allied armies to the German front line or to points in Germany.

As a consequence, France derived little material benefit from the aerodromes bequeathed to her during the war, and in the great majority of cases these grounds have been given back to their original owners. There are a few exceptions, such as the American Air Service reception and dispatching ground at Orly, near Paris, which has been taken over by the Aerial Navigation Service and is being equipped as an airship port. Commercial value can only be derived from landing grounds when they are placed on an important line of flight. While local authorities should be encouraged to help in the development of aviation ground organization, and can assist considerably by the gift of land in the neighborhood of important centers, there is not much to be gained by mere groups of grounds.

At the present time France possesses about thirty State owned and controlled aviation grounds, and about twenty privately owned aerodromes. These figures, however, are not any real indication of the value of the grounds to commercial aviation, for a string of equally spaced landing



grounds between Paris and London, or between Paris and Brussels, can be of infinitely greater value than a big grouping of grounds around Bordeaux or near the Spanish frontier.

Last year the total distance covered by public service planes operating under the control of the French Aerial Navigation Service was 1,203,565 miles. This figure comprises flights with passengers or merchandise accomplished according to schedule. No military flights, demonstration trips, tests, or private journeys are included.

#### Passenger Service

The greatest volume of traffic was, and still is, between Paris and London, over a country which is most unfavorable for flying, for it is adversely affected by fog, and comprises the crossing of the English Channel. The effect of fog is shown by a comparison of the number of trips made between England and France during the winters of 1919-1920 and 1920-1921. The past winter was exceptionally mild, with an almost entire absence of violent storms, but as a considerable amount of fog prevailed, the regularity of the service was much more affected than during the wild and severe winter of 1919-1920. There is no doubt that given the ground and general organization existing on the Paris-London line very much better results would be obtainable in the United States by reason of the more favorable climatic conditions.

To develop a passenger-carrying service, freedom from accident is essential, with regularity as an important but secondary consideration. For a freight service regularity is of primary importance.

The degree to which these two requirements have been obtained is shown by the official returns for the public service lines under the control of the French Aerial Navigation Service. For the years 1919 and 1920, when the mileage covered by public service planes was 1,203,565, with a total of 6697 passengers, the number of fatal accidents was fourteen, or one person killed per 85,973 miles flown. Merely as a matter of comparison it can be noted that for a period of twelve months, including a portion of the time mentioned above, the distance covered was 1,148,188 miles and 15,697 passengers carried with fifteen deaths, giving one person killed for a distance of 76,545 miles. During this latter period passenger traffic has increased enormously, and although the number of accidents per mile is higher, the proportion of passengers killed is much lower.

In arriving at the figure of one person killed for every 85,973 miles flown, it should be noted that no advantage has been taken of such trips as the trans-Atlantic flights, the Farman flight from Paris to Northern Africa, and large numbers of other European sporting and demonstration events, all of which were accomplished without a fatal accident. These figures are important, for they are the first of their kind covering aviation on a commercial basis. Insurance companies up to the present have shown very little confidence in aviation, and have always insisted on very high premiums being paid. Undoubtedly this is owing to the fact that all the figures they have obtained on aviation accidents have dealt with, or comprised, military and demonstration or stunt flying, which are entirely foreign to commercial aviation.

#### Freight Carrying

The increase in the amount of freight carried on the Paris-London line is remarkable, the figures jumping from 31,040 pounds in 1919 to 271,720 pounds in 1920. The great proportion of this was from Paris to London, only a comparatively small amount coming from England to France. There are two reasons for this. Paris manufactures quantities of high-grade and costly articles which can bear the increased cost of transportation by airplane.

As examples, dresses, hats, jewelry, fancy goods, and small automobile parts are shipped regularly by airplane from Paris to London, but there is comparatively little traffic of these goods in the opposite direction.

Another reason for the heavier traffic Londonward is the better publicity carried out in France. Instead of merely advertising the airplane service in a general way, as is done in England, the commercial departments of the French aerial navigation companies circularized all the big stores, all the high-class milliners, dressmakers and jewelers, and in many cases paid personal visits and pointed out the great advantages to be derived from shipping goods by airplane instead of by train and steamer. The dispatching departments were induced to make a trial, and in nearly every case it soon became common practice to prefer the airplane for urgent deliveries. In the matter of mail, the bulk of the traffic is from London to Paris, but this is owing to the fact that the rates are much lower from London than in the opposite direction.

In addition to the commercial lines from Paris to the north and northeast, there is another important line, of an entirely different nature, from Toulouse in the south of France to Casablanca in Northern Africa. Here the amount of traffic is light, but the ordinary means of locomotion are so defective that the airplane has really no competition from train and steamer. The distance from Toulouse to Casablanca is 1150 miles, and by airplane can be covered in 13 hours' flight, or in two days' elapsed time, for the journey is made in four stages and there is no night flying. This compares with seven to eight days by the fastest boat and train service. This route, unlike those in Northern France, is entirely free from fog, and is not often affected by storms.

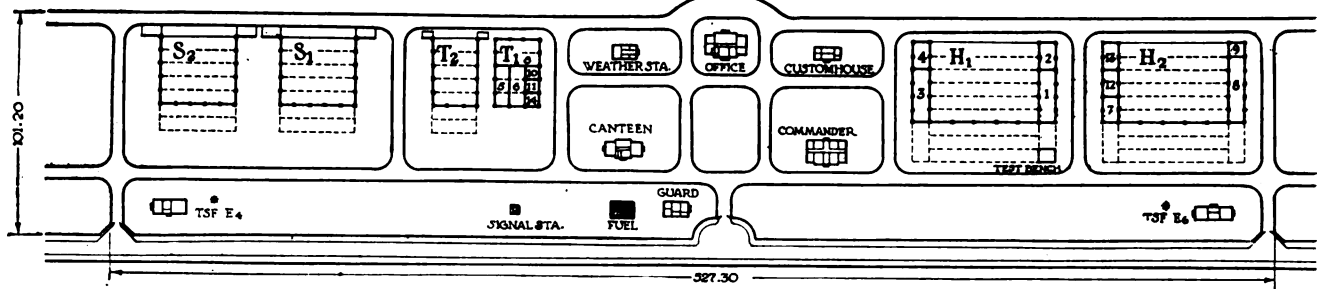
#### An Important Line

It covers only a slight distance over French territory, has been established by the Latecoere Co. and is operated entirely by them, under the French subsidy system, but without the use of French Government landing grounds. French military grounds are used in Africa. The line of flight follows the Spanish coast to Gibraltar, then cuts across the Mediterranean to Tangiers, and follows the northern African coast as far as Casablanca. As the French Aerial Navigation Service cannot establish landing grounds outside its own territory, this work has been taken up by the Latecoere Co., and emergency grounds have been laid out at intervals of 60 miles along the entire route. The journey is made in four stages: Toulouse to Barcelona, Barcelona to Alicante, Alicante to Malaga, and Malaga to Casablanca, the average length of the stages being a little less than 300 miles. By following the coast line for the entire distance all difficulties regarding the route are avoided, and there is also the advantage that in addition to the 60-mile emergency landing grounds the pilots can bring their machines down on the sea shore in case of absolute necessity. These landings, of course, are not recommended, for it is difficult to get away again from the sand, but their possibility offers a guarantee against serious accidents. Because of these specially favorable conditions, compared with the more northerly lines, the Latecoere Co. was able during a whole year to maintain a regularity of 97 per cent. Only 3 per cent of the trips were not accomplished or were not finished within the time limit necessary to get the Government trip subsidy.

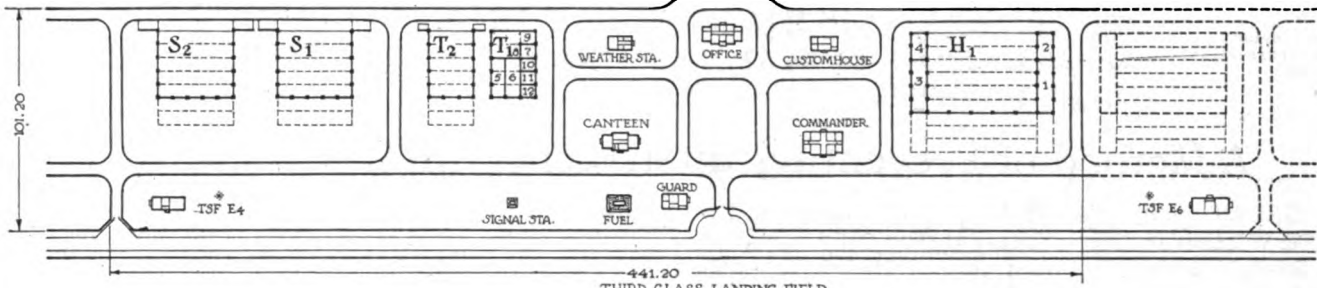
Machines used on this route are the Breguet 14 A2 and the Salmson Corps d'Armée type, the former being fitted with the Renault engine and the latter with the Salmson star-type water-cooled engine. These machines have been modified for commercial purposes and carry two passengers, mails and freight, with a fuel supply for four hours' flying.

For this 1150-mile route, with three departures in

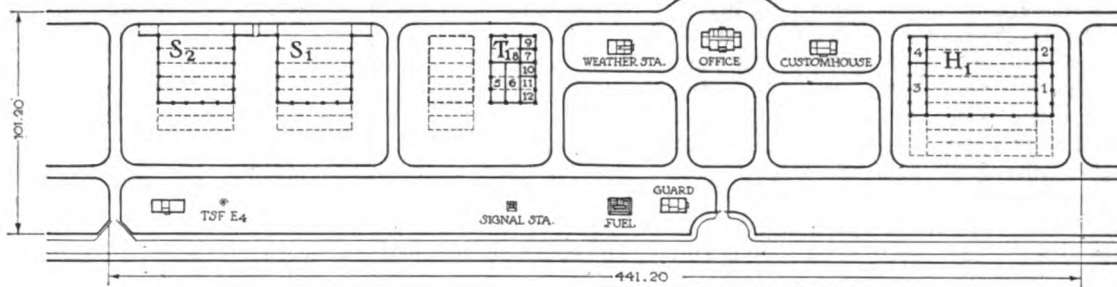
FIRST CLASS LANDING FIELD



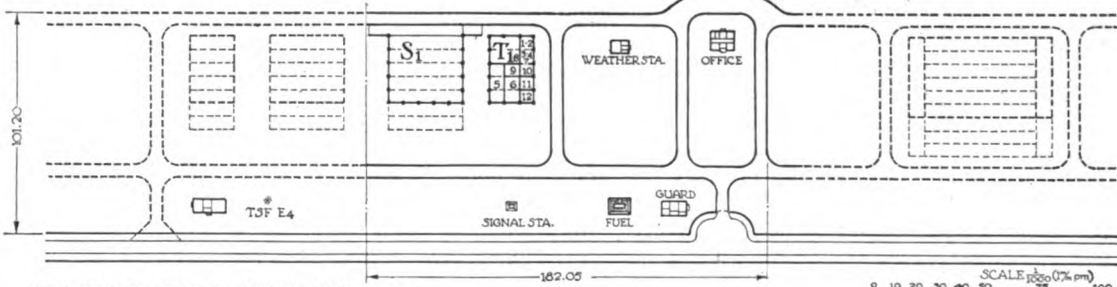
SECOND CLASS LANDING FIELD



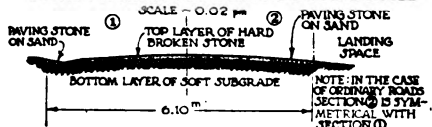
THIRD CLASS LANDING FIELD



FOURTH CLASS LANDING FIELD



SECTION OF ROADS SURROUNDING LANDING SPACE



EMERGENCY LANDING FIELD

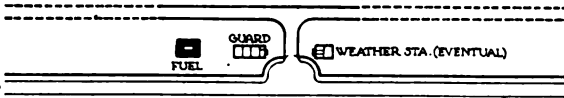


Diagram	Intended Use	Provisional	Definite
FIRST CLASS	1 Machine shop	T <sup>1</sup> 6x7	H <sup>1</sup> 24x7.5
	2 Stockroom for same	T <sup>1</sup> 6x7	H <sup>1</sup> 12x7.5
	3 Woodworking shop	T <sup>1</sup> 6x7	H <sup>1</sup> 24x7.5
	4 Stockroom for same	T <sup>1</sup> 6x7	H <sup>1</sup> 12x7.5
	5 Electric shop	T <sup>1</sup> 18x7	T <sup>1</sup> 18x7
	6 Stockroom for same	T <sup>1</sup> 12x7	T <sup>1</sup> 18x7
	7 Tinshop and forge	T <sup>1</sup> *	H <sup>1</sup> 12x7.5
	8 Automobile garage	T <sup>1</sup> 12x14	(T <sup>1</sup> 12x20 H <sup>1</sup> 30x7.5)
	9 Stockroom for same	T <sup>1</sup> 6x7	H <sup>1</sup> 6x7.5
	10 Weather station stockroom	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	11 Emergency station	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	12 Fire station	T <sup>1</sup> 6x7	H <sup>1</sup> 12x7.5
	13 Mechanics' lodgings	T <sup>1</sup> *	H <sup>1</sup> 12x7.5
	14 Unassigned	T <sup>1</sup> 6x7	
SECOND CLASS	1 Machine shop	T <sup>1</sup> 6x7	H <sup>1</sup> 24x7.5
	2 Stockroom for same	T <sup>1</sup> 6x7	H <sup>1</sup> 12x7.5
	3 Woodworking shop	T <sup>1</sup> 6x7	H <sup>1</sup> 24x7.5
	4 Stockroom for same	T <sup>1</sup> 6x7	H <sup>1</sup> 12x7.5
	5 Electric shop	T <sup>1</sup> 18x7	T <sup>1</sup> 18x7
	6 Stockroom for same	T <sup>1</sup> 12x7	T <sup>1</sup> 18x7
	7 Tinshop and forge	T <sup>1</sup> *	T <sup>1</sup> 6x7
	8 Automobile garage	T <sup>1</sup> 12x14	T <sup>1</sup> 12x14
	9 Stockroom for same	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	10 Weather station stockroom	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	11 Emergency station	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	12 Fire station	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7

Diagram	Intended Use	Provisional	Definite
THIRD CLASS	1 Machine shop	T <sup>1</sup> 6x7	H <sup>1</sup> 24x7.5
	2 Stockroom for same	T <sup>1</sup> 6x7	H <sup>1</sup> 12x7.5
	3 Woodworking shop	T <sup>1</sup> 6x7	H <sup>1</sup> 24x7.5
	4 Stockroom for same	T <sup>1</sup> 6x7	H <sup>1</sup> 12x7.5
	5 Electric shop	T <sup>1</sup> 18x7	H <sup>1</sup> 17x7
	6 Stockroom for same	T <sup>1</sup> 12x7	H <sup>1</sup> 18x7
	7 Tinshop and forge	T <sup>1</sup> *	T <sup>1</sup> 6x7
	8 Automobile garage	T <sup>1</sup> 12x14	T <sup>1</sup> 12x14
	9 Stockroom for same	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	10 Weather station stockroom	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	11 Emergency station	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	12 Fire station	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
FOURTH CLASS	1 Machine shop	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	2 Stockroom for same	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	3 Woodworking shop	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	4 Stockroom for same	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	5 Electric shop	T <sup>1</sup> 18x7	T <sup>1</sup> 18x7
	6 Stockroom for same	T <sup>1</sup> 12x7	T <sup>1</sup> 12x7
	7 Tinshop and forge	T <sup>1</sup> *	
	8 Automobile garage	T <sup>1</sup> 12x14	T <sup>1</sup> 12x14
	9 Stockroom for same	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	10 Weather station stockroom	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	11 Emergency station	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7
	12 Fire station	T <sup>1</sup> 6x7	T <sup>1</sup> 6x7

\* Located in machine shop. The location and the size of buildings. TSF (Stations E<sub>4</sub> and E<sub>5</sub>) vary with the field. Useful information can be obtained from the Communication Dep. The size of the weather station varies with the field; information can be obtained from the Weather Bureau.

either direction every week, the company has to maintain a fleet of eighty planes in order to assure a regular service. At least ten planes are always kept in reserve at the three intermediate stations between Toulouse and Casablanca in order to assure a regular service in case of mechanical failure or breakdown. Established on Sept. 1, 1919, this company had flown 435,000 miles by the end of February, 1921, and carried 12,000 passengers.

### Results of Commercial Aviation in France

#### PUBLIC SERVICE LINES ONLY—YEARS 1919-1920

Lines	No. of Complete Trips	Miles Flown	Paying Passengers	Freight, Lb.	Mail, Lb.
<i>International Lines:</i>					
Paris-London	1919 365	88,190	683	18,408	160
Paris-London	1920 2,578	616,332	5,859	239,589	5,118
Paris-Brussels (via Lille)	1919 473	59,126	27	9,296	470

Lines	No. of Complete Trips	Miles Flown	Paying Passengers	Freight, Lb.	Mail, Lb.
<i>International Lines:</i>					
Paris-Brussels (direct)	1920 387	68,953	302	3,832	496
Bayonne-Bilbao	1919 60	2,050	0	0	0
Bayonne-Bilbao	1920 139	13,866	36	0	0
<i>Local and Colonial Lines:</i>					
Toulouse-Casablanca (Africa)	1919 241	66,889	3	1,494	395
Toulouse-Casablanca (Africa)	1920 885	227,422	126	21,825	7,539
Paris-Cabourg (Season traffic only)	1919 34	3,780	16	1,840	0
Paris-Cabourg (Season traffic only)	1920 63	7,391	41	1,944	0
Total traffic 1919	1,173	220,035	729	31,040	1,025
Total traffic 1920 (including new lines)	4,428	983,530	5,968	271,720	13,306
	5,601	1,203,565	6,697	302,760	14,331

For 1,203,565 miles of flight 14 persons killed, being one death per 85,973 miles flown.

Customs import duties at Le Bourget (Paris) Air Port:  
1919.....15,000 francs 1920.....310,000 francs

## A Method of Preventing Interference in Worm Gearing\*

A GREAT many manufacturers mill hobs on Pratt & Whitney or Lees-Bradner thread millers, which do not produce a straight sided thread, the curve varying with both the helix angle and the diameter of the milling cutters. If this hob is relieved by any method that leaves the curve on the side of the thread as it was milled; if you proceed to hob gears with it, and your customer then cuts the mating worms with a single point tool in a lathe when the worm gears are installed they are going to give trouble, and complaints will come in that the sets heat up and cut and are noisy, simply because the teeth in the gear and worm do not conform.

To verify the truth of this statement, hob a worm gear with the curve on the side of the tooth of the hob, and mesh it with a worm produced with a single point tooth on a lathe, mounting this pair in any fixture that will give the correct centers. You will find them to be noisy and to give poor tooth contact. To determine just how much it takes to correct them, take this same worm and let a man who can score the sides of the teeth in file form, put the worm back and run it into the worm gear, and it will surprise you to see the amount of iron dust that will pile up under this worm and gear on the table of your testing machine.

Some manufacturers claim to get fairly good results from a fly tool used on machines geared up to pass a fly tool through the periphery of the teeth, but I am frank to say that we have never gotten a worm gear from this method that was not a series of very pronounced flats. This leads me up to observations made in a number of experiments and tests which were more or less contrary to standard practice. The latter in my estimation does not give as good results as I have obtained by making the pitch diameter equal to 0.99, its correct theoretical value, or by cutting one tooth more in about 50.

In a worm and gear, of which the gear blank is cut with one more tooth in 50, there would be interference at the corner of the worm tooth from the pitch line down to the root of the tooth if it were not that the hob had removed or under-cut the tooth. Part of this interference is caused by the worm or hob being of greater linear pitch than the worm gear, but on the adjacent tooth this interference would have been less, and on the third tooth there would have been very little interference. This cut away or under-cut from the pitch line down is what is wanted, as it keeps the mating worm and gear from rubbing at this point when the worm and gear are first meshed, with the result that the bearing or contact of the worm is of double involute shape from the center of the

gear outward. That is, the contact is thrown down to the bottom of the worm tooth, which is the most efficient point of contact as regards rubbing or frictional loss.

In addition to this central contact a contact is obtained at the very points of the teeth, which soon wear into involute shape. This contact is obtained in a few minutes of running without abrasive material.

With the slight amount of metal removed below the pitch line by the under-cutting process just spoken of, the surfaces are so close together that it is only a short time until perfect contact is obtained on the whole tooth, whereas in a worm gear with a theoretically correct pitch diameter, excessive pressure occurs below the pitch line in the center of the gear and at the two points of the tooth.

This being so radical a departure from former practice and theories I would have been loath to go into this explanation had it not been for the fact that all our customers who gave the method a fair trial obtained better results than with the old method. This method was first brought to my attention through a gentleman by the name of Voltaire. We made quite a number of tests and have as a result adopted this method in all of our own worms and gears that we market for sale in sets.

## Economic Aspects of Great Lakes-St. Lawrence Ship Channel

THE proximity to the Great Lakes of a great part of the automotive industry has made the Great Lakes-St. Lawrence Ship Channel of special interest to such manufacturers. High freight rates and freight congestion during peak production times are other factors which have led automotive manufacturers to scrutinize carefully the various phases of this much-discussed waterway project.

The economic aspects of the Great Lakes-St. Lawrence Ship Channel are discussed in a practical and interesting way by Roy S. MacElwee and Alfred H. Ritter in a volume recently published by the Ronald Press Co. The book is entitled "Great Lakes-St. Lawrence Ship Channel," and comprises a detailed study of the present transportation situation, especially as related to this proposed waterway. The book is a result of a careful and practical survey of the entire situation made by the authors and takes up such matters as the cost of transportation between upper lake ports and Liverpool, production in the territory tributary to the Channel, comparison of navigation facilities on the Great Lakes with those of ocean ports, the problem of return loads, the volume of commerce affected by the Channel, etc.

\*From a paper read by John B. Foote before the American Gear Manufacturers' Association at their Cincinnati meeting.

# The Motor Bus Field as a Market for Trucks

There is undoubtedly a large field for the development of the motor bus in the United States. How far this method of transportation can be developed and the means to hasten its growth can be determined only after careful analysis. This article is of interest because it gives the opinion of one man who has visualized the possibilities of the field.

**I**N discussing potential truck markets, there is a necessity for visualizing the possibilities of motor bus development in this country. After this general picture has been obtained, a careful study of the more detailed phases of the market, together with constructive help in the development of motor bus travel, will aid materially in selling trucks to this field.

Certain fundamentals underlie the development of the bus market. These relate to the type of chassis construction, the adaptability of the truck unit to the special type of transportation for which it is to be used, and other similar factors. A few companies have studied these problems carefully, but they are still far from being fully solved. Truck manufacturers may well profit by more extensive research into the engineering and merchandising problems involved in the motor bus field, as the possible growth of such transportation is not yet conceived in many quarters.

Because of the importance of this potential market for the truck, the remarks recently made by a prominent truck axle manufacturer are of special interest at this time. Ezra W. Clark, at the recent M.A.M.A. credit convention, outlined briefly some of the problems underlying the motor bus problem and indicated the certain lines of probable development. While some of the conclusions drawn may be a trifle too optimistic as regards the immediate future, the general trend is undoubtedly along the lines indicated. Before the market can be developed to a high degree, however, considerable sales effort and analysis will be necessary. Mr. Clark said in part:

## Special Bus Chassis

It was only a few years ago that a very large percentage of the motor trucks in use were, in reality, but converted passenger car chassis. The use of these converted motor trucks soon developed two facts: First—that the world needed motor trucks. Second—that a passenger chassis could not be made to do double duty in the specialized field of freight transportation.

Today a very large percentage of motor buses used in America are built on regular truck chassis. The use of these converted motor buses has developed two facts: First—that America needs motor buses. Second—that converted motor truck chassis cannot be made to do double duty in the specialized field of commercial passenger transportation.

Opportunity and ability constitute duty. America needs motor buses. The motor truck industry of America has the ability to produce motor buses and the fulfillment of this obligation will bring the automotive industry under the approving eyes of the nation. Doing a worth while

thing well will establish our industry in the good will of public opinion.

The population of the United States increases approximately 20 per cent every ten years. It has increased from 75,000,000 in 1900 to 105,000,000 in 1920, of which a disproportionate percentage has occurred in the cities. Urban population is increasing at the rate of 34.9 per cent as compared with 11.1 per cent in rural districts. The burden of transporting the immense armies of city workers to and from their homes each day has fallen, in the main, upon the trolley systems of America. New York, Chicago, Boston and Philadelphia have supplemented the trolley with elevated lines and subways. (Chicago's subway designed but not constructed.) Trolley building has almost ceased in America.

The cessation of trolley construction has been due to the increasing costs of construction and the growth of the automobile as a passenger carrying vehicle. This new unit of transportation has supplemented existing transportation systems and by reason of its speed and flexibility, has greatly enlarged the residential sections of all our cities.

## "Jitney" Service Usually Unprofitable

Sporadic outbreaks of "jitneys" in various cities, show the possibilities of motorized passenger transportation—these epidemics have also shown the fallacy of trying to operate high-powered, small capacity passenger automobiles at a profit. The public has been educated at the expense of the "jitney" owners and operators.

The growth and development of most cities has radiated from their business sections along fixed lines of transportation so that in many cities "outlying" and "neighborhood" business and recreation centers have grown up with startling rapidity.

An analysis of the transportation facilities of any of our cities, in view of these facts, will show a wonderful opportunity now open to improve the present systems with motor bus lines. These may be operated by and in conjunction with the present trolley systems or by independent companies over routes laid out by city authorities so as to bring the wage earners of the cities into close touch with their places of employment and recreation.

The quickest, most convenient and most comfortable way in which the present transportation systems of our cities can be supplemented and enlarged, is by the development and use of the motor bus. An exhibition of the successful operation of motor bus lines in some of our larger cities indicates that this phase of city life will see a marvelous and stupendous growth in the next few years.

Specialized work requires specialized equipment. The

character of service required should govern the design and construction of motor vehicle used for the commercial transportation of passengers. Eliminating the automobile and taxi-cab, motorized passenger vehicles may be divided into the following four classifications:

### Types of Bus

The development of the automobile has made rather startling changes in the systems of rural education. The isolated "little red school house" is being abandoned in favor of larger consolidated schools in the center of rural population. This evolution means larger and better schools with a consequent raising of the standards of instruction. School buses operated by townships and school districts, make regular runs, bringing the children to the central grade schools. Buses for this service are of two types—very light construction for use on dirt and unimproved roads and the heavier type designed for use on improved and hard roads.

**Motor Stages**—Seating from 12 to 20 passengers, operated by one man, pneumatic tires, speed of 20 to 35 m.p.h., are coming into prominence.

This type of vehicle is suitable for suburban service and passenger traffic between cities. Motor stages of this type—the European "Charabanc"—are now very largely used in California and many of the western railroads are using them as feeders to and from their divisional points.

**Single Deck Buses**—Seating from 18 to 30 passengers—operated by one man—pneumatic tires or cushion wheels—speed governed by ordinance.

This type of bus can be used to supplement the service of double deck buses during the peak hours in cities where the volume of traffic does not require the use of a heavier type bus; also used as extensions to double deck bus service carrying passengers further out into the suburbs; can be used by public utility companies to supplement present trolley systems and as cross town feeders. At present it is almost impossible to raise money for public utility extensions and improvements, and this type of bus presents an inexpensive method of extending present facilities without the need of expensive track and power house construction. This type of bus can also be used for transfer of passengers between railroad terminals and hotels.

**Double Deck Buses**—Seating from 40 to 50 passengers, manned by driver and conductor—operating on solid tires or cushion wheels.

This type of motor bus is indicated for service along regular routes preferably on streets not occupied by trolley tracks, covering distances from 4 to 10 miles, along the main arteries of traffic. They can be profitably operated in large cities and in smaller cities where there is a heavy peak load at certain hours of the day.

There are, in addition to the types mentioned, one or two other phases of motor bus construction which may be described as incident to a period of transition. In this class should be placed the trolley bus, operating without tracks on rubber tires, obtaining its power from an overhead trolley. Also, the flanged wheel motor bus, operating economically and efficiently as a passenger vehicle on short line railroads where the traffic does not warrant the use of expensive railroad equipment.

### Design Problems

Motor bus operation in many cities has shown that standard truck chassis are not suitable for motor bus construction and service for the following reasons: excessive weight; too much unsprung weight; high center of gravity; rigidity of suspension; unsuitable gear ratios; narrow treads; large turning radius; stiff steering gear; high top clearance; high passenger floor; too short wheel

base, causing dangerous overhang. The development of these shortcomings of standard truck construction shows the necessity of special construction for motor buses, covering the following points:

- Lightness with strength (insuring minimum gas consumption).
- Small unsprung weight.
- Low center of gravity.
- Flexible control.
- Special transmission.
- Wide treads (eliminating swaying of bus).
- Ample wheel base (to prevent undue overhang).
- Short turning radius.
- Low-step entrance and exit.
- Low top clearance.
- Curb receipt and delivery of passengers.
- Ample brake capacity (to provide for frequent stops).
- High-low gear efficiency (to provide for frequent starts).

The above points cover the desirable and undesirable features to be considered in the construction of double and single deck buses for regular city routes. As important considerations are involved in the special designing of motor stages and school buses, but time does not permit an enumeration of these factors.

Consideration should also be given to the use of bus trailers in the peak hours of traffic. They should have their own brake equipment.

Gentlemen, out of the motor truck industry will arise in the next few years, The Spirit of Transportation which will give to America automotive transportation of passengers in specially designed motor buses. The nation now needs and can use a sufficient number of motor buses of the various types enumerated, to keep our combined motor truck factories in continuous production for years to come.

## Motor Car Transport in South Africa

**I**N an interview on the Gold Coast, South Africa, as of Aug. 10, His Excellency Brigadier-General Guggisberg, C.M.G., D.S.O., says:

"Motor roads we have in plenty. In fact, we have in the whole of the Gold Coast about 3000 miles of motorable roads open for traffic. That is to say, 700 miles are open all the year round, but the remainder are necessarily closed for a couple of months during the height of the rains. The motor roads, although they have served very well in the past, form an up-to-date system of transport for nothing but short distances. The cost of construction and maintenance is very high, the cost of running lorries on them is also high.

"As an example, the following are the comparative costs of conveying one ton of produce one mile on the Gold Coast:

"By carriers, 8s. 6d. a ton per mile.

"By Ford lorry carrying 15 cwt., 3s. a ton per mile.

"By Ford lorry carrying 15 cwt. and pulling a trailer containing 10 cwt., 2s. a ton per mile.

"By medium lorry carrying altogether about 2 tons, about 1s. 6d. a ton per mile.

"By railway, 3¼d. a ton per mile."

**R**UST prevention for files and other iron or steel parts is effected in a simple manner by dipping the parts in strong milk of lime and letting them dry as rapidly as possible. As long as the layer of lime remains intact no rust can form. If the parts are used, the lime layer is removed without difficulty by means of a sharp brush. This process, recommended by *Werkstattstechnik*, is especially important in the case of stockrooms that are not absolutely dry.





## Right-Hand Steering

Editor, AUTOMOTIVE INDUSTRIES:

It is wrong to think that right-hand steering is a serious requirement in Europe, and in particular in those countries where driving to the left is the custom, as in England, Sweden and some parts of Italy. Why, then, are all the European-made cars right-hand driven? The answer I would give is the following: Right-hand drive seems to have originated from the way horses were, and still are, driven. Anyone knows that the ordinary man can use only his right hand to properly handle the whip. Certainly then he must hold the lines with the left hand. To drive one or many horses properly the lines must be kept in the center of the carriage and thus we see how it is necessary to sit to the right when driving horses. When the automobile was first built it was natural that driving should be at the right, and thus we received the right-hand steering.

On the modern car the control (gear and hand-brake handles) is located in the center of the car, and to operate it with ease and comfort it is necessary to have the steering on the left side, and let the right hand operate the gear shift. Certainly the left steering as practised in America has something to do with driving on the right side of the road, but there was no left steering from the beginning, and it is there to-day because the center control is there and must be there to have the car up to date. I think that in a year or two most of the European-made machines will also have the center control, and no doubt they will then soon change to left steering no matter whether the car is manufactured in England, France or Germany. As an example, the French "Citroen" already has left-hand steering, and most British and Italian cars have the center control, although this year more seem to have the right-hand steering.

It is not at all comfortable to drive the average American car with the right-hand steering. Take a car of the \$2,000 class and see the difference in the standard car with the left-hand steering and the so-called export model with the right-hand steering. All the manufacturer usually does is change over the steering and the pedals to the right side. When the pedals were on the left side there was plenty of room for the feet and the accelerator pedal was to the right of the foot-brake. There was more than enough room for everything, and to reach the starter button one had only to step on it without using the left foot on the clutch pedal. The same car altered to export model, with right-hand steering, often has the steering wheel located at a slight angle to the instrument board for the reason that the exhaust pipe may have been somewhat in the way to enable the manufacturer to put the wheel straight. This does *not* matter very much, however, but the big thing is the way the pedals and the starter are located. There is *not* the same roominess as on the left side, for the hand-brake lever takes away much space. The accelerator pedal is located between the clutch and brake pedals, and it all looks and feels crowded. When driving the left leg is usually resting on the hand-brake lever, and to reach the starter button one is compelled to use many motions with the feet. In many cases the starter

cannot be reached unless the driver gets up from his seat, and in the cases where this is not necessary, the driver has to use the left foot, which naturally means that he has to have the gear in neutral. The exhaust pipe is, in most cases, located on the right side of the motor on the American car. Anyone knows how the heat is felt from the floor board on a warm summer day. In the export car, with right-hand steering, this heat is extremely uncomfortable as it has open flow through the holes for the pedals.

The right-hand driven car has often no changes in the instrument board, consequently the driver cannot easily see the instruments, which usually are located to the left as they are on the standard model. In a few cases the instruments are in the center of the board.

The public in foreign countries really prefers a left-hand driven car, especially when it is an American car. Take, for instance, the Scandinavian countries. In Sweden, where the driving is to the left, it is easier to pass or to meet a car on the road where there is left-hand steering, as the roads usually are narrow and it is important to know how near the road-ditch one may keep the car when meeting another, or how near one may drive when passing a car. In Denmark and in Norway the driving is to the right, the same as in the States, and there is no reason why right-hand steering should be asked for there. The Norwegians at least have awakened to the fact that they do not want anything but left-hand steering.

To sum up, the American manufacturers should forget right-hand steering when filling export orders. Their agents and their customers will be pleased with the left-hand steering, and those cases where the manufacturer charged his \$25 extra for the right-steer outfit, the agent will be glad to have this amount reduced on the invoice.

When the manufacturer receives orders from far-away countries, and the order stipulates right-hand drive, it will pay all concerned to have the manufacturer tell his agent that in a right-hand driven car this or that will be out of place and uncomfortable. He should not be afraid of losing the order for that frankness. In every case the agent will say that the standard way is accepted.

BIRGER JACOBSSON.

IN the course of a paper read before the Royal Society of Arts, Sir Charles Bedford said that the Denaturation Subcommittee of the Empire Motor Fuels Committee had conducted an exhaustive practical inquiry, and had come to the conclusion that redistilled bone oil was the substance which most closely complied with the desiderata for a denaturant as laid down by the Board of Customs and Excise. At the present time the Engineering Subcommittee of the same body was understood to be conducting elaborate inquiries on a large working scale in conjunction with the experts of the London General Omnibus Co., and their report was now awaited. Light caoutchoucine in combination with secondary substances, such as shale oils, benzol, gasolines and sulphurous oil residues, came next in efficacy, but it was not known yet whether it would serve for motor purposes.

# Developing the Individual for Institutional Responsibility

The Business Publishers Association has devised a course to increase individual business vision and to make business papers of constantly growing value to industry. A school of industrial journalism has been established for developing and training staffs of business publications.

**T**HE progressive development of an organization is usually in direct proportion to the individual growth of the individuals within the group. AUTOMOTIVE INDUSTRIES has frequently pointed out the desirability of increasing the scope of the employee's vision of the business as a whole. Various methods of promoting such individual development have been outlined. Other business papers have discussed the same question at considerable length.

As an indication of a firm belief in the fundamental character of such personal development, the New York Business Publishers' Association has put into operation a plan by which the members of the staffs of the various business papers will be given a comprehensive and thorough training covering the editorial, business, and service activities of industrial publishing. Like any other business, industrial publishing includes a number of separate departments and activities. In order that an individual worker in any department may function at maximum efficiency, he must have a comprehensive knowledge of the policies, ideals, and aims of the other departments of the business.

In addition to these points of similarity with other businesses, however, the business paper staff employee has to deal with problems of fundamental analysis in a peculiar sense. He must be able to weigh relative values, analyze clearly and constantly, and keep in close touch with the entire field in which he is working. The ability to do this can be acquired by experience, but experience alone does not teach rapidly. It is a recognition of this fact that has led the Business Publishers' Association to establish a school of industrial journalism.

The course is designed to meet two urgent needs:

1. The need of individual workers in this field for well organized instruction in the principles and practices of the business.
2. The need of industrial publishing organizations, both small and large, for closer team work among the members of their staffs.

Co-operation of the leading industrial publishers has made the course possible. The idea was originally proposed by H. M. Swetland, president of the United Publishers Corporation, and the plans have been worked out under his leadership by the New York Business Publishers' Association Educational Committee, of which he is chairman. Associated with him on this committee are J. Malcolm Muir, vice-president, McGraw-Hill Company; M. C. Robbins, publisher, *Gas Age*, and president of Associated Business Papers, Inc.; J. C. Oswald, publisher, *American Printer*; E. P. Harris, of Harris, Dibble & Company; and R. H. McCready, president, McCready Publishing Company, and president of the New York Association.

The "study-unit" plan will be used in conducting the

course. This plan, which combines home study and weekly class meetings, has been developed by the Business Training Corporation, which has been engaged to prepare the text and other educational material and to organize and direct the instruction staff. All the instructors will be men who are now engaged in industrial papers, so that the instruction will be intensive and practical.

Special texts on the subjects covered in the course are being prepared with the aid of a Cooperating Staff of forty well-known publishers, editors, business managers and service department managers affiliated with the New York Business Publishers' Association. These men have supplied the material and data which will be the basis of the course.

The increased influence of business publications during recent years has made such a course as this specially desirable. This increased influence has brought with it increased responsibilities. Subscribers and advertisers have learned to expect types of service which cannot be rendered without special effort and organization. This course marks a definite recognition by industrial publishers of these responsibilities and obligations.

Considerable interest in this course has been evinced by men not directly associated with business publishing, while within the ranks of the publishers the idea is being supported with enthusiasm. The course will be taken by practically all of the business and editorial executives of the papers affiliated with the association. Several men in different industries have also signified their desire to get the insight into industrial publishing offered by the course. Such men from the outside will be welcomed.

The entire course will last eight or nine months. Classes are being organized and will begin work within a few weeks. In addition to classes for members of the New York Business Publishers' Association, arrangements will probably be made for classes for business paper organizations in Chicago, Boston, Philadelphia, Cleveland, St. Louis and other cities.

The course is organized in fifteen study-units, each one of which is devoted to a distinct subdivision of the general subject. Each study-unit requires two weeks. The length of the whole course, therefore, is thirty weeks, which is equivalent to the customary university year.

A general outline of the course indicates clearly the broad scope of the material to be covered together with the practical nature of the training:

## SECTION A—INTRODUCTORY

### UNIT I—THE FIELD OF INDUSTRIAL PUBLISHING

1. Fundamental functions of an industrial paper.
2. Scope and influence of industrial papers in modern business.
3. Evolution and growth of industrial publishing—in the United States—in relation to foreign countries.
4. Distinctive features of industrial publishing—in relation to

- other lines of business—in relation to other kinds of publishing.
5. The ethics of industrial publishing.
  6. Opportunities for intelligent productive service and for personal advancement.

**UNIT II—ORGANIZATION AND PERSONAL REQUIREMENTS**

1. Main activities in industrial publishing—editorial—business—service.
2. Organization of an industrial publishing business—departmental relationships and teamwork.
3. Recruiting the organization—sources—methods.
4. Personal traits required on an industrial paper—methods of developing these traits.
5. Self-analysis tests.

**SECTION B—EDITORIAL ACTIVITIES****UNIT III—EDITORIAL CONTENTS**

1. Determining the general editorial policy.
2. Types of articles desired—sources for securing them.
3. Handling regular departments and current trade news.
4. Getting the right point of view of the industry—keeping in touch with the industry.
5. Cultivating editorial judgment—testing news value.
6. Keeping ahead with editorial policies and opinions.

**UNIT IV—EDITORIAL METHODS**

1. Gathering material and data—from industrial leaders—through field correspondents—miscellaneous sources.
2. Classifying and filing material and data—inclusive index files—compiling illustrative and statistical data.
3. Planning and scheduling editorial work.
4. Budgeting editorial expenses.
5. Managing an editorial staff.

**UNIT V—PREPARING EDITORIAL MATERIAL**

1. Preliminary steps—picking live questions—outlining articles—classifying sources.
2. Field investigating—gathering information—making notes—securing illustrations—checking up.
3. Writing the article—style—giving current interest.
4. The art of interviewing.
5. Reporting conventions and other meetings—verbatim reports—journalistic reports.
6. Testing articles and other reports.

**UNIT VI—WRITING FOR INDUSTRIAL PAPERS**

1. Essentials of good style.
2. Securing unity—through outlining—through avoiding extraneous matter.
3. Securing coherence—by proper arrangement of ideas—by accurate connectives.
4. Securing force—by concreteness—by repetition—by emphasis.
5. Making news value count.
6. Use of illustrations, charts, tables and summaries.

**UNIT VII—PRODUCTION TECHNIQUE**

1. Preparing manuscript for printer.
2. Typography—various type faces and their uses—colors.
3. Physical appearance of publication—paper—illustrations—layout.
4. How editorial and advertising departments can lessen work in print shop.
5. Proofreading and final changes.
6. Procedure in print shop and bindery—typesetting—electrotyping—printing—binding.

**SECTION C—BUSINESS ACTIVITIES****UNIT VIII—CIRCULATION-BUILDING**

1. Code of ethics governing business activities in industrial publishing—what constitutes good business practice.
2. Selective basis of circulation.
3. Lists of prospective subscribers—sources—analysis—checking.
4. Circularizing and follow-up plans and methods.
5. Personal solicitation for subscriptions—part time agents—full time salesmen.
6. Space advertising for subscriptions.
7. Special book and other offers—uses and dangers.

**UNIT IX—CREATING ADVERTISING**

1. Selective basis of advertising in industrial papers.
2. Six essential conditions for profitable advertising—analyzing and testing for them.

3. Advantages of industrial papers as advertising mediums.
4. Rates for advertising space—based on quality, circulation and publication's influence.
5. Classes of advertising prospects.
6. Sales promotion methods to secure advertising.
7. Principles of salesmanship in securing advertising.

**UNIT X—HANDLING CORRESPONDENCE**

1. Importance of correspondence in building good-will.
2. Fundamentals of good business letter writing—adaptation to reader—correct analysis—careful planning.
3. Beginnings and endings of letters.
4. The five C's of a good business letter and how to attain them—clearness—correctness—conciseness—courtesy—character.
5. Sentence structure and paragraphing.
6. Getting action through letters.
7. Special types of letters—editorial—circularizing—selling—collecting—adjustment.

**UNIT XI—ACCOUNTS AND COLLECTIONS**

1. The necessity of especially accurate records in industrial publishing because of long-term contracts—allocating expenses and incurred obligations.
2. Chief items of income and expenditure—classification and percentages.
3. Characteristics of good records—accurate—timely—simple—adequate.
4. Using accounts in management—comparative statements to show tendencies—unit costs.
5. Use of statistics—charts and graphs.
6. Budgeting and checking up actual against estimated results.

**UNIT XII—DEPARTMENTAL MANAGEMENT**

1. Fixing definite quotas and objectives.
2. Establishing standards of performance or output.
3. Making conditions right for effective work.
4. Systematizing routine operations.
5. Scheduling and dispatching.
6. Layout of an office—of a desk.
7. Mechanical aids to efficiency—records—charts.
8. Handling employees—getting teamwork.

**SECTION D—SERVICE ACTIVITIES****UNIT XIII—SERVICE TO THE INDUSTRY**

1. Special research and studies for the benefit of the industry as a whole.
2. Creating industrial literature in the fields served.
3. Handling and answering general inquiries in the industry.
4. Compiling statistics and general data.
5. Issuing reviews and forecasts.
6. Studying foreign conditions and markets and promoting foreign trade within the industry.
7. Preparing handbooks, annuals and directories.
8. Working with trade associations and technical societies.
9. Influencing public opinion and governmental bodies.

**UNIT XIV—SERVICE TO ADVERTISERS**

1. Service on mechanics of advertisement—display—type—illustrations.
2. Service on message of advertisement—the right note—preparation of copy—headlines and sub-heads.
3. Furnishing special information on the industry—data on viewpoint of industry—business and marketing conditions—technical development in industry.
4. Studying and analyzing merchandising problems.
5. Helping to check plans and results.
6. Relation of advertising service department to advertising agency.

**SECTION E—ETHICS AND POLICIES****UNIT XV—ETHICS AND POLICIES IN INDUSTRIAL PUBLISHING**

1. Standards of editorial practice.
2. Standards of business practice in relation to circulation building and advertising.
3. Standards of practice with relation to competitors.
4. Ethical principles covering relations with industry and with advertisers.
5. Determination and formulation of basic policies of an industrial paper.
6. Present tendencies in industrial publishing—greater specialization—combinations.
7. Preparing for the needs and problems ahead.

# The Basis of Industrial Understanding

It is easy to desire to deal fairly with employees, but hard to work out the theory. Because of past occurrences, many workers regard employers with suspicion. This makes difficult a practical application of the square deal idea. Considerable study necessary to obtain results.

By Harry Tipper

**A** GOOD many of the letters received from the subscribers to AUTOMOTIVE INDUSTRIES from time to time reiterate the statement that it is not so much the method of operation as the square deal with the employees which counts in building an organization.

There is no doubt about the truth of this statement in the abstract. As a practical matter, however, the difficulty of getting to an agreement is not removed by any sentimental desire for a square deal or by the consideration of platitudes and truisms relating to it. A very few conversations with employees on one hand and workers on the other hand reveal suspicion and a general belief on each side that the other side is not dealing in actions and holding opinions which are fair.

Many times employers have stated to me their desire to be fair with their workmen and in the same breath have stated the impossibility of dealing squarely with them on account of the unfair opinions they hold and the unfair actions they take. On the other hand, workers have frequently pointed out the injustices from which they suffer or think they suffer and the impossibility of believing the employer who permits such injustices to go on.

This division is sharp and pretty general. The suspicion is of long standing. No habit of mind which is of long standing can be changed rapidly and with ease. Prejudices that are deep-seated cling very tenaciously and are not removed by an abstract desire for agreement or a vague belief that peace is better than warfare.

A very large part of the general cry for understanding is a demand that the other man understand us and make all the allowances that should be made for our prejudices, our weaknesses, and our values.

Justice is based upon understanding, but the understanding must be broader than ourselves and particularly it must take in a thorough understanding of the other parties. Square dealing is not governed by a desire to be fair, but by the understanding which makes it possible to be fair. And that understanding is rarely secured, although the desire for square dealing is fairly general. Therefore, it is necessary not merely to discuss the principles which enter into productive co-operation, but it is important to consider the methods by which the co-operation has been secured in the individual cases, because the practical result can only be obtained by the patient working out of the improvement.

Just as the experimental department is the scientific laboratory for mechanical improvement and industry, so the factory is the industrial laboratory out of which grows the human development. The men who are engaged in the experimental work are prepared to follow carefully and relentlessly every clue to improvement which may be sug-

gested to analyze, test, and operate all these possibilities until the conditions are thoroughly understood and the improvement can be turned into practical reality.

Something of the same kind is required in the development of human relations within the establishment. The same painstaking study, experimenting with, the testing and rejecting of many methods before sound practice is discovered, must govern the development of the productivity in relation to the human affairs of industry itself.

Comparatively few executives are willing to undertake a somewhat difficult study of the human side. They are buried in the technical requirements of their own work, in the mechanics of organization or in the economics of the propositions before them. The reports which come to their desk do not contain any expressions of human value or quality. They do not deal with incentives, fatigue, or aspirations, and they do not suggest a waste which is going on from a human standpoint. The ordinary duties devolving upon the executive are not such as to emphasize the human side or lead the imagination into the consideration of the human causes behind the economic effects.

This is sufficiently the case to give rise to the mistake of considering economic effect as causes, and we talk of these economic conditions as though they were the reasons for the development of business tendencies and situations, instead of the effects produced by our methods of human organization and our difficulties of human understanding.

Very few men in industry would answer in the negative if they were asked, Do you believe in dealing squarely with your employees? On the other hand, very few men devote a considerable part of their time to the discovery of the human causes behind the inefficiencies exhibited in the mechanical results and to the patient consideration of the methods by which they can be overcome.

Two years ago, when the amount of labor was less than the demand for it and the efficiency of labor was lower than usual, a good many executives in industry were spending a lot of their time in an endeavor to meet the labor difficulty without any previous knowledge of the causes and without much hope of arriving at a more than temporary solution.

Just now while labor is plentiful and there is a large amount of unemployment, and as a consequence the efficiency of labor is a little higher, very few of those men are continuing their study and endeavoring to provide themselves with the information which will enable them to meet future difficulties better than the past difficulties were handled.

Even in the best of organizations employees are prone to suspect the motives and justice of the employers. There is a tendency for every man to overemphasize the value of the services he renders and the influence exerted by those

services upon the total result. This runs through all ranks of workers. It is interestingly displayed in the speeches of engineers, doctors, advertisers, salesmen, and others, who in acclaiming publicly the importance of their own occupation, show the extent of its influence upon civilization, so that the unprejudiced reader would be able to determine whether religion had been of as much importance as salesmanship, or engineering had done as much work as advertising.

Because of this tendency and because of the limited range of interests and understanding, there is always large ground for suspicion. We are always apt to suspect those things of which we know little, and the decisions rendered, because of evidence we have not reviewed, are apt to meet with our criticism.

It is in the solution of these small problems of personal grievances in the development of confidence between individuals that the executive becomes trained in the causes of human inefficiency and becomes capable of approaching the larger problems with some hope of solving them or preventing the larger problems from becoming active by the solution of the smaller ones.

It is particularly unfortunate that executives in industry do not study the human side of the matter until they are confronted with a strike or a general difficulty or some unusual inefficiency. They are obliged to approach the large problem without any previous experience with the small problem and with no established confidence arising out of the personal adjustment.

It is impossible under such conditions to arrive at a solution of the larger problem and it is unlikely that we shall do anything important in the advancing of human relations in industry until the same time and patience are put upon the daily individual difficulties that are put upon the routine and the economics of the large problems of strikes and general disturbances.

We are much better advised in economic affairs and our methods of education are much more effective in that regard. We do not attempt to put the young engineering student in front of the complicated problem of managing a huge industry. We train him in the solution of the simple and more primary problems, so that in each stage of his development he is encouraged to tackle a somewhat larger problem, until he is capable of handling the most important.

In most of the cases of successful industrial establishments, securing an unusual efficiency per individual and unusual freedom from industrial disturbances, the work has been done principally by the ability of the executives in adjusting the personal differences, their understanding of personalities, and their gradual gain in experience, so that the larger matters have been solved more or less readily upon the background of the previous work.

There is a general impression that intangible subjects like this one may be dealt with by any observing individual without the patient development of the skill and understanding required in the mastering of mechanical pursuits. This impression is widespread and is perhaps the greatest difficulty in the way of development from the human side of organization. On the other hand, the economic results secured by executives who have devoted time and patience to the study have been sufficiently important to justify the work which they have devoted to the matter.

The present period of depression is usually considered as a period which will be followed by a gradual extension of the business with more difficulties in securing a profit. All such previous periods have demanded a greater efficiency in the production in order to surmount the difficul-

ties imposed by the new conditions, and the progress in the mechanical arts has come largely from these necessities.

The manufacturing capacity of the United States at the present is almost three times per capita the capacity of either Great Britain or Germany, and as a consequence the problem of disposing of enough product to fill our factories is a very serious one. Part of this problem must be met by the increased efficiency of production, and in a large measure this increased efficiency will come out of the increased productivity of the individual.

A good many changes can be made in the mechanical systems but the improvements that can be secured in this respect will not be sufficient at any particular time to affect the total result except in minute percentages.

The capacity of the individual has not been increased even though it fluctuates under different economic conditions and there is a large unused capacity which would permit improvements in productivity in very great amounts if this unusual individual capacity could be harnessed. It can be harnessed only as the confidence, the incentive, the interest in the work and the character of the reward agree with the organization requirements and keep the enthusiasm of the worker centered upon his organization and his work.

This desirable condition is not to be arrived at by merely talking about the square deal or an academic desire for the square deal. It will be secured by a careful study of the individual problems, adjustment of personal grievances, and extension of education and understanding within the plant.

In this, as in a number of other human problems related to industry, that way which appears to be the longest way round is the shortest way to the permanent conclusion. Temporarily it is easier to control an organization by instructions and orders than it is by education and understanding, but the centralized systems of instructions and orders do not develop the individual and they provide no incentive for development. They fail finally because of this fact, while the slow apparently inefficient and unsystematic method of creating confidence between the individuals, adjusting the personal differences, educating the minor executives on the purposes of the organization and developing the possibilities of the workers in their own work, result in a final efficiency far greater than the efficiency produced out of the centralized systems, subdivided work, the rule, and the control of instruction.

SEVERAL rings have recently been tested by the ball method at the Bureau of Standards in Washington. The method used is a modification of that heretofore employed which uses two balls the sum of whose diameter is slightly greater than the diameter of the ring. The new method consists of placing three balls of the same diameter in a ring 120 deg. apart with a fourth ball resting on them. This method gives substantially the same results as the two-ball method. In this connection there is need for a more accurate method of governing the contact pressure in measuring precision balls. The machine with a drop plug indicator on which this work is now done has sufficient friction in the anvil end to cause an uncertainty in the measurement of the contact pressure used. To provide a better means for measuring balls, and also for comparison of precision gage blocks by mechanical means, drawings of the Millionth Comparator used at the National Physical Laboratory, England, and by the Pratt & Whitney Co. have been secured and it is to be expected that a similar comparator will be constructed at the bureau.





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## The German Show

THE German automobile show, which opened in Berlin on Sept. 22, is of special interest this year because it shows the engineering and commercial status of the German industry for the first time since the war. The designs presented at this show represent the accumulated experience of German engineers during the last seven years.

While only brief reports are available at this time, the special cable report, printed on the news pages of this issue, indicates several interesting trends. Chief among these is the fact that the show was apparently far more than an automobile show—it was, in a sense, an automotive show. Not only were automobiles and accessories exhibited, but also trucks, bodies, motorcycles and even machine tools. Thus it would appear that this post-war Berlin show was designed to interest every group from the car user to the manufacturer. It will be particularly interesting to learn the reasons for giving the show so broad a scope.

The Germans are apparently about to make a strong bid for foreign automotive trade. The low value of

the mark, of course, will aid them materially, while the efforts they have made to achieve simplicity of design and minimum production costs will be a helpful factor. An additional indication that the show is an effort in this direction is the fact that all foreign cars were barred, even Austrian cars having been prohibited from exhibiting.

## Gear Changing

IT is well known to every automobile driver that with a sliding pinion change gear it is ordinarily much more difficult to change from a higher to a lower gear than vice versa. It is not much of a trick to change from first to second without grating of the gear teeth, and changing from second to high, in case of a three-speed gear, involves no difficulties at all, as no gears have to be meshed and the clutch jaws slide readily into engagement.

When the clutch is disengaged and the gears are unmeshed, both the clutch-driven member and the car slow down in speed, owing to the resistances encountered in their motion. If the change of gear is made very fast, there will be no appreciable change in car speed between the unmeshing of the low and the meshing of the intermediate gears. As the intermediate gear is engaged the clutch speed must be reduced. There is a natural tendency for the clutch to slow down in speed owing to its bearing friction, and this probably explains the comparative ease with which the change from low to intermediate gear can be effected as a general rule.

The change from high to intermediate and from the latter to low is not so difficult on a steep hill, as in that case the speed of the car decreases very rapidly when the gears are unmeshed and assumes a value corresponding to the lower gear to be engaged. In fact, it is usually necessary to shift the gears quite smartly, otherwise the car will lose too much speed and will be hard to keep under way. But occasionally it is desired to go into intermediate or low gear for the sake of accurate control, in places where the road is comparatively level. The car then loses speed only slowly and it is almost impossible to make a quick change of gear without unpleasant gear noises. Either the driver has to wait until the car has slowed down a great deal or else he must speed up his engine and partly engage the clutch while the gears are out of mesh, so as to bring the speed of the clutch into correspondence with that of the car on the gear to be engaged. This latter operation is a rather delicate one and is fully mastered only by few drivers.

Generally speaking, gear shifting is the easier the less the difference in the ratio between successive gears. With a four-speed gear the ratios between successive gear speeds are smaller, as a rule, than with a three-speed gear, and a four-speed gear should, therefore, be easier to handle than a three-speed. Of course, the inertia of the clutch is an important factor in every case. When the gears are meshed, the speeds of the clutch and of the car are brought into a definite relation, which generally means that one has to speed up and the other slow down. As the inertia of the clutch is ever so much less than

that of the car, by far the greatest change takes place in the speed of the clutch, and the force of the impact when the gears are brought together depends almost entirely on the polar moment of inertia of the clutch-driven part.

## The Gasoline Tax

NO statement is quite so misleading as a half-truth. Advocates of the gasoline tax in various states have pointed out that such a tax is fair because it is a somewhat accurate gage of the degree to which a vehicle uses the roads. There is a certain degree of truth in this assertion, but the other factors bearing on the situation are such as to entirely destroy its validity for argumentative and legislative purposes.

To begin with, all gasoline is subjected to the tax. Thus, many gallons are taxed which never find their way into motor vehicles used over the roads. The chief fallacy of the argument, however, lies in the fact that many other motor vehicle taxes operate simultaneously with the fuel tax, thus obviating the function of the fuel tax as a proportioning medium.

Ten new states have added a gasoline tax within the last year, yet in no case has there been any diminution of other motor vehicle taxes. The fuel tax has simply been placed on top of other taxes in every instance. It is not a substitute tax, but an added tax burden.

Thus, even a slight analysis shows the unsound basis of the half-truth brought forward in favor of gasoline taxes. Yet a recent N. A. C. C. survey brings to light the surprising fact that motorists in many states were found supporting the fuel tax on the basis of this fallacious reasoning. If the gasoline tax were made the only tax imposed upon motor vehicles in any one State, and if such a tax were apportioned in accordance with the usage which such a vehicle obtains from the highways, there would be a valid argument in its favor. As the matter stands, however, this very definitely is not the case. The gasoline tax simply imposes upon owners an increased tax burden, increases sales resistance for those selling motor vehicles and fails to meet the requirements of a sound taxation policy.

## International Trade

THE suggestion has been made that American manufacturers would enhance their prestige in many countries by substituting the word "international" for the term "export" or "foreign" as used in their correspondence, literature and advertising. Export or foreign, as terms, have no meaning when they are read in another country. The American manufacturer, of course, can consider his business in China, we might say, as being foreign, but it is not foreign to the dealer or buyer there. The same may be said of "overseas" or similar other designation.

Translations of English into other languages almost without exception turn such words into the equivalent of "foreign" or "foreigner," and the buyer or dealer in another country thus sees himself con-

sidered as a "foreigner." This term usually carries with it something of unpleasantness, as is evidenced in our own use of it in regard to the hordes of immigrants who have come to this country from Europe. The term is no more pleasing in other countries and its use may set up a conscious or subconscious barrier that does not promote friendly relations, although it may have been used entirely in a business sense.

The word international is more pleasing; it conveys an idea of size and spread that is readily appealing and certain companies have incorporated this into the name of their export company.

## Increased Salaries for U. S. Foreign Consuls

A NUMBER of United States consular officers in England have resigned within the past year because of a lack of sufficient pay to allow them to maintain the living standard set by representatives of other nations. For many years various interests have endeavored to have this situation remedied by increasing the salaries of the men who represent this country's business interests abroad. Despite these efforts nothing has been done.

Our foreign consuls play an important part in America's export trade and they surely deserve a monetary consideration consistent with the efforts they expend. In the past they have frequently benefited the manufacturer of automobiles in supplying him with information that otherwise would have been unattainable without considerable expenditure of time and money. But all these facts are too well known to deserve discussion here. The fact that these men, who remain at their posts, are forced to deprive themselves of many of the things that have always been considered necessities should be enough to enlist the whole-hearted support of manufacturers in the effort to secure increased salaries for them.

Statistics have been presented showing that the salaries of American representatives abroad are from 30 to 40 per cent less than those paid to men holding similar positions from other countries. The average salary of American consuls general is but \$6,620 a year. Consuls of Great Britain (not consuls general) receive an average total payment of from \$6,983 to \$7,056, while Americans holding these positions receive an average salary of \$3,720. And British business men are complaining that the salaries of their representatives are too low.

Honor is, of course, attached to a consular position, but the functions of the consul require men of real business ability. Only such men are capable of rendering valuable service to the industry. But because they are capable of rendering this service their ability if expended along other lines would be recognized to a greater extent so far as salaries are concerned. Again, the type of men who accept a position for the honor alone are not generally those capable of performing the duties the consular service is expected to perform.

# Production Decline Not Imminent

## September Business Is Exceeding August

### Collections Generally Good With Progress Made in Reducing Past Due Accounts

NEW YORK, Sept. 27—Reports of current business made by members of the Motor and Accessory Manufacturers Association to the credit department show that their business for September is running slightly ahead of August. A considerable amount of new business has been booked which indicates that no falling off in the production of passenger cars is imminent. Collections generally are good, and they show an improvement from month to month. Progress also is being made in cutting down past-due accounts. Indications are that business for the next two or three months will continue about as it has been running since May.

Fully as significant as the actual business booked is the feeling in all branches of the industry that the worst is over and that the tide has turned definitely toward better conditions. Improved morale is apparent throughout the industrial world and is reflected in nearly all lines. Leaders among financiers and manufacturers are convinced that the business depression has been due largely to a state of mind and that once optimism dispels pessimism throughout the country the consumption of finished products will increase, unemployment will become less general and buying power will expand.

### August Business Better

So far as the parts makers are concerned, their chief complaint is against automobile companies which have failed to release partly fabricated materials ordered 15 months ago. There are a considerable number of companies in this group and it is felt that if they ever are going to get out of their difficulties they should have made some progress by this time. This does not apply so much to the truck field because it is realized that truck sales have been virtually at a standstill for many months.

There is little complaint against the companies which actually are doing business and have been to some extent ever since the depression began. There have been of late comparatively few cancellations and automobile manufacturers have shown a disposition to clean up their commitments when price concessions have been made.

The report of August business made

## M. A. M. A. MEMBERS' BUSINESS FOR 8 MONTHS

NEW YORK, Sept. 27—The following table shows at a glance the business done each month this year by the members of the Motor and Accessory Manufacturers Association together with the total of past due accounts held by members, the total notes outstanding and the percentage of change each month:

Month	Total Purchases	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	\$6,264,587	.....	\$8,099,727	.....	\$4,359,871	.....
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,063,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.

by members of the M. A. M. A. shows that there was a slight increase in the total of goods sold as compared with July and very little reduction in the total of past due accounts.

## Walsh Gasoline Tax Proposal Unpopular

WASHINGTON, Sept. 27—The proposal of Senator Walsh of Massachusetts to incorporate in the tax bill a tax of one cent per gallon on gasoline will probably fail to receive serious consideration from the Senate. Though the author is a minority member of the Senate Finance Committee, his substitute will not receive the approval of the Republican majority at this time because they are determined to push the plan of tax revision as adopted by the Finance Committee.

Based on estimates of gasoline consumption for the calendar year of 1920, the one-cent tax per gallon would yield approximately \$50,000,000 annually. This tax was originally suggested by Secretary of the Treasury Mellon, in his recommendations for tax revision. The nation-wide protest from automobile owners, as well as manufacturers, had its effect and the proposal was subsequently withdrawn by the Treasury in its revision on proposed tax assessments.

There will be a long debate on the various provisions of the House bill as amended by the Senate Finance Committee.

## JOYCE NAMED TRUSTEE

EAU CLAIRE, Sept. 26—J. T. Joyce of Eau Claire, Wis., has been appointed trustee of the bankrupt estate of the United States Auto Gear Shift Co., of the same city, which recently filed a voluntary petition, scheduling liabilities at \$278,424 and assets at \$749,258. Creditors will meet Oct. 1.

## Athol Denies Making Use of Unfair Methods

WASHINGTON, Sept. 26—Denial has been made by the Athol Manufacturing Co. that it is or has been using unfair methods in the production and sale of artificial leather as alleged in the complaint filed by the Federal Trade Commission. The company asked the commission for a further and fuller investigation which, it says, will establish the true status of artificial leather as a useful and advantageous product. This case is of particular interest to the automotive trade because Athol top material and Athol leather are used on certain cars and tops.

The company advised the commission that the artificial leather made by it and its competitors is coming into wider and wider use and is supplanting the use of genuine leather in many lines and for many purposes. It declares that there is now real competition between its business and the business of dealers in ordinary old fashioned genuine skin and hide leather.

## FORD STARTS BODY SHOP

MILWAUKEE, Sept. 26—The Ford interests are starting work on a large body shop at Iron Mountain, as the second principal unit of an enormous woodworking operation established in the heart of the Upper Michigan forest and mining district, according to advices received here. The bulk of the wood products required by the Ford passenger car, truck and tractor industries is to be furnished by the Iron Mountain plants, which are situated in the midst of one of the richest hardwood and softwood timber belts in the world and adjacent to the famous hardwood belt of extreme northern Wisconsin. Carloads of lumber, timber, bolts and other wood products are being shipped almost daily.

# Display in Berlin Is Impressive

## German Makers Hold First Post-War Show

### Exhibit Discloses Industry on Full Production Basis—Use of Aluminum General

BERLIN, Sept. 26 (*By cable to AUTOMOTIVE INDUSTRIES*)—Germany's first post-war automobile show opened yesterday in the specially constructed Kaiserdamm Palace, which is 820 x 230 feet, in the northern suburbs of Berlin. It also marked the official opening of Berlin's 12-mile speedway which belongs to the Manufacturers Automobile Club. The show is entirely German and even Austrians are barred.

The exposition contains exhibits by 58 passenger car manufacturers, 34 truck makers, 35 body builders, 40 accessory concerns and 30 machine tool companies. It discloses clearly that the German automotive industry is again established on a full production basis. Because of the low value of the mark it is prepared to make a serious bid for foreign markets. The attendance is large and foreign buyers are plentiful.

With rare exceptions the cars are all up-to-date in design and represent the cumulative experience of the last seven years' attempts to bring production costs down to a minimum. Few German makers are following the American simplified design as German manufacturers generally prefer a higher grade, rather more costly type.

From an engineering point of view the feature of the show is the more general use which is being made of aluminum.

Eighty per cent of the cars displayed have four cylinder engines, 16 per cent six cylinder, 1 per cent eight cylinder and none of 12. Detachable heads are found in 11 per cent of the engines.

Mercedes is using steel cylinders in all models. There is a pronounced tendency toward aluminum steel lined cylinders, overhead valves, electric lighting and starting in most of the models. Ninety per cent of the cars are Bosch equipped.

The unit power plant construction is seen in 21 per cent of the engines; separate transmission in 78 per cent; four speed transmission in 83 per cent; spiral bevel drives in 39 per cent and straight bevels in 59 per cent.

Straight side tires are unknown on passenger cars but giant straights have made their appearance on many trucks. It is declared here that the Continental Caoutchouc and Gutta Percha Co. has come under control of the B. F. Goodrich Co.

There also are reports that the Packard Motor Car Co. has purchased a factory in Poland and that Ford has obtained control of the Hansa-Lloyd Automobile Co. in Bremen.

Maybach, the former co-worker of Daimler and noted as an airship manufacturer, has produced a car without clutch and gear box and with an electric motor sufficiently powerful to drive the car at low speeds, but with an emergency gear. The engine is a six cylinder, closely resembling the Dutch Spyker engine which is manufactured by Maybach. The rear axle is of aluminum and the car has front wheel brakes.

Rumpler, the aircraft manufacturer, has produced a passenger car with scientific stream lining. The chassis is in the form of a forged steel hull. It is powered with a six cylinder all aluminum W type engine. It is designed for rear driving with the rear wheels without universals. All the mechanism, including cantilever springs, is inside the hull.

Stinnes is showing a low priced cheap production car with a four cylinder all aluminum overhead valve engine.

W. F. BRADLEY.

### Goodrich Denies Report

AKRON, Sept. 27—W. C. Arthur, manager of the International B. F. Goodrich Corp., which controls the foreign holdings of the Goodrich company, denies that it has acquired or contemplates acquisition of the Continental company as reported in Paris.

### No Packard Plant for Poland

DETROIT, Sept. 27—The Packard Motor Car Co. denies that it has purchased an assembling plant in Poland. Such a proposal was made to the company several months ago but it never was considered seriously.

## British Ensign Motors in Hands of Creditors

LONDON, Sept. 16 (*By Mail*)—A chassis at the 1919 Olympia show which attracted great attention largely because of its massiveness combined with the high finish of its parts was the Ensign "six." Its introduction was typical of the senseless boom characteristic of that show. The sequel was told this week at a conference of creditors for a private arrangement of its affairs. Total liabilities disclosed amounted to \$1,220,590. It was agreed that creditors for over \$100 should secure \$2.50 per \$5 of debt in four installments. The alternative was a forced realization of assets which it was stated would yield but 75 cents per \$5 debt. This company built a fine factory on apparently little that was tangible as regards prospects.

## Revere Stock Sale Results in Arrest

### Buffalo Broker Who Bought Shares Before Receivership Charged with Extortion

INDIANAPOLIS, Sept. 26—J. R. Porter, a Buffalo broker, was arrested at Logansport last Friday at the request of the police of Erie, Pa., on charges of extortion. Several weeks ago Porter filed charges of grand larceny against Newton Van Zandt, former president of the Revere Motor Car Corp. Porter said he would waive extradition and return to Erie when officers from that city arrived. He will say nothing concerning the charges against him.

Prior to his arrest, Porter appeared before the Cass County Grand Jury which is investigating the affairs of the Revere corporation, which is now in the hands of a receiver. He appeared as a stockholder of the company.

Van Zandt contends that he never met Porter but that the Buffalo man bought 330 shares of Revere stock from another broker for \$8 a share. Van Zandt says that after he retired from the company several months ago, Porter wrote him a letter saying that he had resold the stock to a client who could not afford to lose the money which resulted from the decline in the value of the stock following the financial difficulties of the company. Van Zandt declares Porter wanted him to make good the difference but that he declined to do so because it might establish a precedent for many cases of the kind for which Van Zandt was not responsible.

A release from liability given Van Zandt by the Revere corporation came to light last week. Van Zandt is now in New York and his friends assert that he was not in any way responsible for the difficulties of the Revere corporation.

### BLAME PUT ON SPEEDING

WASHINGTON, Sept. 27—Analysis of statistics compiled by the Maryland State Roads Commission dispels a popular belief that most automobile accidents occur on the sharp curves, grade crossings and steep grades. It has been found that the vast majority are caused by the recklessness of motorists, and 90 per cent are due to speeding. Maryland authorities discovered that the largest number have occurred at the places that have always been considered safe, while the sections of roads which have been commonly regarded as extremely dangerous are proving to be relatively free from accidents.

## Truck Possibilities Extensive in Canada

**Potential Users Number 102,740;  
Ontario Obvious Field Await-  
ing Development**

WASHINGTON, Sept. 27—According to latest available statistics the motor truck field in Canada is capable of a more intensive development by American manufacturers, according to a report received from Consul Felix S. S. Johnson, Kingston, Canada, as in 1920 there were in use in the Dominion 26,852 trucks. This indicates that motor transportation occupies a guaranteed place among the Dominion's carrying systems, and that the sale of trucks has barely commenced. The real market remains to be developed, and therefore it presents attractive possibilities for enterprising American manufacturers.

### Quebec Good Prospect

A study of the commercial situation shows that while there are only 26,852 motor trucks in operation at present, there are approximately 102,740 industrial or commercial firms which must sooner or later come into the truck-using category, and this list does not include the farming element, which is gradually coming to appreciate the value of the truck as a carrier of farm products to the markets. The same figures indicate that Ontario is the obvious field which awaits development, as out of the total of the 102,740 concerns mentioned, 38,036 are located in this province. Next comes Quebec, with 29,573; Nova Scotia with 7138; Saskatchewan with 6013; British Columbia with 5761; Manitoba with 5414; Alberta with 5096; New Brunswick with 4601 and Prince Edward Island with 1108.

### Draft Horses Scarce

As an encouragement to motor truck manufacturers, there is the fact that heavy draft horses, of the kind most suitable for use on trucks, are becoming more and more scarce. Some industrial concerns state that they would be quite willing to use horses on their trucks, if the right grades could be had, but in the absence of enough heavy draft horses to meet their needs, they are falling back more and more upon motor trucks. The distribution of truck registrations for the province of Ontario shows that the big firms are leading in this line, as firms are credited with owning 26.91 per cent, while business gets 23.67 per cent of those operated. Tradesmen come next with 18.17 per cent, the unclassified have the same percentage, while farmers follow with 7.22 per cent and the manufacturer drops to the end with 4 per cent.

## Produce Two Cars Daily at Plant of Pan Motors

ST. CLOUD, MINN., Sept. 26—President C. D. Schwab of the Pan Motor Co. reported to a meeting of stockholders

that while the drop forge plant had been closed entirely for a year and the motor plant during the winter, operations have been resumed on a greatly reduced basis in the automobile factory and that an average of two cars daily now is being produced. He said that 200 cars have been turned out since the factory resumed operations and that with the material now on hand 69 more will be made before Oct. 1.

The outstanding indebtedness of the company was reduced by \$373,853 during the year. The remaining indebtedness is offset by the raw steel products on hand at the drop forge plant and more than 100 unsold cars. The stockholders consider favorably a proposal to issue \$1,000,000 in preferred stock with local banks as trustees.

## Interlocking Cord Receiver Discharged

AKRON, Sept. 27—Elihu Harpham has been discharged as receiver of the Interlocking Cord Tire Co. of this city and Mogadore following an agreement reached by the new management of the company with creditors, whereby all creditors' claims are to be satisfied. The basis of settlement will include a 15 per cent cash payment of all claims within 45 days, the balance to be secured by one and two year notes.

According to Edward Kohl, president of the new board of directors, the company has \$22,000 in cash with which to make initial payments on creditors' claims, and has \$13,600 in promissory notes and \$7,200 in other notes. Of the cash, \$12,000 was raised through subscription of stockholders.

Harpham was named receiver of the company Jan. 17, when the former officers were indicted on charges of violating the Ohio blue sky law.

New officials under the reorganization claim they will have assets sufficient to cover the firm's entire liabilities of \$120,000. They also announce plans are being made for resumption of production some time next month.

## COAST A. E. A. MAKES PROGRESS

SAN FRANCISCO, Sept. 27—The Automotive Equipment Representatives Association, with headquarters in this city, has made substantial progress since its organization a short time ago. Manufacturers' agents on the Pacific Coast are eligible to membership. One of the main purposes of the organization is to see that sales are made exclusively to jobbers.

## CREDIT MEN MEET OCT. 7

NEW YORK, Sept. 26—The second annual convention of the Automobile Financing Credit Men's Assn. will be held at Cleveland Oct. 7. Fred Weber, Jr., of the Bankers' Commercial Security Co. of New York, is president of the organization. His report will show that the 30 members of the organization have financed the sale of 300,000 motor vehicles valued at \$400,000,000 in the past two years.

## Deficiency Payment Extended by Senate

**New Draft of Tax Bill Would  
Allow 18 Months to Elapse—  
Passage Before Nov. 1**

WASHINGTON, Sept. 26—In the Senate tax bill, which Senator Penrose formally reported to the Senate to-day, there is an amendment in Section 250 of part 4 of the administrative provisions which is intended to relieve the taxpayer in case of additional assessments made without complete knowledge of all taxes in the case. The new provisions proposed by the Senate Finance Committee would extend the time for the payment of deficiencies to eighteen months from the passage of the revenue act. This change is of vital importance to the lumber industry and other branches of trade affected by the decision in the LaBelle Iron Works case.

### Provides for Bond

Paragraph "F" of Section 250 makes this provision and authorizes the Commission of Internal Revenue to require taxpayers to furnish a bond with sufficient sureties conditioned upon the payment of deficiencies, in accordance with the terms of extension granted. It is provided that in lieu of other interests provided by law as a part of such deficiencies, the rate of interest on these sums shall be two-thirds of one per cent per month from the time the extension is granted, except where such other interests provided by law are in excess of interest at the rate of two-thirds of one per cent.

If the deficiency or any part of it is not paid in accordance with the terms of the extension, the treasury would be authorized to add, in lieu of other interests and penalties provided by law, the sum of 5 per cent of the deficiency and interest on the deficiency at the rate of 1 per cent per month from the time it becomes payable, in accordance with the terms of the extension. These provisions were drafted to prevent undue hardships to lumber men and others who are obliged to pay back taxes, in accordance with the Supreme Court Decision in the LaBelle case.

### Passage Before Nov. 1

The Senate leaders expect to pass the tax bill before Nov. 1. It now appears that there will be a long debate on the various provisions of the House bill as amended by the Senate committee.

In the report of the majority from the Committee on Finance it was stated that the recommendation for the excess profits tax repeal was based upon a study of its inequities. It was pointed out that the excess profits tax bears less severely upon large than upon small corporations and in practice it exempts the over-capitalized corporation, penalizes business conservatism and places upon the Bureau of Internal Revenue tasks which are beyond its strength.



## Will Consider How To Assist Dealers

### N. A. C. C. Members to Take Up Question of Financing Them for Winter

NEW YORK, Sept. 28—The National Automobile Chamber of Commerce members' meeting at headquarters here next Thursday will be one of the most important sessions ever held by that organization, from the viewpoint of dealers. It has been decided to eliminate from the discussion such subjects as taxation and highways, important as they are, and get down to topics which are vital to the industry.

The first question which will be taken up will be, "How can manufacturers help dealers to carry cars next winter?" In the discussion various plans for financing dealers so that they can carry stocks and keep factories in production will be outlined. There will be no formal address but discussion leaders have been appointed to open the debate.

The second important problem to be taken up will be, "What can be done by manufacturers to help solve the used car problem?" Manufacturers realize as keenly as dealers that some satisfactory solution must be found for this question before the industry can be thoroughly stabilized.

Space for the annual shows at New York and Chicago will be drawn in the afternoon.

The truck manufacturers who are members of the organization will hold a session Friday, at which they will consider means of financing the motor truck distributor, prompt handling of motor truck paper by banks, and vocational selling of trucks.

## Metal Trades Advance 10 Per Cent in August

MILWAUKEE, Sept. 26—The most encouraging report made within a year's time concerning the condition of business in Milwaukee and vicinity is that contained in the current issue of Business and Financial Comment, published monthly by the First Wisconsin National, Milwaukee's largest bank. The review credits the automotive industries with much of the responsibility for the improvement. It says in brief:

"The drift of business in Milwaukee may be tested by three factors—capacity of operation, number of men employed, and sales. The metal trades as a whole increased their capacity of operations about 10 per cent in the last month. For this result the automotive group was largely responsible, as will be seen from the figures of employment. Iron, steel and their products lost 1.8 per cent in number of employees, and metal products other than iron and steel lost 20.3 per cent, while the automobile, parts and accessories group gained 23.4 per cent. In the whole metal trades group sales were about 30 per cent better in August than in July, but com-

pared with August, 1920, they were about 40 per cent smaller.

"From somewhat scattered sources of information it appears that quantity of production in Milwaukee and vicinity reached its lowest point about last April or May when operations in iron, steel and machinery were rapidly falling off and improvement in automobiles, textiles, leather and shoes had not yet made much headway. Since that time there has been a slow but steady climb in production, quickened in the last thirty days by a slightly better showing among some metal trades firms. Production as a whole is not back to that of last September, since at that time iron and steel products and automobiles had not yet slowed down appreciably. Production in September, 1920, can be estimated at about 80 per cent; the lowest point about 60 per cent, and at present about 75 per cent."

As the keynote of the current summary, the following is given: "Business moved slowly in the past month, but it was the first month in over a year in which there were no discouraging slumps. The balance for the month inclined to the favorable side. . . . People have reason to be telling one another that 'the worst is over' or that 'business is picking up some'."

## British Tire Makers Feel Effects of Cuts

LONDON, Sept. 16 (By Mail)—The position of the British tire trade reflects the conditions prevalent in the general industry. Report is rife of tires being sold at 50 per cent less than their listed rates, with the names of the manufacturers taken off. Therefore it was not unexpected that the Leyland & Birmingham Rubber Co., one of our biggest miscellaneous rubber-making companies, should show a deficit on the year's working up to June 30 last. The amount is \$100,000 (at par), whereas last year's return showed a profit of \$432,000 and 15 per cent dividend was paid. In May last year the company issued 125,000 shares at a premium of nearly \$2 each, which emphasizes the set-back suffered within the past few months.

## New Goodyear Truck Delayed by Detours

AKRON, Sept. 27—The Goodyear multiple wheeled motor truck reached Los Angeles, Cal., on Sept. 24 on its first trans-continental run, according to word received here. The truck left Akron with a load of rubber heels, on Sept. 8, in charge of M. D. Scott.

It is the first time a multiple wheeled motor truck has been seen on the Pacific Coast. The truck made fast time from Akron to Kansas City, but encountered bad roads and long detours through New Mexico. It had been planned to reach Los Angeles by Sept. 20, the detours delaying the trip four days.

The truck's run does not come up to the record of the conventional truck for the Akron-Los Angeles run. Two years ago a four-ton Packard four-wheeled truck made the trip in eleven days and 22 hours elapsed time.

## Aim to Avert Slump in Car Repair Work

### Service Associations Will Spend \$16,000 to Bring Business in Winter

NEW YORK, Sept. 26—Automotive Service Associations of New York and Brooklyn are preparing to spend \$16,000 on an advertising and direct mail campaign to avert the usual slump in winter automobile repair work. The appeal will be carried to the car owner to have the overhauling work which usually is put off until early spring done during the winter. Brooklyn started the movement a few weeks ago and mapped out the plan. An initial appropriation of \$4,000 to be secured through voluntary subscription of members was made. New York later joined the movement with a \$12,000 appropriation.

The plan is to use quarter page advertisements in several daily newspapers, some morning and some evening, spreading these out so that every other day or every third day during the months of October and November one paper will carry the advertisement. No individual names will appear in this advertising, but the signature will be that of the association. The copy will be prepared especially to get the interest of the car owner and set him to thinking of the advisability of having his work done early. To follow this up and clinch the argument, there will be 50,000 folders printed in two colors, also bearing the emblem of the service association, but with the name and address of the firm that has subscribed to the fund.

The financial arrangements are such that the fund will be raised by subscriptions of \$100 each. Of this amount, \$25 will be paid on the signing of the contract and the balance in installments covering the ten weeks that the campaign will run. The associations will, therefore, have at all times money in the treasuries from the subscribers in advance of the time that that money will be needed.

### Subscribers Benefited

Subscribers to the fund will get the general advantage of the newspaper advertising and have their names printed on the folders. Non-subscribers to the fund who are members of the association will, of course, derive some benefit from the advertising, but they will not be able to follow it up. The prestige of the associations will be advanced and membership in them will, therefore, become more valuable.

The campaign in Brooklyn is in full swing and the campaign in New York has just started. Forty teams of two men each are visiting responsible firms and asking for their subscriptions, carrying with them samples of the advertisements and folders. The first half hour of the drive resulted in six subscriptions, so the plan is evidently being favorably received.

## Seiberling Shortly to Control Portage

### Acceptance of Offer of \$750,000 for Property Recommended by Former Officials

AKRON, OHIO, Sept. 26—Frank A. Seiberling, founder and former president of the Goodyear Tire & Rubber Co., soon expects to be in control of properties of the Portage Tire & Rubber Co. at Barberton. Control of the Portage plant will practically complete Seiberling's plans for the staging of his "come back" in the tire industry, following his resignation as Goodyear president under the refinancing and reorganization of the company several months ago. Edward G. Wilmer, representing eastern financiers, is his successor at Goodyear.

Seiberling already controls the Star Tire & Rubber Co. of Akron and the Lehigh Rubber Co. of New Castle, Pa. He is negotiating both for the Republic tire plant at Youngstown and the Marion Tire & Rubber Co. at Marion, Ohio, it is reported. Acquisition of these together with the Portage will give him a chain of small rubber companies capable of a combined production of over 10,000 tires daily.

Seiberling's offer of \$750,000 for the Portage property, made before Judge C. D. Westenhaver of the Federal Court at Cleveland, is the highest offer made, and its acceptance has been recommended by deposed Portage officials and by George D. Bates, trustee of the company. The court's approval of the Seiberling offer is expected before Oct. 1. Seiberling plans to resume production immediately with a force of several hundred men and eventually to employ 1500 men in the plant.

Portage stock is carried at a book value of \$2,100,000. When appraised recently its value was placed at \$1,500,000. Mr. Seiberling's offer is half of the latter figure, payable in 7 per cent preferred stock, the title of the common stock to revert to the holding company to be formed.

Seiberling, it is stated, proposes to pay \$750,000 in stock to the fabric creditors of the Portage company and the balance at the inventoried figure in cash to take care of other claims of creditors.

The Portage company has a capacity of 3000 casings and 2000 tubes daily.

## Better Feeling Apparent at Indianapolis Plants

INDIANAPOLIS, Sept. 26—While there has been no increase in the volume of production in Indianapolis motor car plants, there has been a slight increase in the production of the accessory plants. Shock absorber, windshield device and body manufacturers are more optimistic than they were thirty days ago. They state that while orders show only a slight increase and in some in-

stances none, there is a much better tone and inquiries are more numerous. There appears to be an easier money situation, which up to the present time has been reflected only at the banks.

Credit conditions as yet are not good, although these are expected to improve during the next thirty days. Bankers here, following the recent report of the Federal Reserve Bank, particularly the Chicago district, are in a much better frame of mind. The financial situation, they say, is not what it should be, but it has improved so much lately, they feel the worst has been passed. While no announcement has been made it is the general feeling that the interest rates will be dropped before another month or at least before the first of the year.

## Receiver for Lorrain; Reorganization Likely

INDIANAPOLIS, Sept. 26—Walter S. Butler has been named as receiver for the Lorrain Car Co. of Richmond, by William A. Bond, judge of the Wayne Circuit Court, in compliance with a petition filed by D. H. Cummings, president of the company. The company manufactures motor hearses and has become financially involved as a result of the business depression. The liabilities are approximately \$35,000.

The company was incorporated with a capital of \$1,500,000, of which \$1,000,000 was to be common stock; \$150,000 first preferred stock, \$350,000 to be second preferred stock. Of the common stock, \$250,000 has been issued; of the first preferred stock, the entire issue has been sold and is said to be protected by customers' notes. Of the second preferred stock only a small amount has been issued.

It is said that the concern probably will be reorganized and the business taken over following an adjustment of its affairs under the receivership.

## STATE DEALERS ORGANIZING

ST. LOUIS, Sept. 26—Preliminary work for the organization of State dealer associations in Pennsylvania and New York has been completed by the National Automobile Dealers Association. Delegates from local associations in Pennsylvania will meet at Harrisburg Oct. 5 to adopt a constitution and by-laws and arrange for a State convention to be held in the Capitol building in that city in November. In New York State, delegates from local associations will meet in Syracuse about Nov. 20, when preliminary organizing steps will be taken and plans made for a general convention probably to be held in December.

## ACCEPT HARPER BEAN PLAN

LONDON, Sept. 5 (*By Mail*)—Creditors of the Harper Bean interests have accepted the plan for the continuation of the company's trading. The creditors will receive at the rate of 3s. 4d. (nominally 80 cents) per £1 (nominally \$5) of debt.

## Ames Advises More Aircraft Research

### Resumption of Scientific Activity Urged Upon Manufacturers by Aeronautic Chief

WASHINGTON, Sept. 26—Re-establishment of research laboratories maintained by aircraft manufacturers, many of whom were directly associated with the automotive industry, has been recommended by Dr. Joseph S. Ames of the National Advisory Committee for Aeronautics. In a statement to-day, Dr. Ames stated that civilian aviation demands the development of cheaper, more reliable and more efficient aircraft and that the advisory committee favors the continuous prosecution of scientific research and experimentation for the development of aircraft for any purpose. He deplored the discontinuance of this activity.

It is the contention of Dr. Ames that civilian aviation must be developed, for in the last analysis it should be the main support of the industry in time of peace. He has suggested that Congress take immediate action on the aviation bills which have been introduced, that is, for the establishment of the Bureau of Air Navigation in the Department of Commerce. Dr. Ames regards the situation as serious from the standpoint of industrial development and particularly national defense. It is his contention that the recent bombing tests of airplanes versus battleships off the Virginia capes have served to indicate the great possibilities of aircraft in coast defense and naval warfare, and to accentuate the demand for progress in aeronautical development.

Dr. Ames pointed out that in the present demand for economy in government there is danger that the development of aviation may be unwisely retarded. He stated that economy can be wisely effected only where economy is possible without retarding necessary development, and that it will be a mistake to retard the development of aviation.

## Airplane Design Topic at Dayton S. A. E. Meeting

DAYTON, OHIO, Sept. 26—The Dayton section of the Society of Automotive Engineers will open its season with a meeting on Oct. 4. I. M. Laddon, chief of the airplane design branch, Engineering Division, U. S. Air Service, will give a talk on all-metal airplane construction. The meeting will be held at the Engineers' Club at Dayton, Ohio. The talk will cover internal bracing, the use of steel and duralumin as tubing, wing covering, etc. The paper will discuss advanced types of airplane design such as the Dornier Zeppelin airplane and monoplane, Junker monoplane, Fokker monoplane and biplane, Brequet and others.

## Peerless Stock Up Under Transfer Deal

Rises 15 Points—Stockholders  
Requested to Deposit Shares  
Before Oct. 10

CLEVELAND, Sept. 26—The deal for the purchase of the controlling interest in the Peerless Truck & Motor Corp. of this city has reached the point where an outline of the sale has been given to stockholders of the corporation. Although negotiations were still in progress between R. H. Collins of Detroit and associates and B. G. Tremaine, president of the corporation, and his associates, notices setting forth details of purchase were sent to stockholders through the mails.

The purchase will be made on the basis set forth in previous dispatches from Cleveland. Collins and his associates are to take over 50,000 to 80,000 shares of the company and pay \$50 a share. Of the purchase price \$10 will be paid in cash and there will be six deferred payments totaling \$40 a share. These will be in six equal installments semi-annually over a period of three years. The deferred payments will be secured by a trust agreement under which there will be deposited as security for the personal obligations of Collins and associates all of the shares sold and additional security covering the first two installments of principal. After these two installments are paid, the notice says, the only security which the stockholders will have will be the shares themselves but the amount of the indebtedness so secured will be reduced to \$26.67 a share.

### Recommend Acceptance

The notice, which is signed by B. G. Tremaine, president, and F. S. Terry, also an executive of Peerless, states that "we and our associates are favorable to Mr. Collins' proposition, and will recommend its acceptance to our friends. The furnishing of the minimum of 50,000 shares is therefore practically assured. Our attorneys, Mr. Tremaine and G. B. Siddall, probably will make the sale when the minimum of 50,000 shares is deposited with the Cleveland Trust Co. All stockholders who sign the agreement and deposit their shares on or before Oct. 10 will participate in the sale. Agreement and shares received later than that date will be returned."

The notice then proceeds to ask stockholders to deposit their stock in escrow with the Cleveland Trust Co. so that they may participate. This request would indicate that Tremaine and his associates have not yet obtained under proxy all of the stock that Collins and his associates desire.

Collins was in the city to-day and was in conference with officers of Peerless at the plant. The deal, which involves the payment of practically \$4,000,000 is expected to be consummated shortly.

The Peerless stock sold to-day on the exchange here for 38, a rise of 15 points

## HORSE PROPAGANDA REFUTED IN CANADA

CHICAGO, Sept. 26—The responses received from a questionnaire sent to 5000 Canadian tractor owners by the International Harvester Co., show that tractors are being operated this year despite the many conditions unfavorable to their use. Only 15 per cent of those answering the questionnaire stated that they had not used the tractor this year.

The questionnaire was sent out in an effort to refute the propaganda of the Horse Association of America which stated that but 5 per cent of the tractors in the Canadian Northwest were in use this year, and as a result of this condition an investment of over \$42,000,000 in tractors in this section was disappearing in depreciation.

since the first rumors of the approaching deal were heard. When Collins takes over the management it is reported that sales promotion work will be carried on on a much larger scale than it has ever been. Every effort possible will be made to increase the prestige of the Peerless products throughout the world and it is expected that production will be increased greatly.

## First Show in China Scheduled for November

WASHINGTON, Sept. 26—Trade Commissioner Lynn W. Mekins advises manufacturers of automobile accessories and automobiles in this country to make arrangements with exporters for an exhibit of their products at the Shanghai Automobile Show, to be held during the week of Nov. 26 to Dec. 3, the first exhibit of that character ever held in China.

He points out that in order to reach Shanghai in proper time, it would be advisable to ship samples of accessories and other display material through parcel post or express by way of the Pacific. The existence of a branch of the United States Post Office at Shanghai enables parcel post shipments to be made under domestic rates and conditions. A majority of the best known American, French and British automobiles will be displayed by local representatives. A list of importers of and dealers in automobiles and automobile accessories in China may be obtained from the Bureau of Foreign and Domestic Commerce.

### ADDS STANDARD EQUIPMENT

CLEVELAND, Sept. 26—The Grant Six has added as standard equipment wood disk wheels, spare cord tires, Neville sliding steering wheel, drum shaped headlamps, parking lamp on the cowl and bumpers in both front and rear.

## California Trade Shows Slight Drop

Will Feel Effects of Oil Field  
Strike If Acute Situation  
Develops

LOS ANGELES, Sept. 26—The continuance of the demand in southern California for motor equipment surpasses understanding. In June, it was predicted, the peak had been reached when the 10 counties passed the 5000 mark in registrations. This seemed to be borne out when July showed a slight decline, but August followed with a gain that not only passed the previous month's figures but was more than 100 in excess of June. September probably will fall slightly behind August, but indications are that the predicted slump has been postponed for at least one more month.

Dealers and others closely identified with the trade have quit trying to guess business prospects. The air has been filled with a belief that business would have to get much worse, because of conditions in other parts of the country, but the time has not arrived, according to the figures. At the end of August there had been 33,681 new motor cars and trucks registered in southern California as against 29,375 for the same period the year previous. August reported 5384 new passenger cars, of which 2333 were Fords, and 500 trucks and commercial cars, of which 220 were Fords.

There is no doubt but that if the strike in the oil fields that now is waging brings about an acute situation, the automotive trade will feel the effects. Kern County, the heart of the oil district, is one of the most thoroughly motorized sections in the entire State, and a complete tieup in operations will paralyze all kinds of industry there. In Los Angeles County the banks that have taken over a liberal quantity of both trucks and passenger cars have begun selling them at far below the original list prices. It cannot be told at this time how serious will be the effect of this class of trade. Truck dealers are likely to feel it more than the passenger car dealers.

### MAY SELL SCOUT MOTORS

LONDON, Sept. 16 (*By Mail*)—The affairs of Scout Motors, Ltd., at Salisbury, one of the oldest British automobile makers, are being revived by the court. The company, though never at the front of the industry, had a fair reputation for a mid-grade car but had a bigger market for their "Scout" trucks. The gross debts are declared at \$158,770 and the assets taken at a forced sale value are valued at \$50,000. The official report on the company's affairs suggests a possible sale of the company, but adds the significant remark, "the present position of the motor industry is not very favorable."

## September Business Is Exceeding August

### Slight Decline in Some Sections Balanced by Increases in Others

NEW YORK, Sept. 26—The feeling of confidence engendered in the automotive industry by the unexpectedly good business of the summer months is being sustained by the September sales showing and the belief that there will be no serious slump in trade in October or November.

Liquidation of high priced inventories by passenger car makers is rapidly nearing completion, and they are buying supplies at the market. There also has been a gratifying increase in the efficiency of labor. These two factors together have been responsible in no small degree for the substantial price cuts which have been made and which have been passed on to the "ultimate consumer," in marked contrast to the situation in many other lines.

There is a striking disposition throughout the industry to be mutually helpful. The parts and accessory manufacturers are fully alive to the difficulties confronting the vehicle makers and are disposed to assist them in every way possible. In respect to inventories and labor, the parts makers are in much the same position as the car manufacturers. This has been reflected in substantial reductions within the past few days in some of the most important unit parts used in assembled cars.

#### Business Better in South

While there has been a slight falling off in sales of passenger cars at retail in the great industrial districts, this has been balanced by increased business in the South and in the leading agricultural sections where farmers are liquidating their bank indebtedness and are replacing some worn automotive equipment. Reports of better business in the South are particularly encouraging.

It is notable that the feeling in Detroit is increasingly hopeful. Employment figures for that city show that there has been no decline in the number of men employed, although a few more are on part time. Ford production for September will run several thousand behind August, but this is not due to lack of orders but rather to manufacturing complications. Ford sales were stimulated to a marked degree by the most recent price cut, and the company has sufficient orders on hand now to keep it going at capacity until Nov. 1. Dodge, Studebaker, Buick, Nash and Reo are behind on deliveries. An indication that the companies in the higher priced class are feeling the beneficial effects of the generally brighter outlook is found in the fact that September will be the best month the Lincoln Motor Car Co. ever has had.

## SMITHS LOOM LARGE AS POTENTIAL BUYERS

DETROIT, Sept. 26—Eleven and five-tenths per cent of the Smiths are buying automobiles this fall and winter.

This information was solicited by a leading farm journal by sending out a questionnaire to the 12,824 Smiths listed among its 1,100,000 subscribers. The idea of this means of getting a line on what farmers were going to do with their money suggested itself to a man named Smith in this journal's research department.

By applying the percentage of Smith car buyers to its total subscription list, the journal estimated that 126,500 cars will be purchased by its 1,100,000 readers. Of this number the questionnaire revealed that 116,200 had already determined upon the make of car they will purchase.

The entire industry is centering its attention to a greater degree than ever before on the question of service and the needs of car owners. This probably will result in fewer complaints in the future about high upkeep costs and unsatisfactory repairs.

## Two Days for Next French Grand Prix

PARIS, Sept. 17 (*By Mail*)—Next year's French Grand Prix race will be a two-day event for two different types of cars. Racing cars will be run on one of the days under a piston displacement rule, but the national club is undecided whether to retain the present 183 cu. in. rule or to drop to 122 cu. in. The smaller piston displacement has a big following, but if adopted for next year, it will eliminate all foreign competition, for the 183 cu. in. rule has been decided on in England, America, Italy and Belgium. The second race will be for stock cars having minimum body dimensions and a limited amount of gasoline and oil. This event will be quite independent of the one for purely racing cars, although run over the same course. It has yet to be decided where these two races will be held. The date probably will be early in July.

#### E. W. BROOKS DIES SUDDENLY

CADILLAC, MICH., Sept. 27—Announcement has been received here of the sudden death in Kansas City of E. W. Brooks, field representative of the Acme Motor Truck Co. He had been factory representative of the company in the Southwestern States for three years and had just returned to Kansas City from a long business trip when he suffered a stroke of apoplexy in the lobby of his hotel.

## Cotton Prices Boom Georgia Industries

### Increased Employment and Bank Clearings Reflect General Im- provement in Conditions

ATLANTA, Sept. 26—That there has been material improvement in business in Georgia during the past five or six weeks is indicated by a report of the State Department of Commerce and Labor issued the latter part of this month, which states that Georgia industries are now employing more persons than at any time during the past seven months. The increased price of cotton is responsible for the betterment in employment conditions, and if the price holds around the 20 cent per pound level still further improvement is anticipated during the coming month.

Material improvement is shown in employment conditions in virtually all of the southern States the past five or six weeks, or since cotton began its steady advance, according to reports received in Atlanta.

Bank clearings in Atlanta also show a large and steady increase. Clearings the third week in September were larger than any single week since last January, the increase each week amounting to several million dollars the past month.

#### Increase at Ford Branch

The Atlanta branch of the Ford Motor Co. reports a tremendous increase the past few weeks in Ford car and truck sales, the South leading all the other districts in the percentage of gain since the latest price reduction. The increase for the Atlanta branch has been 63 per cent, and this branch now has approximately 1000 unfilled orders on hand. A good sign of the general business improvement is the fact that there has been an enormous increase lately in the sale of Ford cars to commercial houses for the use of salesmen in covering their territories.

P. A. Megahee, secretary of the Georgia Automotive Dealers Association, has just completed a trip throughout the State, visiting the various local dealer organizations, and reports that everywhere he visited increased cotton prices have been reflected in increased automobile sales, especially among the smaller dealers. There is a much better feeling among the dealers in the smaller towns than there has been for more than a year, and their general opinion is that the industry is close to normalcy.

#### CITIZENS VISIT TIRE PLANT

HOLYOKE, MASS., Sept. 27—More than 5000 citizens inspected the new plant of the New England Tire & Rubber Co. at its formal dedication. The inspection was preceded by a meeting of the stockholders at which officers and directors were named. John Kearns is president of the company, C. D. Huntley, treasurer and general manager, and J. S. Bernstein, secretary.

## Goodyear Production Neared Peak Volume

### Wilmer, After Survey, Says Buy- ing Is Being Done on Close Lines

AKRON, Sept. 26—Summarizing operations in the rubber industry during the past half year, following a complete survey of Goodyear properties which included trips to Canada, Arizona and California, President Edward G. Wilmer of the Goodyear Tire & Rubber Co. expresses the conviction that the foundations are being soundly laid for the future stability and progress of the industry.

"Our sales during the summer season have exceeded our expectations of last spring. There was a larger use of automobiles than we had thought there would be, compelling our production of tires to go within as high as 85 per cent of its peak volume," states Mr. Wilmer. "Part of this was due undoubtedly to the fact that there had not been the normal buying during last fall and winter. Neither consumers nor dealers did any stocking up this summer, and they are still buying carefully from hand to mouth."

### Three Plants Surveyed

Mr. Wilmer's trip included surveys of the Goodyear tire plants in Toronto, Canada, and Los Angeles, Cal., and the company's cotton plantation in Arizona.

"At the Canadian plant at Toronto they have completed their readjustment to new conditions and are moving ahead. Progress is being made in the domestic field and even more encouraging progress in export," states Mr. Wilmer. "All along the Pacific Coast we found business conditions were better than in the country generally. They have felt the readjustments much less than we have in the East. I was more than pleased over the new Goodyear factory at Los Angeles. It is a wonderful plant and ideally adapted to serve its purpose. Our California factory reached a peak production of 4100 tires a day this summer. A larger volume of business that will use proportionately more of its facilities will greatly improve its showing, but already it is meeting the demands upon it, both from the standpoint of production and current earnings."

"In Arizona, where the company has its cotton plantations, I found a section of America which had gone through great reverses during last winter and spring, but which is now showing real signs of revival."

"They had in the Salt River Valley 180,000 acres in cotton last year. They had only been in the business of raising long staple cotton for three or four years, and were not prepared to carry them through a year in which the prices of their product slumped substantially under the cost of production."

## Piston Displacement Values Shown by Race

BRESCIA, NORTHERN ITALY, Sept. 8 (*By Mail*)—An average of 72 miles an hour was maintained by Ernest Friedrich in to-day's 215-mile race, with a four cylinder Bugatti having a piston displacement of only 91.5 cu. in. This constitutes a world's record for cars

of this size and is a higher speed than was attainable in 1914 with engines of twice this piston displacement.

The Bugatti cars, which weighed 1100 pounds, had a four cylinder motor of 68 and 100 mm. bore and stroke, with four valves in the head operated by an overhead camshaft, with vertical bevel gear drive. The crankshaft was carried in three ball bearings, and roller bearings were used for the connecting rod ends. Ignition was by a couple of high tension Bosch magnetos carried on the aluminum dash and driven from the overhead camshaft by a horizontal shaft with a couple of flexible fabric couplings.

The high speeds attained in this race, the small amount of mechanical trouble, the economy in tires, which gave such good service that they never influenced the result, and the high degree of perfection which has been attained in getting these 1100 lb. cars to hold to the road, all confirm the conviction that the 183 cu. in. limit is too high for racing purposes.

## No Distributors Rumored in Willys-Overland Plan

NEW YORK, Sept. 28—Reports in circulation among wholesale and retail representatives of Willys-Overland, Inc., are to the effect that the company is about to eliminate the distributor from its plan of marketing Willys-Knight and Overland cars. It is said that dealers will operate directly under branch sales managers. Each branch will have several hundred dealers under its direction under this plan. It is reported that sales territory throughout the country will be redistributed.

## Rickenbacker Acquires Former Disteel Plant

DETROIT, Sept. 26—Rickenbacker Motor Car Co. has taken over the Disteel Wheel plant of the Detroit Pressed Steel Co. in a deal which affects four companies in the industry importantly. It is one of the first of a number of plant changes which may be expected this fall and winter, all making toward the solidification of the companies concerned.

Besides Rickenbacker and Detroit Pressed Steel, the companies in the present deal are Briggs Mfg. Co., body builders, and Everitt Bros., body painting and trimming. Everitt Bros. will consolidate its business in its East Jefferson Avenue plant, while Briggs Bros. will practically double the space occupied in its former plants.

The plant has now been sold to permit Detroit Steel Products to consolidate its manufacturing units in the Mt. Elliott Avenue plant. Each of the companies involved in the deal is already in the new plants. All of the Rickenbacker offices are now at the former Disteel plant. President B. F. Everitt said that production will be under way on all models in December though no shipments will be attempted until January.

## Conservatism Marks Philadelphia Trade

### Sales of Lighter Trucks and Lower Priced Automobiles Show Improvement

PHILADELPHIA, Sept. 26—Trucks, particularly those of smaller capacities and lighter construction, are having a better sale than for some time in this city and vicinity, but only under the constant spur of salesmen's contests in which prizes or bonuses figure and through readjustment of territory and increased energy on the part of sales managers. Sales of lower priced automobiles are picking up and while business is not yet on a normal basis, buying is more systematic and inquiries are more frequent. Many of the dealers are still engaged on cutting down their sales and service operating expenses. One economical step that is becoming general is the drastic cutting-down of the number of salesmen's cars and demonstration cars. It is noted that most customers who are buying cars for their personal use are more conservative.

Accessory dealers report that business, at the end of the summer, is becoming more active, yet not as active as had been hoped. Tire manufacturers in this territory report the summer sale of their products as good. While they expect a slowing up of business with the end of the summer motoring, they are optimistic as regards future trade.

Tire dealers report that there is a heavy demand at present for tires for small cars which have had big price reductions. These sizes are far outselling the larger sized tires. Companies supplying tires to automobile manufacturers in the territory, including southern New Jersey, say that they have felt the slump that affected the industry. Old debts have been paid for the most part, although collections have been slow, and the majority of companies are starting on a new basis.

### LEE MAKING NEW TIRE

NEW YORK, Sept. 26—The Lee Tire & Rubber Co. is producing a new tire known as the Lee 22 Zig Zag, priced at \$13.75, and suitable for Ford, Maxwell, Overland and Chevrolet cars. This figure has been fixed, the company states, in anticipation of 1922 prices.

### CORRECTION

NEW YORK, Sept. 27—The statement was made in a survey of automotive conditions in Mexico, printed in AUTOMOTIVE INDUSTRIES, Sept. 1, that Messrs. B. Estades & Cia are the Pierce-Arrow distributors in Mexico City. This was an error, for the distributors of the Pierce-Arrow line in Mexico City are Compañia Automotrix Mexicana, S. A. This company has had the exclusive franchise for Pierce-Arrow in Mexico for several years.



## Truck Association Closes Headquarters

### Business of Chicago Organization Will Be Conducted Through Informal Meetings

CHICAGO, Sept. 27—At a meeting of the board of directors of the Motor Truck Manufacturers' Association held here, it was decided to close the association office and dispense with the services of the manager and staff. At the suggestion of B. A. Gramm, vice-president of the Gramm-Bernstein Motor Truck Co., an association member, it was decided to continue the activities of the organization through the medium of occasional meetings of such members as may remain in the association.

The reasons given for the closing of headquarters and the virtual dissolution of the association are that the present state of the motor truck industry does not justify the expense of office and staff, and the lack of financial support from its members.

The Motor Truck Manufacturers Association was organized in April, 1918, for the purpose of ready exchange of parts among manufacturers under contract with the government to build army type B trucks. Later the activities of the organization were broadened to cover such points as legislation and general expansion of the industry. The association started with 14 members. This number was raised to 55 but dropped to 31. David Thomas has been manager of the association since its organization.

## Hupp Changes Prices on Enclosed Models

DETROIT, Sept. 27—Hupp Motor Car Corp. has reduced prices on its enclosed car models to \$2,250 and \$2,200 for the sedan and coupe respectively. The former prices were \$2,285 and \$2,400. No changes are made in the models, the lower prices being effected through manufacturing economies. The price of the open models, \$1,485 for touring and roadster, remains unchanged.

### KISSEL TRUCKS DOWN

HARTFORD, WTS., Sept. 26—Reductions ranging from \$600 to \$1,000 on its line of trucks are announced by the Kissel Motor Car Co. The prices follow:

	New Price	Old Price
Utility model 1½ ton....	\$1,975	\$2,775
Freighter model 2½ ton.	2,875	3,475
Heavy duty model 4 ton	3,675	4,475
Goliath model 5 ton.....	4,085	5,085

### ANOTHER CUT BY ANDERSON

ROCK HILL, S. C., Sept. 26—The Anderson Motor Car Co. announces another cut in prices on its various models. It covers the new line which is now being turned out. Economies in manufactur-

ing and distribution have made the cut possible. The price list follows:

	New Price	Old Price
5 passenger touring..	\$1,650	\$1,795
7 passenger touring..	1,795	1,845
Coupe .....	2,450	2,795
Sedan .....	2,550	2,795

No change has been made in the price of the two passenger speedster which remains at \$2,195.

### SAXON MAKES CUT

DETROIT, Sept. 26—The following price reductions are announced by the Saxon Motor Car Corp.:

	Old	New
2 passenger roadster.....	\$1,545	\$1,345
5 passenger touring.....	1,495	1,295
Coupe .....	2,295	1,995
Sedan .....	2,295	1,995

### R. & V. KNIGHT REDUCES

EAST MOLINE, ILL., Sept. 27—Reductions have been made on the R. & V. Knight, Model R, as follows:

	Old	New
5 passenger.....	\$2,150	\$1,500
Coupe .....	2,850	2,650
Sedan .....	2,950	2,750

### STEPHENS SALIENT SIX DROPS

FREEPORT, ILL., Sept. 27—The Moline Plow Co. has announced that the Stephens Motor Works has reduced prices on the Stephens Salient Six, effective Oct. 1, as follows, all prices f.o.b. this city:

	New Price	Old Price
6 passenger touring..	\$1,850	\$2,065
4 passenger touring..	1,850	1,985
Sedan .....	2,850	3,100
Sedanette .....	2,850	3,100
Roadster .....	1,800	1,900
Special sport model...	1,950	2,085
Special roadster.....	1,900	2,000

### RESUME REPUBLIC DIVIDENDS

NEW YORK, Sept. 29—Dividend payments on the preferred stock of the Republic Motor Truck Corp., which is controlled by John N. Willys, have been resumed. The quarterly payment due July 1 was passed. The current dividend of 1½ per cent is payable Oct. 1. Shipments from the Republic factory this month will aggregate 200 trucks and sales next month are expected to exceed this total. This is regarded as indicating a much better trend in the truck market.

### FARMERS AWAIT REDUCTIONS

KANSAS CITY, Sept. 27—The implement trade has suffered more than any other in the past year. Reports indicate that farmers are not yet ready to buy, though their credit is such that now they may enter the obligations. It is said that farmers still believe that implement prices have not been readjusted.

Reports that a further readjustment of prices may be expected in October have aroused discussion as to steps which may be taken to bring about a revival of demand.

## Durant Is Producing at Long Island Plant

### Scheduled Output Set at 50 to 60 Cars Daily—Will Be Increased

NEW YORK, Sept. 29—The Durant Four now is in production at the Long Island City plant and the scheduled output for next week is between 50 and 60 cars a day. Production will be steadily increased. The automatic machinery has been placed and the company contends that a record has been made in getting an entirely new car into production in seven months. Production in the Lansing plant will begin about Nov. 1. The output for the year at the Long Island City plant will be between 4000 and 5000 cars.

Durant Motors, Inc., has been informed by the Illinois Securities Commission that it will not be permitted to sell stock in that State on the ground that its securities are "purely promotional and without basis of value." A statement issued by Carroll Downs, vice-president of Durant Motors, states that the attorneys for the corporation advised several months ago that under the Illinois law as it then stood any stock which was listed in the larger stock exchanges of the country was eligible for sale in Illinois. Sale of Durant stock then began but the Illinois law was amended so that admission to the stock exchanges did not make securities eligible in that State. When this amendment was called to the attention of the company sale of the stock was suspended.

## Gear Manufacturers Meet in Rochester

NEW YORK, Sept. 28—The semi-annual fall meeting of the American Gear Manufacturers Association will be held in the Powers Hotel, Rochester, Oct. 13, 14 and 15. Reports will be presented by the various committees on standardization. The program will include papers on "Gear Tooth Wear," by S. O. White, chief engineer of the Warner Gear Co., Muncie, Ind.; "Duralumin as a Material for Worm and Other Gearing," by R. W. Daniels, Bausch Machine Tool Co., Springfield, Mass.; "The Grinding of Gear Teeth and Its Future in the Industry," by J. F. Barr, secretary, The Gear Grinding Machine Co., Detroit, Mich.; "Tooth Forms," by E. W. Miller, chief engineer, Fellows Gear Shaper Co., Springfield, Vt.

Arthur E. Sutherland, former justice of the Supreme Court of New York will be one of the speakers at the informal dinner on the evening of Oct. 14. His subject will be "Capital and Labor." Another speaker at the dinner will be Ernest Pavioir, who will talk on "Advertising."

# Big Automotive Merger Proposed

## Several Companies Will Be Included

**Creditors of Jackson Motors Hear of Plan—Combine Involves \$50,000,000**

NEW YORK, Sept. 29—Creditors of the Jackson Motors Corp. will have presented to them at a meeting in Jackson, Mich., to-day a proposal that they sanction entrance of that company into a \$50,000,000 merger of automotive concerns. The plan has been worked out in detail after months of effort by the bankers involved, headed by Ralph Van Vechten, of the Continental and Commercial Bank of Chicago.

Details of the negotiations for the consolidation have been kept a close secret, but it is understood that the companies which will be taken in will include the Traffic Truck Co., the Covert Gear Co. and the Herschell-Spillman Co. Efforts were made some time ago to interest in the plan the interests which control the National Motor Car and Vehicle Corp. of Indianapolis, the Liberty Motor Car Co. of Detroit and the Cole Motor Car Co. of Indianapolis, but these corporations decline to enter the combination.

It is understood also that negotiations have been under way with the Mitchell Motor Co., Inc., of Racine, Wis., and the Gardner Motor Car Co., Inc., of St. Louis. Bankers closely connected with the Mitchell company said to-day that they had heard nothing of any plan of entering such a merger. The interests which control the Mitchell company are identical with those back of the Hupp Motor Car Corp. but there has been no intimation that Hupp was in any way interested in the merger.

C. O. Miniger, who is president of the Electric Auto Lite Corp., a subsidiary of the Willys Corp., is a director of Jackson Motors but it was said here to-day that there was not the slightest possibility of Electric Auto Lite being included. So far as the Willys interests were concerned, it was said, the connection of Miniger with Jackson Motors was merely a coincidence.

While it has been known in banking circles for some time that efforts were being made to form a big combination, little has been heard of it in the trade. Probably the most active workers for it have been Van Vechten, Harold Plimpton, a Boston broker, who is a member of the Jackson finance committee, and Carl L.

V. Exselsen, a Chicago attorney. Exselsen is secretary and treasurer of the Jackson company.

The call sent to creditors of Jackson Motors for the meeting at Jackson to-day, says:

"Very earnest and active work has been done during the past two months preparing a satisfactory solution of Jackson Motors problems. The plans evolved are about to be consummated and the general plan of the entry of Jackson Motors into the merger will be disclosed and acted upon."

The creditors had been informed a few days earlier that under this plan Jackson would become a unit of a \$50,000,000 automotive merger which would be announced about Oct. 1. The executive committee of bankers and others interested has definitely agreed to pay part of the claims against Jackson in cash if the plan is approved.

It is understood that the Covert Gear Co. is one of the largest creditors of Jackson Motors and it has been understood that plans have been under way for a refinancing of the gear company.

Jackson Motors Corp. was incorporated in 1919 to take over the Jackson Motor & Mfg. Co., the United Four Wheel Drive Truck Corp. and the Lamson Truck & Tractor Co. The plant at Jackson covers almost six acres of floor space. It makes a full line of passenger cars and also four wheel drive trucks. The authorized capital is \$3,000,000 common and \$2,000,000 preferred. A general balance sheet of July, 1920, showed assets of \$6,212,742 and working capital of \$1,259,743.

The Herschell-Spillman Motor Co. has a large plant at North Tonawanda, N. Y., and manufactures two types of motors, one a four cylinder for automobiles, light trucks and small tractors and the other a six cylinder for high class automobiles.

The Covert Gear plant is located at Lockport, N. Y., and the company manufactures transmission gears. Alvin A. Gloetznar, the president, is understood to have been prominent in promoting the merger.

The plant of the Traffic Truck Co. is in St. Louis.

## UNDERWRITERS MEET OCT. 3

CHICAGO, Sept 26—The Automobile Council of the Underwriters Laboratories will meet at the Chicago office of the Laboratories Oct. 3, the day before the meeting of the rates committee of the National Automobile Underwriters Conference.

Possible increases in the present standards of the laboratories covering test requirements for automobile bumpers and consideration of a possible grading of automobile locking devices with reference to their merits are among the questions expected to be discussed.

## Tire Standardization Report Is Completed

**S. A. E. Committee and Rubber Association Have Approved Recommendations**

NEW YORK, Sept. 27—The special committee on tire and rim standardization of the Society of Automotive Engineers appointed last December to consider the standardization of tires and rims, has completed its report relating to policy so far as co-operation of the society with the National Automobile Chamber of Commerce and the Rubber Association of America is concerned, and will present its recommendations at the January meeting of the standards committee of the society. The recommendations will then be presented to the society as a whole for action. They have already been approved by the rubber association.

## Pending for Year

At a meeting in Cleveland last year, the decision was reached to appoint a special committee to act in this matter, and subsequently in December, 1920, the council of the society appointed J. G. Vincent, vice-president of engineering of the Packard Motor Car Co.; H. H. Rice of the National Automobile Chamber of Commerce; A. L. Viles representing the Rubber Association of America, and H. M. Crane, also representing the S. A. E., to survey the present practice. The result of the consideration of all questions pertaining to the matter is embodied in the report. If this report is adopted by the society, it will be entered in the official handbook as "S. A. E. Best Recommended Practice," instead of "S. A. E. Standard," as is now the case, the change being due to the alterations in the existing table.

## New Sizes

Three present sizes would be eliminated, 32 x 3½, 33 x 4, 33 x 4½ straight side with the substitution of a 30 x 3½ clincher and 30 x 3½ straight side type, with a 31 x 4 oversize and no regular. The sizes to be recommended as the best practice are as follows:

Tire Size		
Rim Size	Regular Size	Oversize
30 x 3½ C	30 x 3½	31 x 4
30 x 3½ SS	.....	31 x 4
32 x 4	32 x 4	33 x 4½
32 x 4½	32 x 4½	33 x 5
34 x 4½	34 x 4½	35 x 5
34 x 5	34 x 5	36 x 6
36 x 6	36 x 6	38 x 7
38 x 7	38 x 7	40 x 8
40 x 8	40 x 8	42 x 9
44 x 10	44 x 10	.....

## INDUSTRIAL NOTES

Victor Bearings Co., Indianapolis, has acquired all the resources and liabilities of the Modern Die & Tool Co. of that city.

Franklin automobile shipments from the Syracuse factory for the first three weeks of September were over 10 per cent in excess of the same period in August.

Kelly-Springfield Tire Co. plant at Wooster, Ohio, will close down entirely before Oct. 1 and the machinery will be shipped to the new plant at Cumberland, Md.

The American Motors Export Co. will begin work on the initial unit of its plant at Jacksonville, Fla., with the arrival of the first carload of steel, now being shipped from the Virginia Bridge & Iron Works of Roanoke, Va.

The Oshkosh Motor Truck Co. of Oshkosh, Wis., which completed a new plant costing about \$275,000 several months ago, is now in active production. The pumps on the fire engines will be made in sizes having a capacity of 750 to 1000 gal. per minute.

Durant Motors, Inc., has made a contract with Kensley, Millbourne & Co., Ltd., 90 West Street, New York, to handle all its export business. The parent company is referring to the export house all inquiries in regard to shipments of cars to foreign countries.

Wilson Tire & Rubber Co. plant at Springfield, Ill., has been sold for \$12,226.40 at a public auction in foreclosure of a mortgage on the property held by the First Trust and Savings Bank. The purchaser was James A. Easley. It is estimated the plant is worth at least \$200,000.

Charles H. Harris, Inc., dealing exclusively in glass for automobile windshields and enclosed bodies, has completed its factory at Norwalk, Conn., and anticipates operating on full time in the next thirty days. This full capacity is possible through the increased business of the last six weeks.

Scholtz Tool, Gear & Machine Works, Inc., Waterloo, Ia., has added \$10,000 worth of new machinery for a service to automobile and garage owners in cylinder and crank shaft grinding. The firm will manufacture and market a device for hauling disabled cars to repair shops, an invention by O. A. Scholtz, manager and principal stockholder of the company.

The Standard Unit Parts Corp., Chicago, has established a branch house in Milwaukee under the management of W. F. Mark. The company is distributor of Continental motor parts, Borg & Beck clutches, Spicer universal joints, Pierce governors and Hy Duty fans. Of the \$100,000 of authorized capitalization, the Wisconsin investment is given as \$15,000 in the application for a local charter.

The Oshkosh Tractor Co., Oshkosh, Wis., has called for bids for the general construction work on its new \$250,000 factory, including concrete and mason work, structural steel, metal sash, etc. The main building will be 150 x 500 ft., one story, with saw-tooth roof, and is expected to be ready about Dec. 1 or 15. The transfer of the machinery, equipment and materials from La Crosse, Wis., is now under way.

The Victor Bearings Co., Indianapolis, with a capital stock of \$300,000, has taken over the properties of the Modern Die & Tool Co. of that city. The company will engage in the manufacture of bearings for automobiles, trucks, racing cars and airplanes. At the present time it is operating both day and night shifts. It is planned

soon to move the entire plant to a new building that is to be erected near the site of the old.

The Western Reserve Mills Co. of Kent, Ohio, which recently purchased the Quitman Cotton Mills at Quitman, Ga., for the manufacture of fabric used in making tires by the Mason Tire & Rubber Co., has also purchased the Millen Cotton Mills at Millen, Ga., for the same purpose. The freight rates to Ohio were so large that the company purchased these mills outright and will manufacture the fabric right in the cotton growing belt.

The Mason Tire & Rubber Co. at Akron announces that the capacity of the tire department will be doubled by the first of the year. Contracts for the installation of new machinery to provide for the increased production have been let. Alterations in the factory arrangements will take care of the increased production. With the new machinery installed the company will have a capacity for 4000 tires and the same number of tubes a day.

Duty Motor Truck Co. will be given a deed to a tract of land at Elgin, Ill., by the local association of commerce as soon as it removes its plant from Greenville, Ill., and is in actual operation. The association paid \$7,500 for the property and 150 residents of the city have invested in stock of the company. It is expected that the company, which agreed to locate at Elgin if a suitable site was provided, will have its plant completed by spring.

The Perfection Hoist & Engine Co. of Milwaukee, which is moving its plant and headquarters to Two Rivers, Wis., has made a unique departure in the design and production of the self-contained electro-generating unit which it is manufacturing. The Perfection lighting plant is powered with a four-cylinder L-type motor, air-cooled, and the piston rings, connecting rods, valves, springs, tappets, etc., are duplicates of Ford parts, making it convenient and economical for the owner at distant points from the source of supply to make immediate replacement.

The Talbott Rubber Co., Springfield, Ohio, has made application for incorporation papers with capital stock of \$50,000 preferred and 500 shares of no par common. The capital has all been paid in. The company will be a distributing organization and will be strictly a dealers' proposition. It has already closed a deal with the Cleveland Rubber Corp. by which the latter will make special fibre and cord tires for it, starting production Oct. 10. The temporary officers are Frank R. Talbott, formerly treasurer and general manager of the Victor Rubber Co., president; J. W. Culley, vice-president; C. A. Crummel, treasurer; R. S. Lucas, secretary. The directors, in addition, include Roger Houston, Dr. C. C. Craig and George A. Talbott.

## VICTOR RUBBER STRONG

SPRINGFIELD, OHIO, Sept. 27—President H. S. Berlin of the Victor Rubber Co. announced this afternoon that the company during the months of July and August earned a profit of \$62,030 and in addition set aside \$36,781 as a reserve for unanticipated contingencies. The company has doubled its sales agencies and is preparing for an extensive sales program in 1922. Berlin states that he expects 1922 to be the most profitable year in the history of the company.

Unemployment Needs  
Before Conference

## Mayor Couzens of Detroit Is Expected to Act as Spokesman of Industry

WASHINGTON, Sept. 28—While no specific proposals regarding unemployment in the automotive industry have been submitted to the Unemployment Conference, it is expected that the subject will come up later in the discussions when the broad principles of the meeting are formulated. Of interest to the industry is the salutary effect the conference has exercised on legislative programs of Congress.

Simultaneously with the recommendation of the committee on public works of the conference, for Federal, State and municipal co-operation in road building and other public activity, it was announced that the House would make it a point to dispose of the pending highway bill immediately on convening next week. The National Automobile Chamber of Commerce and other automobile organizations have endeavored to show the conference the need of new highways and the effect their construction would have on employment conditions.

Although Mayor James Couzens of Detroit was selected as a member of the conference primarily for geographical reasons, it appears that much is expected of him as a spokesman for the automotive industry. Because of the fact that he represents the great automobile manufacturing center, it is reasonable to believe that his advice will be taken on matters relating to the trade. Many automobile manufacturers conferred with the Mayor before he came here. He is a member of the Committee on Unemployment Statistics and the Committee on Emergency State and Municipal Measures and Public Works. In the formal call for the conference the Department of Commerce erroneously listed Couzens as vice-president of the Ford Motor Co.

## CREDITORS EXTEND TIME

PHILADELPHIA, Sept. 28—A majority of the creditors of the Storage Battery & Appliance Co. of Ohio agreed at a meeting here to grant the company an extension of 12 months and a committee was appointed to make recommendations for future action. Operations at the factory will be continued.

## PLAN PETROLEUM MEETING

NEW YORK, Sept. 28—The directors of the American Petroleum Institute have tentatively decided to hold the second annual meeting at Kansas City, Nov. 15, 16 and 17, provided satisfactory arrangements can be made to insure adequate accommodations for members. The annual meeting last year was held in Washington.



General Motors' vote of confidence in Detroit as automotive center of world

## Offices of G. M. C. Largest of Kind

### Mammoth Detroit Structure Will Likewise House Representa- tives of Parts Makers

DETROIT, Sept. 26—Plans for centralization of control of the many interests of General Motors have been brought to perfection at a time almost coincident with the final construction details of its immense general office building, declared to be the largest office building of its kind in the world and the peer of all buildings devoted to the needs of any one industry.

All but two of its fifteen stories will be occupied by the executive and general offices of the corporation. Executive committee and operating committee meetings will be held in these offices at monthly and semi-monthly intervals. Special directors' offices will closet director meetings on such occasions as these are held in Detroit. The main floor will display the automobiles, trucks and tractors made by the companies comprising the corporation.

The second and third floors will be leased to representatives of manufac-

turers making parts and accessories for the industry, thus making the building, in a larger sense, the automotive center of the world rather than exclusively General Motors headquarters.

A large auditorium in the rear will be used for the larger functions of the corporation, and will also be available to the industry as a whole and to the city of Detroit, as an exposition hall.

The building occupies two entire city blocks, practically at the intersection of the two main thoroughfares, Grand Boulevard and Woodward Avenue. It is in the geographical center of the city at a point where eventually, it is thought, will be the greatest business center.

### BULLETIN FOR N. A. C. C. MEMBERS

NEW YORK, Sept. 27—The National Automobile Chamber of Commerce has begun sending to its members a weekly bulletin summarizing briefly conditions in the basic industries together with information covering employment, building, foreign trade, banking and commodity prices. It includes a survey of retail trade as compiled by Bradstreet and a chart showing the factors in motor car use compared with bank clearings and the production of pig iron. The first of these bulletins is based upon the statement that "basic industries are gradually gaining momentum."

## Plan Removes Most of Moline Plow Debt

### Old Securities Will Be Exchanged for New Leaving Indebted- ness Less Than \$3,000,000

CHICAGO, Sept. 26—The new reorganization plan for the Moline Plow Co. was made public here yesterday by Frank O. Wetmore, president of the First National Bank and chairman of the bankers' and creditors' committee of the company. The plan provides that all debts of the company, amounting to slightly less than \$25,000,000 with interest be discharged with 50 per cent of bonds, 50 per cent of first preferred stock and a bonus of common in a new company.

Until the majority of the creditors act favorably upon the plan it cannot become operative. There may be some slight changes in detail.

Without assessment the old securities will be exchanged for new, of which there will be authorized \$12,500,000 first preferred, \$7,500,000 second and 200,000 shares of no par value common.

If this plan works out the company will be left with debts of not more than \$3,000,000. It will have a large working capital.

## METAL MARKETS

**U**NDoubtedly orders aggregating a respectable tonnage were placed on the order books of sheet mills previous to the withdrawal of the concessions recently in vogue. Consumers had been posted as to what was contemplated and many covered themselves well in advance at the formerly current price levels. With sheets to the front as the leading steel commodity in point of market activity, producers of those descriptions of finished steel which are still conspicuously in the doldrums are asking themselves whether it might not be advisable to emulate the example of the sheet makers. This would imply a cutting of prices, and then, once the momentum of revived demand begins to show, the issuing of notice that the concessions would be abrogated in a few days so as to afford buyers an opportunity to place orders while prices are still an inducement. There is no doubt that in the case of quite a few sheet mills the prices at which they booked orders a few weeks ago represented cost or even below cost. These same prices, however, in an operation of 60 per cent of plant capacity may yield a small margin of profit where they resulted in positive loss when operations were on a 20 per cent of capacity basis. With a view to raising their rate of operations producers of finished steel other than sheets are considering the advisability of temporary price cuts. In fact, next to the further price reductions that would be made possible by an early scaling down of freight rates, no other factor looms so big as an incentive to downward revision as the eagerness of all producers to bring a greater part of their capacity into active operation. It is generally conceded by the steel industry that the war has left it over-equipped. Until a revival in export demand absorbs a greater tonnage of steel, there is bound to be in evidence in the domestic market a certain amount of potential selling pressure resulting from the surplus of mechanical equipment over that which the domestic demand calls for. By this it is not meant to imply that there are any large tonnages of steel pressing on the market at this time. The surplus equipment referred to is, in fact, idle. Nor are these observations to be construed as in any way running counter to the opinion which is held in many quarters and for which there is ample justification that, taking into consideration prevailing prices for labor, freight and other items that enter into steel making, the market is far more in buyers' favor than in that of producers.

**Pig Iron.**—Automotive foundries are inquiring for somewhat larger tonnages. Sellers appear unwilling to accept commitments for first quarter 1922. The market generally may be characterized as firm.

**Steel.**—Somewhat more interest is being shown by automotive consumers in alloy steels, which have been almost dormant for a long while. The old 2.50c. quotation in the cold-finished steel market has disappeared, and producers seem eager for orders at \$2 to \$3 below this level. Automotive consumers continue to be the best customers which the strip-steel market has. Fair-sized lots of cold-rolled are inquired for, to be shipped in October. The asking price for the cold-rolled is 3.75c. and for the hot-rolled 2.15c., but these prices are being shaded down to 3.50c. and 2.15c. respectively. Automobile sheets are in good demand at 4.35c. for No. 22 gage.

**Aluminum.**—Prices on imported ingot metal are being slashed merrily and offers

at as low as 17c. for 98 to 99 per cent pure have been reported, although there is doubt whether deliveries would be made at this level. German aluminum sheets are offered at 30@32c. for flats and coils.

**Copper.**—Brass interests are buying more liberally. The market, however, continues only barely steady.

**Tin.**—The market has turned firmer but, as far as concerns buying by consumers, dull.

**Lead.**—Supplies of spot lead available in the East are light and the demand from consumers other than battery makers is keeping up well.

**Zinc.**—As the result of better inquiry from galvanizers, the market's general tone has improved. Production is still being curtailed and, as a result, steadiness prevails.

## FINANCIAL NOTES

**Goodyear Tire & Rubber Co.** 8 per cent twenty-year sinking fund bonds to the amount of \$750,000 will be retired Nov. 1, as provided for in the indenture. The total issue is \$30,000,000.

**Wilton Tool Co., Detroit,** is issuing \$250,000 in 8 per cent cumulative preferred stock to provide capital for expansion. Wilton Tool Co. combines the businesses of the Wilton Tool & Mfg. Co., the Twentieth Century Heat Treating Co. and the Wilton Engineering Co.

**McGraw Tire & Rubber Co.** shows net earnings for August of \$109,000, against \$33,000 for July, \$20,000 for June and deficits of \$10,000 in May and \$40,000 in April.

**Chalmers Motor Corp.** 6 per cent notes due Oct. 1, 1922, totaling \$33,684.80, have been sold at public auction at 50 cents on the dollar, or \$16,842.40.

**General Motors Corp.** directors at a meeting in New York declared a dividend of 25 cents a share on the common stock, \$1.50 on the 6 per cent preferred, \$1.50 on the 6 per cent debentures and \$1.75 on the 7 per cent debentures, payable Nov. 1.

**Kelsey Wheel Co.** has declared the regular quarterly dividend of 1½% on the preferred stock, payable Nov. 1 to stock of record Oct. 20.

**Reynolds Spring Co., Jackson, Mich.,** has declared a dividend of 1½ per cent on its preferred Class A stock, payable, Sept. 30.

Kess-Line to Occupy  
Liberty Car Plant Oct. 1

**DETROIT, Sept. 26**—Kess-Line Motors, an offspring of the Kessler Motor Co., will take possession of the former Liberty Motor Car Co. plant here on Oct. 1, and will prepare for the production of the Kess-Line eight, which will be introduced at the national automobile shows in January.

The factory will afford 70,000 ft. of manufacturing space and will have a production capacity of 60 cars a day. It is located on the Detroit Terminal line, and is well planned for automobile manufacture. Officers of the company are M. C. Kessler, president; W. H. Radford, vice-president, and H. H. Scott, secretary and treasurer. Kessler is president of Kessler motors, Radford an executive prominent in car manufacture since 1903, and Scott a former executive of the Fisher Body Co.

Program Outlined  
to Promote SalesEastern Automotive Equipment  
Men Meet to Discuss Pro-  
motion

**NEW YORK, Sept. 26**—A sales promotion program to supplement that of the Automotive Equipment Association was authorized here by the Eastern Automotive Equipment Association. Members along the Atlantic seaboard States from Maine to Maryland were represented at a meeting and reviewed the plan of a 4-page merchandising letter which will be sent out in the name of the association to a list of dealers and garagemen in the territory covered by the members.

The letter, which is illustrated, tells of the opportunity for profit in the sale of automotive equipment, tells how to sell it and shows helps in the way of display boards and advertising material which dealers can obtain from the manufacturers through the jobbers.

The association voted to hold its annual meeting in New York on Tuesday of show week, when the following nominations for officers and directors will be voted upon: President, H. M. Savage, Whetmore-Savage Co., Boston; vice-president, G. N. Shafer, W. E. Pruden Hardware Co., New York City; secretary, T. B. O'Neill, Martin-Evans Co., Brooklyn; treasurer, Bernard Miller, Economy Auto Supply Co., Newark; directors, F. J. Murray, Post & Lester, Boston; George B. Shearer, Gaul, Derr & Shearer Co., Philadelphia; E. T. Ball, Joseph Straus & Co., Buffalo; R. J. Cahall, Cahall Motor Supply Co., Philadelphia; Wallace D. Page, American Motor Equipment Co., Boston; E. T. Satchel, Motor Accessories Co., Allentown, Pa.; J. R. Hunt, of the J. R. Hunt Automotive Supply Co., Baltimore.

## JACKMAN MOTORS AUCTIONED

**JOLIET, ILL., Sept. 26**—The stock and fixtures of the Jackman Motor Co. of this city have been sold at public auction, following the recent action of the courts in declaring the concern bankrupt. A schedule of the company's assets indicated approximately \$100,000, while the liabilities total \$130,000. The creditors include the Joliet National Bank, Will County National Bank, the Industrial Acceptance Corp. of Chicago, and a number of local firms. It is expected that the business will be concluded in the near future and that the claims will be satisfied, probably at 50 cents on the dollar, governed largely by the court costs.

## SAYERS SIX LOWER

**CINCINNATI, Sept. 27**—Sayers & Scoville Co. has reduced prices on its roadster and five passenger touring car from \$1,945 to \$1,795.



## MEN OF THE INDUSTRY

A. J. Banta has taken charge of the plant of the Clydesdale Motor Truck Co. as vice-president and general manager. He formerly was connected with the Locomobile, Maxwell and Premier companies.

Charles S. Turner has been appointed to the sales organization of Liberty Motor Car Co. For the past five years he has been connected with Robertson-Cole Co., New York, in foreign sales development.

Frank E. Knickerbocker, formerly in charge of the Flint branch of Samson Tractor Co., is in charge of a new factory branch of Oldsmobile in Lansing, Mich. From this branch also J. W. Rapley will handle general distribution in Michigan.

F. A. Petrie, assistant sales manager of Dort Motor Car Co., Flint, has resigned to become vice-president of the Mission Motor Co., Los Angeles, southern California distributors of Dort. He will handle the wholesale end of the business.

Bert Hunt of William Hunt & Co., Johannesburg, South Africa, is on the way to the United States to confer with manufacturers whom he represents. William Hunt & Co. distributes the Chevrolet and the Indian motorcycle in South Africa.

Hugo C. Gibson, formerly chief engineer for the R. & V. Motor Co., is at present active in placing upon the market a number of novel improvements in the automotive field ranging from the chassis to the lighting system. This he is doing in addition to his automotive consulting work.

W. B. Clowes, assistant sales manager for a number of years with the Elsemann Magneto Corp., has severed his connection with that company. He has not stated his future plans. O. S. Stanley, formerly assistant service manager in New York City of the American Bosch Magneto Corp. succeeds Clowes.

Jay Dewey has been appointed Pacific coast sales manager of the George W. Davis Motor Car Co., with headquarters at Los Angeles. Dewey has been identified with the automotive industry for many years and resigns the position of general sales manager for the Lexington Motor Co. to accept the new appointment.

R. A. Wilson, production manager of the Leach Motor Car Co. of Los Angeles, Cal., is in eastern manufacturing centers on an extensive buying trip. Raw materials are being purchased as well as a large amount of machinery for the motor plant. Mr. Wilson plans to visit automobile manufacturing centers at Detroit, Indianapolis, Rochester and Buffalo before returning, about Nov. 1.

Walter E. Myers, president of the Denman-Myers Cord Tire Co. of Cleveland, will arrive in New York on the Empress of India on Sept. 29. Myers has been in Europe since Aug. 13, when he went to attend the Ecumenical Conference in London. For some weeks prior to the conference and since the conference Myers visited various parts of Europe to make a study of business conditions, particularly as they related to the rubber industry.

Forrest P. Richardson, purchasing agent of the Leach Biltwell Motor Car Co. of Los Angeles, has been appointed assistant general manager of that company. Richardson, who also is a director of the Leach Co., has been connected with the concern for more than two years and with Leach was one of the founders of the enterprise, which now is

a \$5,000,000 corporation and equipped to produce approximately 1200 cars a year. The company is in full production, having several months orders ahead.

R. A. Picard, for several years sales manager of A. J. Picard & Co., automotive equipment jobber in New York, has resigned to become sales manager of the Metal Stamping Co., Long Island City. Picard has been active in association work in the jobber field, having been secretary of the standardization committee of the Automotive Equipment Association and secretary of the Eastern Automotive Equipment Association. He served in the World War as an officer in the Motor Transport Corps.

W. T. Bush has been named director of sales for Gray-Dort Motors, Ltd., Chatham, Ont., to succeed W. G. Bell, who has taken up other work in the organization. Bush was at one time general sales manager in Canada of the Studebaker Corp. of Walkerville. Later he was transferred to the head office at South Bend as assistant general sales manager, still retaining his connection in the Canadian organization. Prior to his appointment with the Gray-Dort company he held an important executive position with the Packard Motor Car Co. of Detroit.

J. H. McDuffee, long identified with the motor car industry, will become assistant general manager of the Cole Motor Co., Indianapolis, Oct. 1. McDuffee has been with the industry almost since its first beginnings, his first connection being with the Locomobile in New York. Later he was associated with the Willys-Overland Corp. as assistant general sales manager, and president of the Chicago Subsidiary Corp. Three years ago he went to Indianapolis with Carl G. Fisher, owner of the Indianapolis Motor Speedway, and since then has been connected with Fisher.

George Shortmeyer, formerly New York manager for the Madison Rubber Co. and later district manager at New York for the Sinclair Oil Co., has succeeded O. S. Stanley as manager of the branch of the American Bosch Magneto Corp. in that city. Charles L. Shedd has been appointed manager of the Detroit branch in the place of Roy Davey, who has been made manager of the manufacturing sales department at Springfield, Mass. Shedd at one time was promotion manager of the truck division of the Packard Motor Car Co. at Detroit and subsequently served as distributor for that company at Omaha. Recently he acted as sales manager of the Republic Truck Corp. at New York.

## JACKSON LOWERS PRICES

JACKSON, MICH., Sept. 26 — The Jackson Motors Corp. has made the following reductions:

	Old	New
4 passenger touring.....	\$2,685	\$2,285
5 passenger touring.....	1,950	1,635
Coupe .....	3,750	2,985
Sedan .....	3,750	2,985

## NEW PRICES FOR ATTERBURY

BUFFALO, Sept. 26—The Atterbury Motor Car Co. of Buffalo announces new prices on its various truck models, effective Oct. 1. The prices are f.o.b. Buffalo and do not include the United States war tax. The prices are:

	New Price	Old Price
1½ ton.....	\$2,475	\$2,775
2½ ton.....	3,175	3,375
3½ ton.....	3,975	4,175
5 ton.....	4,975	5,575

Used Car Methods  
Menace to IndustryAllowances Threatening Not Only  
to Dealer but Also to Manufacturer, Reeves Says

NEW YORK, Sept. 28—The real menace to the automotive industry is the unscientific way in which used cars are handled, is the opinion of Alfred Reeves, general manager of the National Automobile Chamber of Commerce. In an address before the Automobile Dealers Association of New York he declared that "it threatens not only the prosperity of the dealer but through him the stability and standing of the manufacturer."

"It is not alone the dealer's problem and efforts to better it should be made by the manufacturers in co-operation with their distributors," Reeves declared.

## Lower Insurance Urged

Among other questions which should be given careful consideration, according to Reeves, are lower insurance rates; better, although not necessarily cheaper service; fewer taxes; a decrease in accidents and a campaign which has been started by some interests to have motorists pay for the building of good roads, although the highways benefit the public as a whole. Reverting to the used car problem, he said:

"During the stress of the competition of the past six months, the ridiculous allowances for second-hand cars were a form of price cutting. However, it was the same when there was an over-demand for cars. Even in those days, dealers allowed more than cars were worth, so that car selling became largely a matter of trading with the owner of an old car.

"The used car situation may not be better until human nature is better. Everyone has his own right to judge car values and it will take a lot of educating to prove to dealers the real value of used motor cars and trucks.

## Allowances Too High

"The used car problem should be studied by the best brains of manufacturers and their dealers. Unfair allowances and inefficient selling plans, with the resultant money loss, are a blot on the escutcheon of one of America's greatest industries.

"Some car manufacturers have not been blameless in this for under the stress of recent conditions they have sometimes pressed the dealer to take new cars in greater quantities than he has been able to handle. They have also overtraded through their branches.

"I look to see the car and truck manufacturers, by advertising and sales promotion work, help to move their own makes that their dealers have on hand, and thus broaden the market for new cars. Sales managers must appreciate the need to help dealers in the greatest of all obstructions to increased new car sales."

## REDUCTION FOR TULSA

TULSA, OKLA., Sept. 26—The Witt-Thompson Motor Co. has reduced prices on the Tulsa roadster and five-passenger touring car, Model E 1-3, from \$1,285 to \$1,175.

# Calendar

## SHOWS

Sept. 28 - Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Grand Central Palace, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Jan. 30-Feb. 4—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

Feb. 6 to 11—Winnipeg, Can.,

Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais,

Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Oct. 10-22—Olympia, England, Truck Show, Nov. 4-12—Car Show, Nov. 28-Dec. 3—Motorcycle Show.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

Nov. 26-Dec. 3—Shanghai, China, Automobile Show.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador, Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibit in connection with the Brazilian Centenary As-

sociação Automobilista Brasileira.

## CONVENTIONS

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Nov. 15-17—Kansas City, Second Annual Meeting of American Petroleum Institute.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 17-20, 1922—Chicago, American Road Builders Association.

S. A. E. MEETINGS

Detroit, Sept. 23, Oct. 21, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.

Dayton, Oct. 1—First Fall Meeting.

New York, Jan. 10-13, 1922—Annual Meeting.

## Underwriters Plan to Reduce Policies

### Propose to Cut Automobile Risks in Two—Recognition Given Moral Hazard

NEW YORK, Sept. 28—A general reduction in the size of automobile insurance policies, in most cases amounting to 50 per cent, was announced at the annual conference of the National Automobile Underwriters, held at the Commodore Hotel here. It was explained that while policies issued last year would be continued, underwriters throughout the country were more cautious in renewing or issuing policies.

Several speakers spoke of policies issued a year ago as a "potential moral hazard," declaring that an unscrupulous automobile owner can risk the loss of his car under last year's policy knowing that he can recover more than the present sale price for it on his policy.

It was the consensus among those present that last year was unusual in the automobile insurance business because of the violent changes which took place and the resulting experiences of the companies, but the belief was expressed that the worst had been passed and that with new restrictions imposed on automobile owners by legislation in many states there would be a continued improvement.

Some of those who addressed the gathering declared that the business could be stabilized through compelling policy holders to take greater interest in their cars, and a lengthy discussion ensued on a means to bring this about.

It was pointed out that owners were negligent in the care of appurtenances on their cars, and that not infrequently when filing claims for losses of the kind, asserted the part was recently purchased when it had been in use for some time

and had deteriorated greatly in value.

W. B. Burpee secretary of the New Hampshire Insurance Co. of Manchester, N. H., was elected president of the conference to succeed George Bulkley of the Springfield Fire and Marine Insurance Co. of Springfield, Mass. John Marshall, Jr., of the Firemen's Fund Insurance Co. of San Francisco was elected vice-president, and F. W. Day was elected treasurer.

## DELAYS SETTLEMENT

PHILADELPHIA, Sept. 26—Insurance companies here writing automobile collision and fire policies are disturbed over the large losses that are being claimed this year and are taking steps to remedy the condition.

One of the largest automobile insurance underwriters in this district has discontinued altogether writing policies on four of the low priced machines. Another company has adopted the practice of delaying settlement until a thorough investigation of each loss has been made, in many cases this extending up to the full sixty-day limit.

Insurance brokers are making a more thorough investigation of the "moral hazard" involved in each case. A casualty company specializing in liability and property damage coverage reports the demand for this kind of insurance has been in excess of last year.

## HOLD BATCHELDER FUNERAL

NEW YORK, Sept. 27—The late Amos G. Batchelder, former executive chairman of the American Automobile Association, who was killed in an airplane accident on May 28, last, will be buried to-morrow at his old home at Attica, N. Y. The body will be taken from the receiving vault at Forest Lawn Cemetery, Buffalo, at one o'clock and carried over the new Batchelder Highway to Attica, where funeral services will be held in the Masonic Temple.

## Ford Is Reducing Accumulated Stocks

### New Manufacturing Schedule Adopted to Reduce Inventory Before Winter

DETROIT, Sept. 27—In the face of steadily increasing business since the price cut of Sept. 2, Ford Motor Co. has adopted a manufacturing schedule which will work off all surplus parts accumulated in the many assembly plants of the company before the winter months set in.

For the second successive Saturday, the Highland Park plant, in which all the parts are manufactured, was down. The company production officers deny that a five-day weekly working schedule has been determined upon, but only that this half day closing is to bring about an equalization of stock.

In addition to the half-day closing, however, employees in many departments are now working on alternate week shifts and have been notified that this arrangement would be continued for the present.

From the company's statement that working arrangements of this kind have been made for equalization of stocks, it is evident that considerable surplus has been accumulated in the rush of summer manufacturing, and that the company does not intend to carry this inventory over the winter. There is every indication, however, that operations will be continued on an ample scale for the balance of the year.

## MERIT MAKES REDUCTIONS

CLEVELAND, Sept. 26—The Merit Motor Co. has reduced the prices of its two passenger and four passenger models from \$2,245 to \$1,985.



# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

Vol. XLV  
Number 14

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, OCTOBER 6, 1921

Thirty-five cents a copy  
Three dollars a year



# Champion

## Dependable Spark Plugs



### MISS AMERICA II USES CHAMPION

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Gentlemen:

In answer to your inquiry of the 6th inst., it gives me great pleasure to advise you that the Champion Spark Plugs used in the "Miss America II" during the Harmsworth Races proved very satisfactory and I wish to thank your Service Department for their cooperation.

Very truly yours,

*Gar. Wood*

GAW:EW



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# AUTOMOTIVE INDUSTRIES

## THE AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, OCTOBER 6, 1921

No. 14

## Foreign Automotive Markets Ripe for Attention

Appreciated exchange and growing recognition of the automobile as a utility awaken renewed interest in foreign trade. Plans must be made far in advance of actual business if future sales are expected.

By George E. Quisenberry\*

**D**URING the next few months the American manufacturers of automobiles and automotive equipment must determine their policies and their attitude in regard to international trade. With a gradual but none the less positive improvement in our foreign trade indicated by practically every report from the centers making up our overseas markets and with the exporters of automotive equipment generally sensing a coming resumption of business on a broader scale, the fixing of these policies and the methods of going after the trade assumes an immediate importance. Plans must be made now for business desired next summer.

Export markets have received little attention recently except from those few companies which overloaded their foreign dealers and faced rejected shipments or uncollected accounts in foreign ports. But other companies have given little attention to their overseas trading and are now confronting a time when their decision must be made. Time is pressing.

The domestic situation for months has been so difficult and so tangled that the manufacturers have had no time to devote any efforts to other markets. Foreign trade was accorded but little thought. This part of the business was due for a slump and the natural tendency of the manufacturers was to neglect it be-

cause of the seriousness of the domestic troubles.

But as the domestic situation has changed, so have the overseas markets. The home markets during the last four or five months have been larger than was expected, so that even the closest observers of the industry and those who best know its strength have been surprised. Car and accessory sales in many cases have exceeded expectations and the result has been a consequent lessening of the domestic worries.

Furthermore, international business has begun to pick up. This is shown by the July and August overseas shipments. July revealed an increase over June, so far as car sales were concerned, and August was better than July. The increases were small, indeed, but they were increases, none the less, and give promise of the better markets that may be expected as the year turns and as general business improves.

Foreign exchanges, leaving out those of Central Europe, have shown a steady appreciation for many countries. The pound sterling has appreciated materially and the improvement in some of the Latin-American currencies has been such that the pessimism in those countries has suffered a severe jolt. The Indian rupee and the Chinese currencies are advancing steadily and Bombay has come back into the gold market as a buyer, indicating a better and more

\*Managing Editor, *El Automóvil Americano*.



satisfactory financial condition in that great British territory. These straws in the winds of prophecy point the way that general business is going.

Mexico is a heavy buyer of automotive products and for some months has been the leader of all countries of the world. Cuba, despite the seriousness of the sugar situation, has not ceased to purchase. Peru, her stocks of cars wiped out during the summer centennial celebration, forecasts better conditions as cotton prices have gone upward. Brazil is making numerous purchases and dealers there have given every indication that cars will still be bought from those companies willing to co-operate in meeting the temporary exchange difficulties. The annual automobile show in Argentina will be held in late November and, with better wheat demand and advancing exchange, the unsold cars there should dwindle and open that market in the coming year. Already Ford has reported increasing business from Buenos Aires and the future appears much brighter, particularly since the \$50,000,000 Argentine loan was announced in New York.

Australasia is buying again and some business is moving to the Straits. South Africa, like Australia, is immensely helped by the betterment of the pound sterling and banking connections in that great section of the world report an improved financial condition. The Far East can be judged by the advancing exchange, the Shanghai tael and other currencies having risen materially as general commerce has bettered perceptibly.

In addition, ship space is in greater demand and the operators report, in their current journals, a larger volume of loading in many ports. The great wheat exports that have been going out of the North American ports since the harvest began indicate a similar movement from the other grain growing countries, such as Argentina, when their crops come in. These things, taken together with the statements of such responsible business men as Hoover, show that business as a whole has improved and that better conditions in foreign trade are in the making.

This upward trend means much to the automotive industries, whose foreign trade is just at the threshold of its development. The foreign markets in the developing countries of the world have seen no more than the start of their automotive purchases. In 1920, by counting Ford production in the various foreign assembly plants, the world purchased approximately 200,000 American-made motor cars and trucks, although few countries received anything like as many as would have been absorbed if delivery had been possible.

New uses for the automobile, the truck and the tractor are being found in these countries and new services opened up for them. Roads are being built and improved in countless sections in a greater amount than for many years. The automobile is being used as an essential and necessary means of transportation, its utility broadening so that it is no longer sold merely as a luxury. It is being put to work, doing its valiant part in upbuilding vast economic, industrial and agricultural resources in many territories.

That these territories have been under a business cloud for twelve months or more means nothing fundamentally and is no argument against their future trade in American-made automotive products. We have proved the automobile here at home and its worth in a thousand services has been so demonstrated that, even in the midst of such a year as 1921, production on a high scale has been necessary to meet the insistent demands of a public requiring transportation.

Why will not this same condition prevail in other countries of the world? These countries may not have realized the automobile fully as yet, they may be in the midst of a temporary depression that brings with it pessimism and gloom and, yet, having no more than scratched the rich natural resources that are theirs, it is inevitable that they shall have need for the transportation services of the automobile as we know it in America.

Thus, we have come to the immediate problem of the automotive manufacturer. Foreign business is ahead of him and destined to come his way if he will advance to meet it. The time was, perhaps, when it would seek him out. "Them was the days," we may say with regret, but we cannot expect them to return to-morrow

or the day after. The world has become shy and wise in parting with its dollars. The dollars are there, of course, and so is the buyer's appreciation of an honest product at an honest price, but those dollars can be coaxed out into the open only with fair dealing and honest service. Fundamental conditions have not changed, but the world has turned back to its pre-war state, realizing the worth of its money and demanding real value in return for it.

Foreign trade consists mainly of foresight and advance effort. It must be sought after and that to-day is of more importance than it perhaps ever has been. Work must be done long before the consummation of the business. The manufacturer or exporter cannot go out to-day and have a volume of business to-morrow. By going out to-day, with merchandising plans carefully made and forcefully followed, sales may be well under way in five or six months, but the time element must be considered. So it is not too early to start now after the trade that should come in next spring and summer from every corner of the world.

The problem of merchandising abroad does not differ materially from that at home. It is different only in minor points and the merchant who has a satisfactory domestic policy will also have a suitable foreign policy, provided the varying points are recognized and allowance made for them. These, after all, are only detail and need not affect the broad general principles of satisfactory service and fair dealing. Too many manufacturers think of foreign trade as something apart from their regular business, something mysterious and something shrouded in uncertainty.

Foreign trade is simply an extension of sales and sales effort across the national border lines and into another country. At bottom, trading methods in each section are similar and this may be especially stressed in view of the great body of automotive dealers who have

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**R**ECENT years have thrown the American automotive industries into international trading. American-made cars and trucks have been distributed throughout the world. These export markets are re-opening. Can American makers hold them? How can they prevent this business from going elsewhere? These questions are fully discussed in this article which has been written after a careful study of present conditions.

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been organized in the different foreign centers, a body of size and significance not generally realized. This development is taking place along the same lines as in America and the same factors apply to it. Consequently, successful firms at home can just as well go after foreign trade as domestic. With the facilities of service, information, credit ratings, etc., existing at present, manufacturers can go into this profitable branch of the automotive industry with full certainty that careful dealing on their part will be just as well received and just as productive of fortunate results as it would be in Pennsylvania, California or Texas.

World trade in automobiles and automotive equipment is again in the making. The post-war armistice period has passed and we are definitely progressing into the after-war development and prosperity. And the American manufacturer goes into this new period with the weather vanes all pointing his way.

Our cars and our equipment during recent years have gone to all parts of the world and the idea of the essential vehicle of transportation, efficiently produced and efficiently serviced, has attained a firm footing. Europe has but little competition worthy to challenge the automotive products from this country. No cars of the medium and lower-priced ranges are being built in Europe. It will be long before the proposed light cars being put into production by French and British makers are made in great enough quantities to be serious competitors from a price standpoint. Quantity production is practically unknown and the higher-priced cars of Europe are in competition with those of America only because the Europeans have been better at propaganda and sales efforts than have our own exporters. Certainly, no one who has had an opportunity to know, will admit that the high-priced products of the other

side are equal in quality to those built here and, that, despite the present conditions of exchange, price competition with the American products is possible in only a few countries and on only a comparatively small number of models. Conditions somewhat differ in the accessory and truck lines, but here again the question is largely one of propaganda and efficient merchandising effort.

Europe is building for foreign trade with passenger car shows in London, Paris, and Berlin. Much stress is being laid on the attempts of the continental manufacturers to build their cars along American lines. Production in these countries is, of course, freer than at any time since the war began, and the makers are now in a position to go after international trade. These factors must be taken into consideration by American manufacturers whose cars and trucks are to go into the foreign market against unlimited competition.

There are American automobile, truck and equipment companies to-day which are merchandising their products in the foreign fields with skill, fair play and intelligence. Our pioneer foreign traders have done their work well and their efforts are worthy of place among the best. These firms have no fear of the future of their export sales and they are just as keen on the foreign markets now as they were one, two or three years ago, knowing that this trade will take a considerable volume of production and knowing likewise that, with care and ability, a profitable and desirable business is assured in response to their foreign effort.

With these markets reopening, American factories must determine their stand on export trade and work out their policies in regard to it. Weeks and months are required to reach distant centers of distribution, and dealer organizations cannot be built up by the mere desire to have them. Something more is required—the business will and ability to go after the trade.

## S. A. E. Working on Material and Other Standards

THE Subdivision on Wrought Non-Ferrous Metal Alloys of the Society of Automotive Engineers' Standards Committee is considering specifications covering brass forging rod, brass spring wire, naval brass, or, as it is sometimes called, Tobin bronze tubing and phosphor bronze spring wire. If these specifications are adopted by the society, the S.A.E. Non-Ferrous Metal Specifications, of which there are now 25, will cover a sufficiently wide range to permit automotive vehicle designers to select standard specifications for practically any automotive purpose for which non-ferrous metals are used. The specifications proposed cover, in addition to the compositions in percentage specified, the physical properties, appearance, dimensional tolerances and general information of interest to engineers and manufacturers.

### Desirable Plate-Glass Practice

In many cases body designers have specified plate-glass window widths without regard to the commercial practice of manufacturing plate glass in even 2-in. widths. Waste can frequently be avoided by a slight change in the window design. It is, of course, cheaper to use a 19 $\frac{3}{4}$ -in. width in place of a 20 $\frac{1}{4}$ -in. width, because the first size can be made from 20-in. glass, while the second size is cut from 22-in. stock, since no intervening size is regularly manufactured.

Realizing this situation, a report has been formulated,

at the request of the Passenger Car Body Division of the S. A. E., which recommends that plate glass for automobile bodies shall be specified in even 2-in. widths in accordance with commercial practice if possible. It is also recommended that the thickness of plate glass should be specified in fractions of an inch, the maximum variations of thickness of any single piece of glass not to be greater than 1/32 in. in order to prevent the glass from being tapered. The report also recommends that the thickness of plate glass for windshields shall be  $\frac{1}{4}$  plus or minus 1/32 in. and the thickness of plate glass for closed body windows shall be 3/16 plus or minus 1/32 in.

### Pressure Gage Standardization

At the next meeting of the S. A. E. Screw Thread Division a preliminary report for pressure gage connections will be acted upon. The principal dimensions specified in the report are the diameter and the threads per inch of the air connection at the back of the instrument. The report has been approved by pressure gage, as well as passenger car and motor truck manufacturers. The general adoption of the recommendation will make pressure gages interchangeable, as there is already a standard for the outside diameter of the instrument case and the location of the holding screws, when these are used.

# Important Changes Feature the New Jordan Model

A new design of Continental engine, made exclusively for the Jordan company, incorporates chain drive and hollow shaft lubrication. Frame has been stiffened and several refinements in coachwork made. New single plate clutch is employed. Exposed metal parts are rust-proofed.

By J. Edward Schipper

**A**N entirely new Jordan car has recently been put in production. While the chief components are still manufactured by parts makers, most of them now are largely of Jordan design and are found in the Jordan car exclusively. An example is the new Continental engine, which will be made only for the Jordan.

While the foundation for the new design has been the previous Jordan model, many improvements have been made, and the resulting product differs materially from its predecessor.

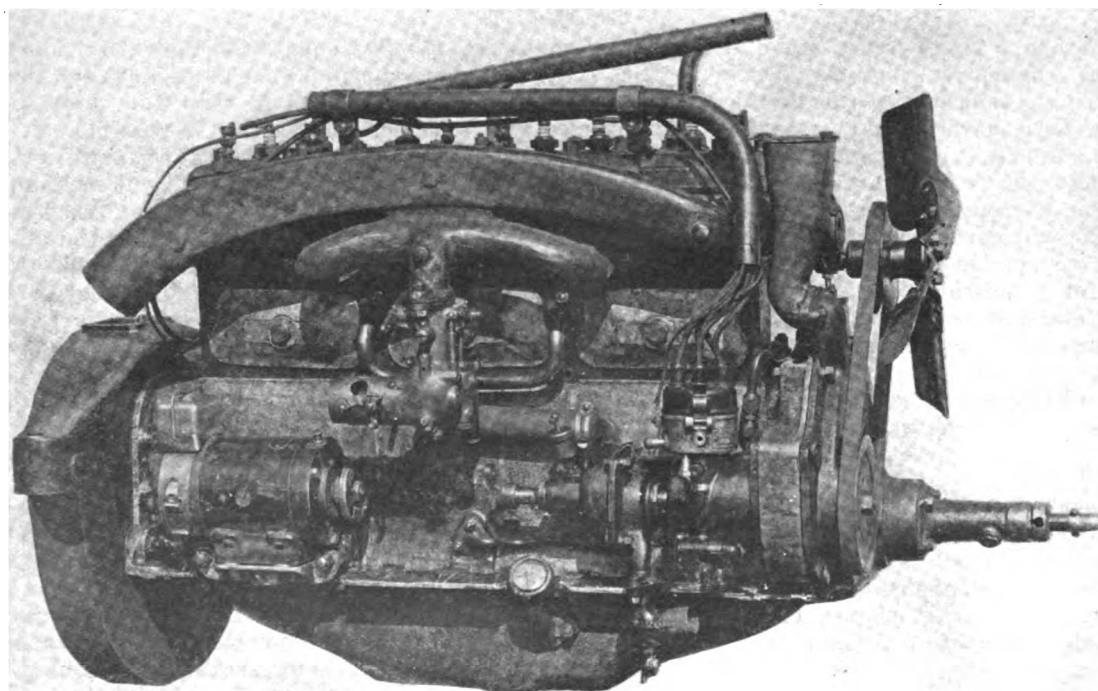
The frame of the car has been stiffened. If the frame of the older model were laid on the floor and two men stood on one side rail it was possible to raise the other side rail 1 or 2 ft. before the side bearing the men was lifted from the ground. With the new frame, the flexure under the same conditions would be only a few inches. The result is a considerable lessening in the weave of the frame and in the tendency of the body to develop squeaks and rattles. This result has been accomplished by extending the maximum depth of the side rails over a much greater portion of the length and by the use of tubular cross-members at both ends. These cross-

members are secured to the frame by riveting through steel castings which project into the tube and are keyed to it. Improved riveting and gusseting of the cross-members has also added to the rigidity of the frame.

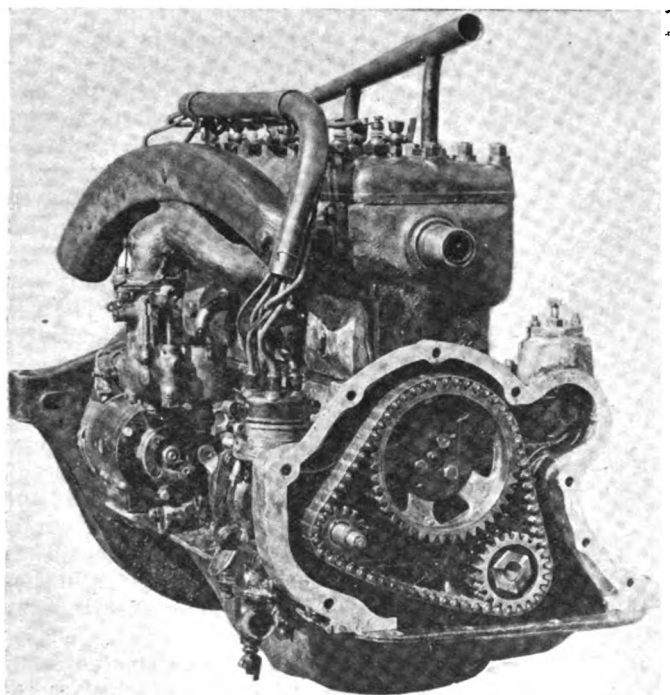
The new engine, which is made by the Continental Motors Corp., is supported at three points and is a block-cast, six-cylinder unit. The head, cylinder blocks and crankcase are cast separately; the flywheel housing is cast separately from the crankcase and is bolted to it. The cylinder head and cylinder blocks are of gray iron, and the crankcase and clutch housing are of aluminum. The engine is an L-head, four-bearing type of 3 5/16-in. bore and 4 3/4-in. stroke. The crankshaft is 2 1/2 in. in diameter, which is unusually large for this size of engine. This large diameter makes for rigidity of the crankshaft and prevents vibration. Freedom from vibration was evidenced by a test which the writer gave the car over varying roads in the vicinity of Cleveland. The compression pressure is about a 70 lb. per square inch absolute.

The cast iron pistons weigh 22 oz., are 3 15/16 in. in length and have three rings, all above the piston pin. The bottom piston land is chamfered and drilled to provide an oil drain. The piston ring widths are 3 1/16 in. and the piston pin diameter is 55/64 in. The piston pin bearing is in the top of the connecting rod, the pin being clamped in the boss and held by a lock screw which passes all the way through the pin and into the opposite side of the boss. In addition to this method of locking the pin, another safeguard against creeping is provided in the form of registering grooves into which a spring ring is inserted.

The connecting rods are of I-beam section,



Right side of Jordan engine showing mounting of water pump-distributor unit, water manifold and large filler-breather device



Front end of Jordan engine showing new triangular chain drive

10½ in. in length, and are machined all over. The crankpin bearings are 2¼ in. in dia., and the main bearings are 2½ in. dia., except the front one, which is 2¼ in. By making the crankpin bearings lighter than the main bearings, the torsional vibration of the crankshaft is said to have been materially reduced. The connecting-rod caps are secured by two bolts of alloy steel. The lengths of the main bearings are, front to rear, 2⅜, 1 9/16, 1 9/16 and 3 1/16.

#### Silent Chain Drive

A new departure for the Jordan company is the use of silent chain drive at the front end of the engine. It is a triangular layout, the Morse chain passing over the crankshaft, camshaft and auxiliary shaft sprocket. Chain adjustment is made by swinging the auxiliary shaft outward until the proper tension is applied on the chain. This adjustment is accessible and the units driven by the shaft are so arranged that they are not affected by the adjustment. This auxiliary shaft carries the fan pulley in front of the chain case. Immediately behind the case are the vertical distributor shaft (driven by helical gears), the oil pump, water pump and the generator, the latter driven through two flexible couplings. The distributor, oil pump and water pump all move as a unit when adjustment is made. The rubber hose connection for the water pump and the two flexible shafts for the generator permit sufficient movement of this shaft to make any necessary adjustment of the chain without affecting the water feed or the generator drive. The forward part of the water pump body and the oil pump housing are in one casting, which gives a very compact arrangement and fits in well with this type of auxiliary drive.

The camshaft is mounted in four bearings, whose diameters and lengths are, front to rear: 2 5/16 by 2 3/64 in.; 2 9/32 x 1; 2¼ x 1 and 2 7/32 x 1 5/8 in. The valves have 1 43/64 in. outside diameter and a lift of 5/16 in. and are operated by mushroom followers. The engine is timed to fire 1-5-3-6-2-4, and the valves are timed so that the exhaust opens 40 deg. ahead of the lower center and closes at 8 deg. past the upper center,

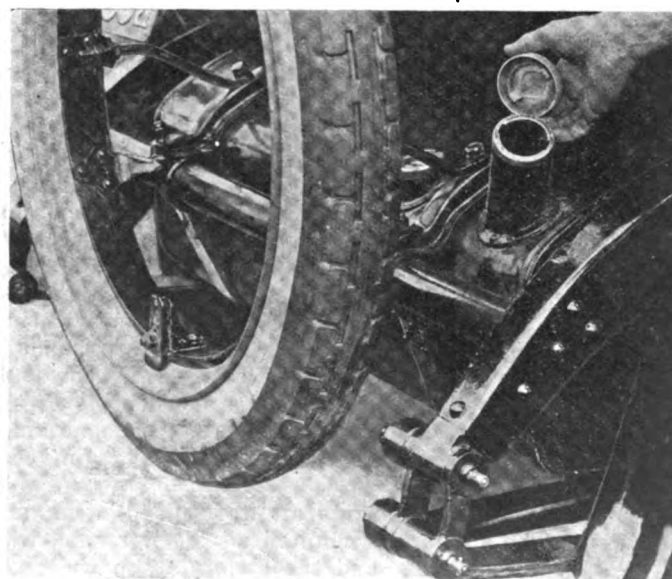
while the inlet opens 12 deg. past the upper center and closes 40 deg. past the lower center. The entire valve layout is designed to be particularly accessible. The valve tappet guides, for instance, can be removed without taking off the cylinder block, being held by clamps which are accessible when the cover plates are removed.

Water circulation is by centrifugal pump. The water system has a capacity of 4½ gal. The radiator is a Sparks-Withington cellular type and is supported in an original and interesting manner. It rests in a cradle consisting of a strap which passes entirely around the shell and clamps at the frame line. This method of mounting the radiator is similar to that employed in mounting the gasoline tank and seems to work out very satisfactorily, particularly in that it distributes the clamping stresses over the entire circumference. The water enters the engine jacket under the exhaust valves in two places and ample water space has been provided around the exhaust valves and spark plugs.

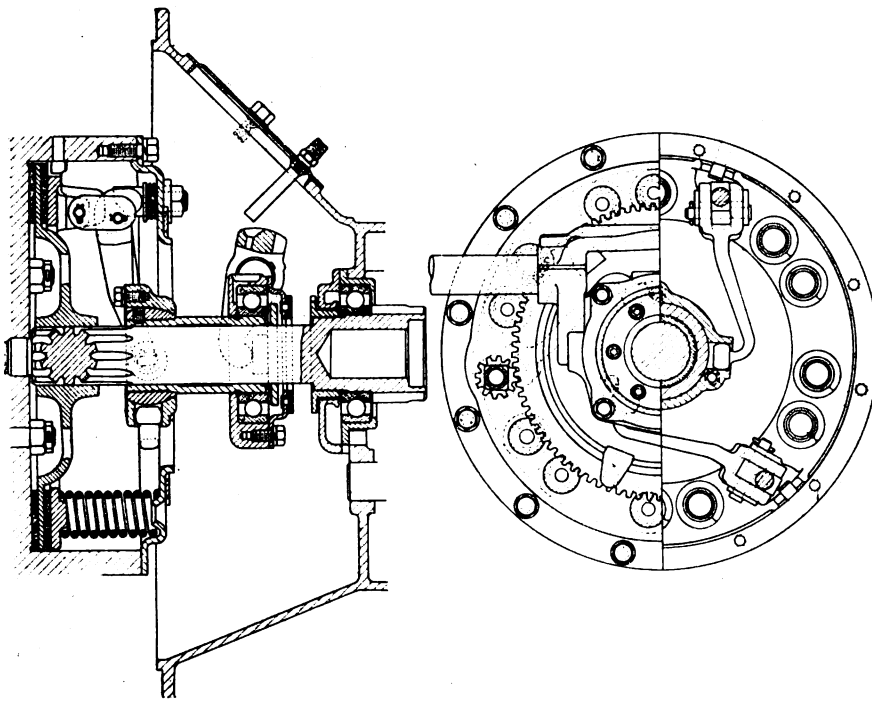
#### Hollow Shaft Lubrication

Oil feed under a normal pressure of 20 lb. to the sq in. is used for engine lubrication. The gear type of oil pump is driven from the bottom of the distributor shaft and forces the oil to a thin steel gallery tube which is cast in the crankcase. From this main tube there are feeder tubes to all main bearings where the oil passes into the hollow crankshaft. Drilled leads in the crankshaft conduct the oil to the crankpin bearings. The timing chain is lubricated by the overflow which is caught in a pocket at the front end of the main gallery tube and delivered directly over the chain. There is also a bleeder lead to the chain, and this unit operates continually in a bath of oil. The pressure regulator is located at the front end of the gallery tube and is easily adjusted to provide the proper tension on the spring pressure relief. An oil pressure gage is mounted on the dash and communicates with the rear end of the main gallery feed. One of the interesting points of the engine is the extremely large oil filler which is mounted at the front in such a way that oil can be readily poured into it without spilling. The oil passage has been made large enough so the oil may be poured into the crankcase as rapidly as desired. There is also a plainly visible dial type oil level indicator.

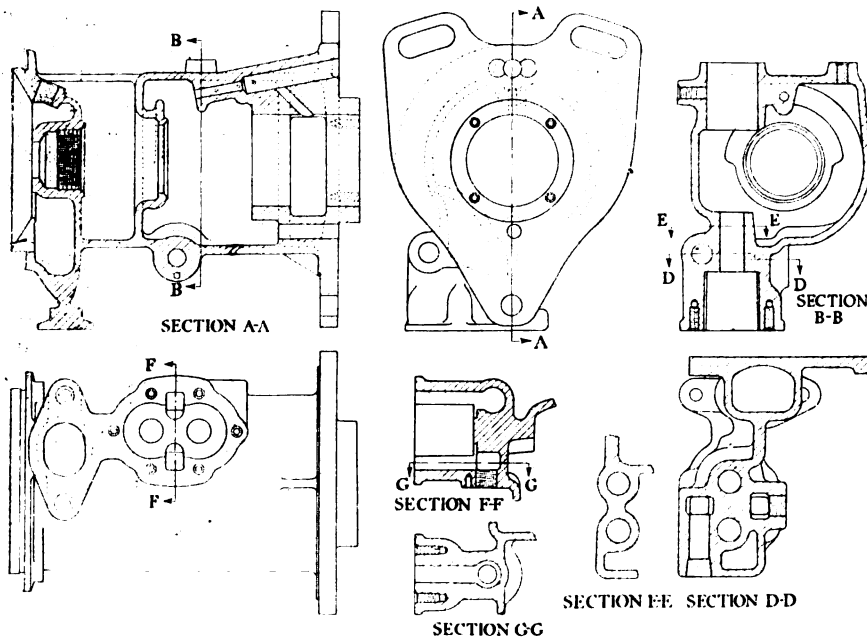
Fuel is carried in a 16-gal. tank of square section



Rear end of Jordan frame showing mounting for spare tire and gasoline tank, new filler cap with spring bayonet instead of thread, and non-rattling spring shackle



Sectional assembly of single dry disk type of clutch used in new Jordan car



Views of casting which encloses distributor gear drive and is part of swinging unit used to enable chain adjustment

mounted at the rear of the chassis between the frame rails. A new type of spring bayonet cap is used on the filler to prevent trouble with crossed threads. The gasoline is fed by vacuum to a 1¼-in. plain tube Stromberg carburetor. The intake manifold is a hotspot type, but somewhat less heat is applied than in the previous model, it having been found that in hot weather the power of the engine was slightly impaired by overheating of the intake. The new hotspot constitutes a compromise which is said to meet summer and winter operating conditions equally well.

Delco equipment is used for starting, lighting and ignition. The starter is mounted on the left side, with a pilot type mounting, and the generator on the right side at the end of the auxiliary shaft, as described. A separate pad is bolted to the crankcase and the generator is mounted on this pad.

The clutch is a new dry, single-plate type manufactured by the Detroit Gear & Machine Co., which concern also makes the gearset. This latter is a three-speed, selective unit, and has been improved from the driver's standpoint by lengthening the shifter lever. The ratios in the gearbox are 3.2 to 1 on low, 1.72 to 1 on second and 3.88 to 1 on reverse. The drive is through a hollow propeller shaft with two Spicer type universals. The rear axle is a new Timken floating design. Following a recent tendency in axle design, this new axle has a bearing on both sides of the pinion, supporting the pinion shaft. It is a spiral bevel type, providing a ratio of 4 2/3 to 1 for the closed bodies and 4 5/12 to 1 for the open bodies. The car is mounted on semi-elliptic springs 37 x 2 in. long in front and 56¼ x 2 in. long at the rear. A Gemmer steering gear is fitted.

While the new bodies are not materially altered in outline, they are considerably changed in detail and fittings. They are all mounted on the standard 120-in. wheelbase chassis. The standard tire size is 32 x 4 in. Some of the body details are novel and interesting. For instance, the louvers in the hood, instead of being on the outside, are on the inside, which is claimed to more effectively draw in the air from beneath the hood.

Close attention has been given to rust-proofing of the car. Practically every bolt and screw on the exposed parts of the body is of nickel-plated brass. This also applies to a large percentage of the hardware. The parts which are necessarily made of steel have been Parkerized.

The entire front compartment has been rearranged. There is a new instrument board in which all of the instruments are under one glass. The board has been cut away at both sides so as to provide a greater amount of knee room for the driver and the front seat passenger. The starting switch is now located on the toe board instead of near the front seat, so that

it is impossible for anyone to accidentally step on the starter button when entering the car. The switch plunger itself has a mushroom type head which prevents water from entering the switch parts.

Much has been done to prevent rattles and other noises about the car. The muffler is now a two-compartment instead of a single compartment type. The muffler tail pipe has been extended to the rear of the body so as to prevent any chance of exhaust impulses giving a drumming sound, particularly in closed bodies. The Jordan anti-rattle shackles, which are held under spring pressure, have been improved and are used on both the front and rear springs. The dashboard, which separates the engine compartment from the body, is backed with non-sonorous material to destroy resonance.

Grease cups, in more or less inaccessible positions, have been eliminated and oilless bushings substituted



wherever practical; where they are not practical, as on the brake shaft, a lead of flexible tubing has been brought back and clipped to the rear spring so that the Alemite attachment can be readily applied. The front end of the drag link, which was formerly packed with grease when assembled and not provided with any further lubricating means, has now been provided with an Alemite attachment.

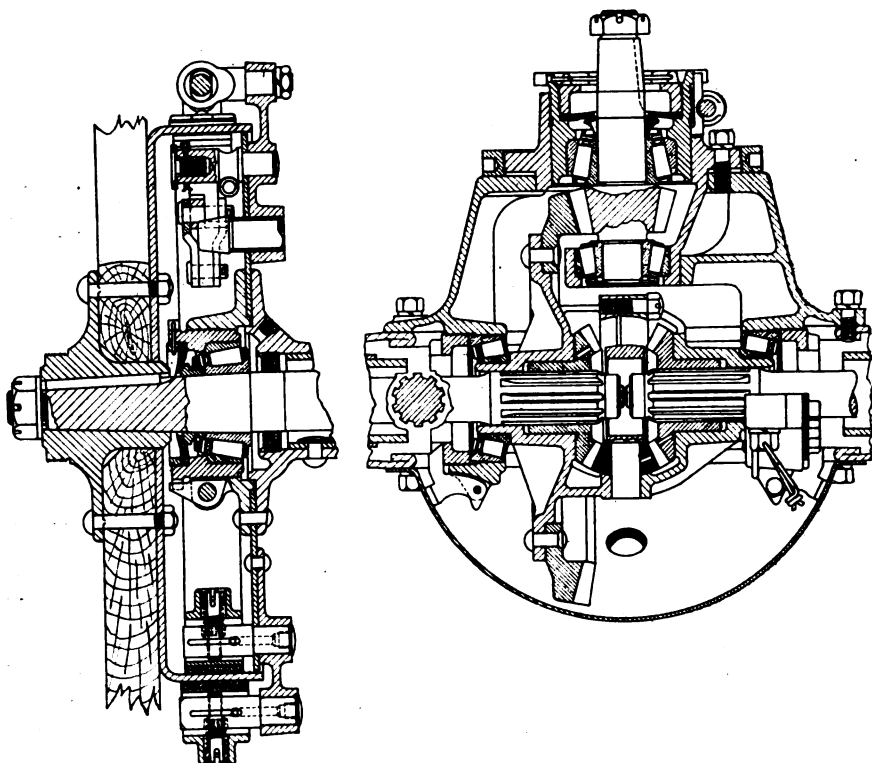
#### Detail Refinements

The small tools are now carried in a compartment in the left front door, which is provided with a steel door and padlock for protection. The tools are snugly fixed in the door so that they cannot rattle. A transmission lock projects above the floorboard and permits of locking the transmission in neutral by pushing down on the lock. The top is now secured to the windshield by means of a nut which gives a positive, non-rattling anchor. There is a cowl ventilator to cool the front compartment and the windshield has been made rain-tight by a new form of rubber stripping. The side curtains have been taken out of the top pocket and put in door compartments.

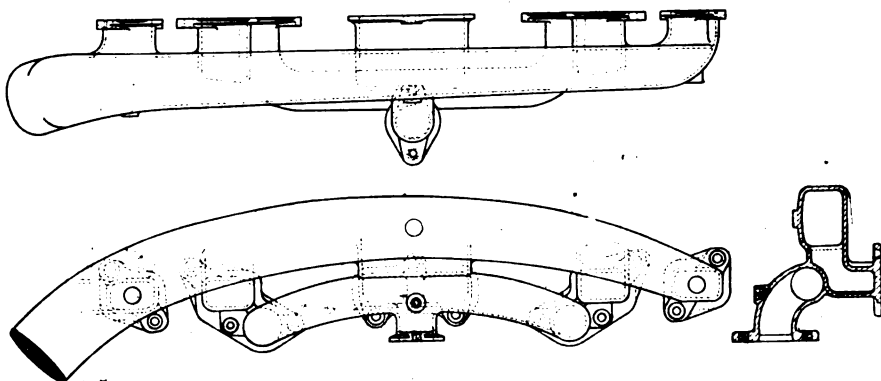
To render the seats more comfortable they have been lowered and tilted at a greater angle. Marshall cushions are employed.

The brake centers have been very carefully laid out so that the flexure of the spring does not affect the position of the brake pedal and brake lever on rough roads.

Jordan prices are as follows: Five-passenger touring car, \$2095; roadster, \$2,095; brougham, \$3,200; sedan, \$3,200; landaulet, \$2,595.



Sectional view of new Timken rear axle used on Jordan cars



Layout of intake and exhaust manifolds showing the new arrangement of hot-spot

## Britons Agree on Type of Car for Export

**B** RITISH manufacturers, at a recent conference, agreed upon certain standards in building cars for export, some apprehension being felt in some circles over the slackening of foreign business. Pessimism was expressed at the meeting over the question of cost and it was realized that until labor and material were cheaper and methods of production improved upon England would be compelled to put forth strenuous efforts to keep pace with its competitors in motor exportation.

In agreeing upon the type of car to be exported the manufacturers decided that the chassis should be strongly sprung, with detachable wire wheels fitted with wide tires. The clearance should be at least 8 inches for small and 9 for large cars. The wheel track should be from 4 ft. 8 in. to 4 ft. 9 in. Less would mean that cars could not be run on the many back-country roads that are generally little else than parallel cart-ruts.

The ratio of power in the engine should be 1 hp. per cwt. of the completed vehicle. Detachable cylinder heads should be fitted. The radiator should be large, and the fan capable of varying speeds. The gasoline tank, with a

vacuum feed fitted, should be in the rear of the car. Lubrication should be by pressure feed. Magneto ignition is preferable, and the lighting system and self-starter should form part of the chassis. Gearing should allow of much hill-climbing on top speed. The rear axle should be of the full floating type, and the brakes and steering particularly strong.

In finishing, brass fittings should be cut out as far as possible, to ensure a minimum of cleaning. The body should be despatched minus the last coat of varnish. Thus freight damage can largely be put right after the car is unshipped. Plenty of elbow-room should be allowed for, as commodities as well as passengers would be carried.

**I** N a paper read before the Academie des Sciences, M. Mailhe described a process for manufacturing motor fuel from linseed and other vegetable oils by passing the vegetable oils over a special apparatus which deprives the oil of its water and hydrogen. The resultant volatile product is then passed over nickel, and M. Mailhe claims that it is then in all respects similar to gasoline.

# New Commercial Airplane Designed in Europe

Rearward stagger of the wings a new feature as is a rectangular section fuselage containing a five-passenger cabin with pilot's cockpit forward. Although plane is of French design a 420 hp. British engine is used. New model embraces many features of other machines of same make.

By John Jay Ide

**A**MONG the foremost airplane designers in Europe to-day are the two directors of the Nieuport company—MM. Delage and Bazaine. In the design of the Model 29-C-1 pursuit machine and its development, the winner of the last Gordon Bennett race, they have added fresh laurels to the firm founded by that great genius, Edouard Nieuport. Had the war continued the 29-C-1 would have replaced the Spad XIII as the standard French single-seater fighter.

The latest product of the Nieuport company is the Model 30-T commercial airplane, equipped with a British Sunbeam "Matabele" 420-hp. engine. The reason for choosing a British engine is not known, unless it be that there is no French engine of the required power in production. There are a number of points in the design of the Model 30-T reminiscent of the earlier models of the firm. Among these are the ailerons on the lower wing only (undoubtedly the most efficient position when flying very low), the landing gear and the method of engine cooling by twin Lamblin radiators (described in *AUTOMOTIVE INDUSTRIES*, Oct. 21, 1920).

New features include the rearward stagger of the wings and the rectangular section fuselage containing a cabin for five passengers and a pilot's cockpit forward. The cabin is very comfortable and has good visibility, thanks to its eight windows.

## Twelve-Cylinder Engine

The engine is of the 12-cylinder V type, developing 420 hp. at 2000 r.p.m. of the crankshaft and 1225 r.p.m. of the 4-bladed propeller. The cylinder dimensions are 4.8-in. bore and 6.3-in. stroke, giving a volume of 1368.7 cu. in. The weight of the engine with water but without fuel or oil is 1091 lb. The engine has two Claudel carbureters, the air being obtained by a scoop on each side of the fuselage, and the vertical exhaust pipe will be noticed.

The rod attached to the two outboard struts on the starboard side was used to carry the Pitot tube for indicating speed during the trials. Normally, of course, the speed is registered by means of the twin tubes seen on top of the upper plane amidships. Originally all control surfaces were balanced. After preliminary trials, however, the balanced portions of the ailerons were cut off.

The characteristics of the Nieuport 30-T are as follows:

Span (upper wing) .....	50.8 ft.
Span (lower wing) .....	47.5 ft.
Gap .....	8.5 ft.
Chord .....	8.5 ft.
Wing area (incl. ailerons) .....	700 sq. ft.
Aileron area .....	60.8 sq. ft.
Stabilizer area .....	64.6 sq. ft.
Elevator area .....	36.6 sq. ft.
Fin area .....	10.8 sq. ft.
Rudder area .....	15.1 sq. ft.
Weight (empty) .....	3300 lb.
Useful load .....	1980 lb.

(Including 550 lb. of fuel and oil)

Total weight .....	5280 lb.
Wgt./sq. ft. ....	7.5 lb.
Wgt./hp. ....	12.5 lb.
Speed .....	107 m.p.h.
Endurance ... ..	5 hours

It will be noted that the propeller used is of the four-blade type and is geared down to run at about five-eighth engine speed. The cowl which covers the engine has a characteristically French appearance. Carrying the exhaust pipe

upward to about the level of the upper wing tends to muffle the noise of the exhaust and render it less annoying to the passengers. The Lamblin radiators referred to above are the torpedo shaped objects below fuselage.

## Automotive Duties in Czechoslovakia

**T**HE Parliament Czechoslovakia will shortly discuss a legislative scheme concerning the increase of import duty on automobiles and parts of automobiles. According to this bill, the import duty will be augmented, for countries to which the general tariff (autonomous) applies, by 90 per cent. of the invoice price; for countries to which a special tariff applies, 65 per cent. of the invoice price. For motor engines and motor ploughs, tractors, locomobiles, and motor boats the duty will be determined according to weight: up to 50 kilos, 6000 crowns as minimum tariff, 7500 crowns for the general tariff; from 50 to 250 kilos, 5500 crowns minimum tariff, 7000 crowns general tariff. Aeroplane engines, without distinction, will be subject to the following duties: 15,000 crowns each, minimum tariff; 20,000 crowns each, general tariff. This increase in customs duties is caused by the fact that the present tariffs do not protect home production, and bear no comparison with analogous duties levied by France, Italy, Great Britain, and the United States.



A recent design of Nieuport 5-passenger airplane

# Manufacturing Possibilities Offered by Duralumin

There has been much discussion concerning the properties and uses of duralumin. This article presents a critical analysis of the manufacturing possibilities of this copper-aluminum alloy. It has been written as a result of considerable experimental and research work.

By William B. Stout\*

**T**HE new light alloy duralumin can be rolled into sheets or forged by hand, press or power hammer.

It can be cast, welded and soldered, while rivets of the same material used with it show new production possibilities, on account of the peculiarity of the heat treatment results. Connecting rods have been made of it, using the metal itself for wearing surface without anti-friction metal. These have operated successfully in both motor cars and aircraft engines. Worm gears have been made of "dural" (as it is colloquially called) and used in heavy truck service successfully against steel worms. Timing gears of this metal show new possibilities of both wear and quietness, but most use has been made of the alloy in structural shapes for ultra-light constructions. The metal itself costs about five times as much as cold rolled steel per pound. For production work, however, only one-third the number of pounds is used for the same strength result, and since the material is much easier to work than steel in most of its forms, it saves materially on labor, tool cost and tool depreciation, so that in many cases constructions can be made cheaper of duralumin than of steel.

Structures are now being built of duralumin which far exceed former strength figures in wood and yet are lighter than any previous wood-and-cloth airplane constructions. We have at present in process machines capable of carrying twenty passengers at two miles a minute for five hours, and fitted with 600 hp. engines, yet the whole machine weighs no more than a Cadillac touring car. It is safe to state that the low weight figure could not have been reached with our present knowledge with any other material.

## Stronger Than Steel in Structures

Many have preferred steel in their experimental aircraft work, for the reason that steel exceeds duralumin in tensile strength even after allowing for its greater weight. But the problem of strength in a structure does not always depend on the properties, but often on the column or compressive strength.

For the same weight, duralumin has about three times the thickness of even its cold-rolled boiler-plate counterpart, and five or six times the section of alloy steels of high tensile strength. The rigidity of a sheet is dependent on its thickness very largely, and, while "dural" is a much more flexible material than steel in equal sections, yet with the greatly increased sections used for equal strength a much greater rigidity is obtained than with steel.

For example, we have produced a rolled section designed for a maximum column strength and yet of such shape as to fit production requirements. This section of 0.035 in. thickness of metal in a 19-in. column weighs 7½ ounces and will support a weight of over 4 tons. If made of high-tensile alloy steel, its thickness, so far as tensile requirements go, would be about 0.009 in., but this would be untrustworthy in a structure on account of the lack of rigidity of such a thin wall.

## Physical Properties

Duralumin looks much like aluminum, except that it takes a high polish and that, when polished, the glinting red of the copper in the alloy can be detected. In ordinary atmosphere the polish is permanent, the metal being non-corrosive to a very high degree. In the tempered state it is almost immune to the effects of salt spray, though in the annealed form salt water affects it.

The chief difference between this and previous aluminum alloys is that its physical characteristics are materially changed by proper heat-treatment. The most peculiar thing about the metal is that the change in physical properties following heat-treatment is not instantaneous but very gradual, attaining a maximum after about four days. During this period not only is the tensile strength increased 50 per cent or more, but the elongation increases from 600 to 800 per cent. More than this, in its heat-treated form the metal can be reheated and softened for passing through mechanical processes not of too violent a nature, and at the end of one hour it will have resumed its original tempered characteristics. The fact that the extreme properties of the metal are not reached immediately, as in most metals, is of great advantage commercially, as will be explained later.

The heat-treatment or tempering of the metal consists in heating to 920-940 deg. for from 7 to 30 minutes, the time being governed by the bulk of the parts. The material is then quenched in boiling water. It is then removed from the quenching bath and worked as soon as possible. In from one to two hours' time the metal acquires sufficient hardness so that it is difficult to work.

In our airplane work we heat-treat a coil of sheet metal in a bath of sodium and potassium nitrates, quench in an adjacent tank of boiling water, uncoil the sheet or strip and start it immediately through the rolls which form it into the shape desired. The process is completed and the spar ready for aging within 20 minutes.

Duralumin is a copper-aluminum alloy, the copper content running about 4 per cent. Some magnesium is also present, and zinc is the most detrimental im-

\*Digested from a paper read before the American Society for Steel Treating.

purity. For this reason duralumin is made only from the purest 99 per cent aluminum, so that the impurities in the various elements of the alloy will not build up a detrimental quantity. It is the inability of the Germans to obtain pure aluminum which has prevented their duralumin alloy from equaling the figures obtained in every-day production from the American product.

The metal itself, however, was developed in Germany from an original French laboratory development. The first real commercial use to which it was put, so far as the public was concerned, was in the metal ships of the Zeppelin company. One of the reasons for the slow development of the Zeppelin, aside from the problems of airship design itself, was the necessity of developing the metal along with the structure.

At first considerable trouble was had with corrosion. Sheets granulated, seemingly without reason, and until the difficulties were worked out, structures built of the material were more or less unreliable and required frequent inspection. This is still true in very thin gages not carefully heat-treated, but with pieces of any real section corrosion is now an almost unheard of thing.

#### Troubles Due to Impurities

The main troubles with duralumin are similar to those with other alloys, being due to the presence of impurities in the ingot or to air bubbles, which later cause serious defects when the piece is forged or rolled.

Most of our material is of 0.035 in. thickness, so that a very small speck of dirt can make a serious flaw in the metal sheet and a very small air bubble a considerable pipe in the center of the sheet.

Most of these flaws do not show up until after the rolling. In this case the greatest stress on the metal in putting it through the rolls is at a hidden point, so that to inspect these spars or chord members a dental mirror is used with a high light, and the surface very carefully examined. Frequently a hole as small as the point of a fine needle can be opened up into a flaw 5 in. long—a sort of stratification of the metal—resulting from original ingot impurities.

In the design of the rolls, also, great care must be taken against too great a degree of draw between annealings, and that all radii must be sufficient for the requirements of the metal.

The great drawback of the material as we are using it at present is the presence of ingot flaws, rolled out in the sheet, which lead to a very high rejection cost. When this is cured the experimental stage of duralumin will be over. As soon as large quantities of the material are demanded rolls can be put in for greater widths of sheet than at present available—16 in. being now the best obtainable—and tubing and other structural forms will become available.

Composition: Copper, 3.50 to 4.00 per cent; magnesium, 0.20 to 0.75 per cent; manganese, 0.40 to 1.00 per cent; aluminum (99 per cent pure) balance.

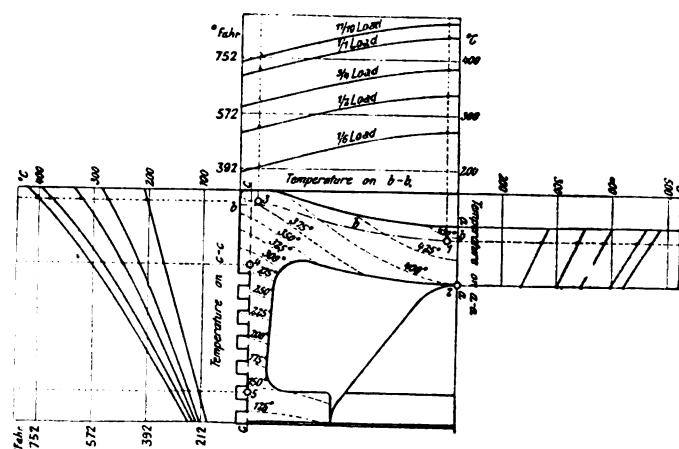
Physical properties: Specific gravity, 2.80; weight, 0.102 lb. per cubic inch; melting range centigrade, 540 to 650 deg.; compressive strength tempered, 44,000 lb.; sheet value tempered, 30,000 lb.; tensile strength tempered, 50,000 to 60,000 lb.; elongation tempered, 16 to 20 per cent; modulus of elasticity, 10,600,000; coefficient of expansion, 0.0000226 per deg. C.; yield point, 30,000 lb.

## Piston Temperatures

RESULTS of an experimental investigation of the temperatures at different points of a Diesel engine piston under different loads and with different fuel injection pressures are published by Dr. Eng. W. Riehm in *Zeitschrift des Vereines Deutscher Ingenieure*. The results will undoubtedly be of some interest to automotive engineers, in so far as they show the temperature gradient through the thickness of the piston head at the center, along a radial line from the center of the piston head outward, and down the skirt. The temperatures were measured with thermo-couples set into the walls of the piston at different points. One joint of the thermo-electric couple was located at the point whose temperature was to be measured and the other joints of all couples were placed in a heat-insulated box secured to the piston head. From this box a multiple-insulated cable, made up of very fine copper wire, extended down the inside of the piston skirt and along the walking beam of the air-pump drive to the outside to a galvanometer. In this way a reliable electric connection from the moving piston to the galvanometer was obtained, which proved very serviceable and always lasted for several days before one of the fine copper wires broke. The temperature of the second joint in the heat-insulated box was measured by a special thermo-couple.

The tests were made on a 70-hp., single-cylinder, four-stroke Diesel engine of 16-in. bore and 24-in. stroke, at 165 r.p.m. Two designs of piston head were used, of different thickness and different degrees of concavity, the object being to determine which of the two would best withstand the tendency to cracking at the center. The results obtained with one of the pistons are given in the diagram herewith. The piston-head thickness in this case is 2.085 in. and the length of that part of the piston shown is 8.4 in.

It will be seen that the maximum temperature occurs at the center of the piston head, as would be expected from theoretical considerations. When running under 10 per cent overload this temperature reaches about 900 deg. Fahr. It is rather doubtful whether such a high temperature ever occurs in an automobile engine, notwithstanding the much higher speed, because, in the first place, the temperature of combustion is higher in a Diesel engine, and, secondly, the very large size of the engine retards the flow of heat to the cylinder walls. The triple diagram clearly shows the heat gradients along an axial line through the thickness of the head, along a radial line on top of the piston head, and along the upper part of the piston skirt. The dotted lines drawn in on the piston section are isothermal lines at the temperature marked thereon.



Results of temperature tests

# Headlight Regulation Discussed at Meeting of Illuminating Engineers

Education of motorists with regard to proper adjustment of headlamps one of the most important factors for improving conditions of night driving. The Massachusetts law was fully explained with examples as to the method of enforcement. City testing stations are valuable.

By P. M. Heldt

FROM discussions before the Illuminating Engineering Society, which held its fifteenth annual convention at the Powers Hotel, Rochester, last week, it appears that at present the chief problem in connection with safe and efficient headlamp illumination is the intelligent enforcement of the laws, particularly as regards the focusing of the bulbs in the reflector and the correct aiming of the lamps. Under the laws based on the I. E. S. headlamp specifications certain anti-glare devices are given approval for use in connection with bulbs of a certain candle-power, but it is realized that the use of such devices does not in itself insure efficient and safe lighting. It remains for the operator to see to it that his bulbs are properly focused, that the reflectors are maintained in a state of efficiency, that the lenses, if of the prism type, are not rotated in the headlamp shells and that the headlamps are properly aimed or directed. In some of the cities of the Middle West official headlamp adjustment stations have been established, and this seems to be the best solution of the problem. The I. E. S. system of headlamp regulation has been adopted as a standard by the S. A. E. and is undoubtedly familiar to most readers.

## Wider Application of Standard Regulations

At the meeting the annual report of the Committee on Motor Vehicle Lighting was presented. In this it was stated that since the last meeting the I. E. S. system has been made the basis of headlamp regulation laws in the states of Nebraska, Iowa, Utah and Ohio, while Massachusetts had adopted the system in principle but had written somewhat different specifications for tests. The committee stated that on the basis of registration figures published in AUTOMOTIVE INDUSTRIES about 43 per cent of all the cars in use in the country were now operating under laws based on the I. E. S. system, as compared with 25 per cent last year. The Province of Ontario also had adopted the system, and 42.5 per cent of the total registration in the Dominion of Canada were thus operating under the I. E. S. system.

It had been suggested to the American Engineering Standards Committee that the I. E. S. specifications be adopted as a tentative American standard, and this matter is now pending. It was learned that the International Commission on Illumination had adopted a resolution to the effect that headlamp regulations should be framed on the basis of an international agreement, so that the regulations would be uniform for all countries. The Commission established a study committee on the subject of automobile headlights, which is to report at the next session of the Commission. This study committee, of

which Dr. C. H. Sharp of the I. E. S. is president, is to draft technical proposals suitable for international adoption and to use the influence of the International Commission to convince the authorities of the different countries of the importance of uniform regulations throughout the world.

## Proposed Change in Tests

During the past year most of the work of the I. E. S. Motor Vehicle Lighting Committee had been in connection with details, but one definite change in procedure in connection with the tests of lenses was proposed. Up to the present two pairs of a certain size of lens had been tested with both 15 cp. vacuum and 21 cp. gas-filled lamps. It was proposed that in future the tests should be made with gas-filled lamps only, but that one pair of each of the four sizes of lenses standardized by the S. A. E.—namely, 8 5/32, 8 1/2, 9 and 9 1/2 in.—be tested. The object of the change was to make the results of the tests more representative of the device, since different molds were used for the various sizes.

The report concluded by stating that conditions on the road in night driving were becoming notably better. Complaints of excessive glare were still being received, however, and sometimes the complaint had been made that the work of the committee was futile, because it had not resulted in a more radical improvement. The committee submitted, however, that such criticism was not necessarily just, as its work extended only to a certain point. Lamps accurately focused or aimed might, even with the best of devices, produce an intolerable glare or an abominably low illumination, or both, and it was evident that the results on the road were to a great extent dependent upon the education of the motorist with respect to the proper adjustment of his headlamps and on the officers of the law to whom the enforcement of head-lighting regulations was intrusted.

Among items for future consideration by the committee are the determination of a standard for the illumination of rear license plates and the illumination of stop and turn signals. It was stated that there is a real need for an authoritative booklet on the proper adjustment of headlamps and on simple methods of checking the illumination to see if it conformed to the specifications.

## New Massachusetts Regulations

A. W. Devine of the Massachusetts Department of Public Works read a paper on Motor Vehicle Headlighting in Massachusetts. He said that in that State the much-copied regulations of Oct. 27, 1915, remained



in force until Aug. 15, 1921. These called for sufficient light directly ahead of the vehicle to make objects 150 ft. ahead clearly visible; for the absence of dazzling rays 3.5 ft. or more above the ground, 50 ft. or more ahead of the vehicle, and for sufficient side illumination so that any object 10 ft. to the side and 10 ft. ahead of the vehicle could be distinguished.

Hundreds of motorists were prosecuted under this law and substantial fines were imposed. The method of enforcement was as follows:

The officer would select a point on a straight, level, unlighted roadway from which approaching vehicles were visible for a distance of an eighth of a mile in both directions. From this point he would measure off 50 ft. in both directions, and would observe the light from approaching vehicles from the time they came into view until they were within 50 ft. of him, in the meantime walking back and forth across the road so as to observe the approaching light more carefully. To avoid the possibility of mistakes only vehicles with specially glaring headlamps were stopped. Operators of machines on which no attempt had been made to regulate the light were summoned into court for violation of the regulations, and in practically every case were fined.

Such enforcement was often preceded by educational work. On certain nights in different parts of the State motorists were invited to congregate at certain points and have their lighting equipment examined by a competent inspector who pointed out defects and faulty adjustment and advised regarding methods of correcting the defects.

As time went on it became apparent that the regulations were not very effective any more. All kinds of glare-eliminating devices were used, some very inefficient, and the lower courts would accept the statement of police officers only if no evidence was introduced to show that an attempt had been made to reduce the glare. The Highway Commission realized that it was not merely a question of the device used, but almost wholly a question of the adjustment. Therefore, on Dec. 1, 1919, when the Highway Commission was absorbed by the larger Department of Public Works and a Registrar of Motor Vehicles took over all the powers of the Highway Commission having to do with motor vehicles, it was decided that something should be done to correct the lighting situation.

Frank A. Goodwin was appointed Registrar of Motor Vehicles, and he detailed Mr. Devine to make a thorough study of the head-lighting problem. The latter first made laboratory tests on the light distribution obtained with some thirty non-glare devices, using a pair of accurate paraboloidal reflectors of 1 3/8-in. focal length, bulbs of 21 mean spherical cp. and 9 and 9 1/4-in. lenses. Following this, road tests were made over a period of several months, the lamps under test being mounted on universal brackets so that aiming tests could be made, and another pair of headlamps mounted beside them for the sake of comparison.

#### Road Lighting Requirements

As a result of these tests and the experience of the investigation department, it was determined that a minimum spread of beam sufficient to cover a 12-ft. roadway would be required for the safety of the users of the

highway. It was also determined that the I. E. S. specifications for glare limits were reasonable, and no attempt was made to modify them. These limits are: 2400 cp. max. at a point 100 ft. ahead of the car, 5 ft. above the ground, and 800 cp. max. at a point 7 ft. to the left of that point.

The next step was to determine what intensities should be required in different parts of the beam. The I. E. S. specification for road performance required a normal illumination of 0.12 foot-candles at the A or B and E or F points. This value was found to be a low minimum in actual road tests, particularly so in the case of a number of devices with which it was almost impossible to see an object illuminated to a corresponding brightness because they projected a beam of rapidly varying intensities from one point to a nearby point. In view of the fact that the Headlight Committee had established such a low and unusually fair minimum, it was felt that it would not be acceptable in making laboratory tests. Road tests and laboratory tests compared showed that under fair conditions of actual use the depreciation in lighting equipment would cause a reduction in illumination of about 50 per cent, as a result of a decrease in the reflection coefficient of the

reflector, a decrease in the impressed voltage on the lamps and deterioration of the lamp bulbs. For this reason it was decided that, as far as the laboratory tests were concerned, the requirements of the I. E. S. specifications for road performance should be doubled and an illumination of 0.25 foot-candles be called for at such points as it was decided to make tests.

In the application of these regulations headlamps are ordinarily mounted at a height varying from 34 to 38 in. above the ground, but for purposes of laboratory test the lamps were assumed to be at a height of 42 in. above the ground. This assumption results in greater freedom from glare in practice, but if not corrected for in computing the required minimum intensities in the beam would mean that those devices which complied with the specifications would not necessarily have sufficient spread to cover a 12-ft. roadway as desired. For this reason those minimum laboratory test points were selected which, with the centers of the lamps at an assumed height of 42 in. would indicate the parts of the beam which strike the edges of a 15-ft. flat roadway, or, under average actual conditions, would indicate the parts of the beam which strike the edges of a 12-ft. roadway. The P and Q points are those points in the beam which strike the edges of a 12-ft. roadway 115 ft. and 57 ft. respectively ahead of the car when the lamps are 36 in. above the ground. The M point is the test point at which is measured the intensity directly ahead of the car 1.25 deg. below the horizontal. This point is 0.25 deg. lower than the society's B point. Retention of the B point would have required 10,000 cp. and would have caused several satisfactory devices to fail to comply with the specifications. Furthermore, it might have resulted in the design of devices with too sharp a cut-off or which approached the glare limits at C and D too closely, resulting in excessive glare when the molds in which the lenses are made had worn slightly. It was felt that illumination up to a distance of 200 ft. ahead was not necessary for safe driving at a reasonable speed. The new regulations were drawn to call for

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**A** RADICAL change for the better in night driving conditions cannot be effected until police officers charged with enforcement of the law and the car drivers are educated as to proper methods of lighting. In Massachusetts enforcement campaigns were often preceded by meetings of motorists where lighting systems were examined and experts explained methods of correcting the defects.

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illumination up to a distance of 160 ft., an increase of 10 ft. over the old regulations. The wording of the specifications for laboratory test was taken from the society's specifications with a few changes. These specifications were given in part in Mr. Devine's paper.

#### Method of Enforcement

Considerable thought was given to the method of enforcement to be employed before formulating regulations. The use of a portable photometer in testing the road performance of lighting equipment was not considered entirely practical, and it was finally decided that the use of double specifications (road and laboratory) was undesirable. To secure compliance with the law it would be necessary to educate the public to make proper adjustments under any system, and adding the use of a photometer only complicated the problem.

The alternative method then suggested itself that enforcement could be had on the basis of condition and adjustment of equipment. A bill was introduced and adopted that "No headlamp shall be used upon any motor vehicle \* \* \* unless such lamp is equipped with a lens or other device approved by the registrar, designed to prevent glaring rays."

Regulations were drawn up requiring that headlamps be used on insufficiently lighted ways, that every approved device be applied and adjusted as required by the registrar's approval, that light sources of 21 cp. only be used and that any reflectors used as a part of such headlamps should have highly polished silvered or glass reflecting surfaces. These regulations went into effect on Aug. 15, 1921.

Other states have limited the maximum candle-power which can be used, and in Massachusetts it was felt that it was necessary to set a minimum candle-power as well, in order that the motorist might not be troubled so much by insufficient illumination. By standardizing on one size of light source, the contrast in the illuminated fields ahead of two vehicles is reduced to a minimum and, besides, there are advantages in the elimination of the many sizes of electric bulbs which dealers have heretofore stocked. In interpreting this provision, if a bulb of 21 rated cp. were used, a reasonable variation in candle-power above or below this figure would not be a violation of the regulations. In addition to the requirement that only 21-cp. light sources be used, all approvals of electric headlamp devices which have so far been issued require the use of a type C (gas-filled) bulb. This requirement is made not only to further standardize on equipment, but also on account of the higher efficiency and slower depreciation of the type C bulb. The new law in Massachusetts calls, then, for the use of an improved device, 21-cp. type C bulb (in electrical equipment), highly polished reflectors and proper adjustment of the device.

#### Tests of Lighting Devices

Forty-three applications for approval of electric headlighting devices were received and tested up to Aug. 15, 1921. Of these, 26 devices were approved for use; of the devices which were not approved 14 failed to comply with the limiting test intensities and 3 devices were refused approval, although they complied with the limiting intensities. Two of the devices which were

refused approval were deemed to be unsafe for use on account of unduly dark and bright areas within the area outlined by specific points, and one was refused approval because of unduly difficult and complicated adjustment.

The results of the tests of devices for approval clearly show that the requirements are much more severe in Massachusetts than in states which have adopted the society's specifications. Much importance is attached to sections reserving the right to refuse approval of any device which, although it conforms to the specified limiting intensities, is liable to prove unsafe because it does not comply with the intent of the specifications or unsatisfactory because it has an unduly complicated adjustment.

#### Focusing Device for Private Owners

Education of the motorist to the necessity of making proper adjustment of his headlamps and keeping his lighting equipment in good order is of prime importance. A novel method of educating the public is being used. A circular disc of heavy paper, perforated with two 0.25-in. holes, spaced 4 in. apart and equally distant

from the center on the same diameter is being issued. On this disc is printed the requirements of the law, the approved list, and focusing and aiming instructions. The disc is used for focusing the lamps by holding it in front of the lamp being focused without the device in place. Two filament images are projected on a vertical surface 25 ft. from the lamp, one image from the top part and one from the bottom of the reflector. The relative position of these images, one to

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**E**XPERIENCE has shown that glaring and blinding headlights usually result from improper focusing. Motorists who have neither the inclination nor ability to adjust their lamps would be benefited if stations were installed in their home city, where experts could periodically examine their lighting equipment and adjust it to conform with required standards. This method has been successfully used in several cities. Some of the devices that have been used are described in this article.

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the other, determines the focal adjustment. This focusing disc has met with great popularity, so much so that some difficulty has been experienced in supplying the demand.

Another important consideration is that for persons who have not the inclination or ability to adjust their own lamps, some place should be available where they can go to have the lamps adjusted. For this purpose complete printed instructions are being issued and competent persons who have the proper facilities are being approved of. Eleven trained inspectors from the Registry of Motor Vehicles are traveling throughout the State instructing and examining mechanics and others who seek official certification of their competency.

#### Tests on Illumination Requirements

Another paper was presented by H. H. Madgsick and R. N. Falge of Nela Park, Cleveland, and dealt with "A Determination by Various Drivers of the Desired Road Illumination from Automobile Headlights." Data were presented showing the road illumination from headlight equipment as set in a moving car by a total of 13 observers, under various conditions of road surface, contour, boundaries, street lighting, weather, speeds, etc., with lighting facilities which afforded a considerable range of intensity and distribution. These data indicate in a general way the lighting required for safety and a moderate degree of convenience—that is, the lower limit of what might be termed good practice—for the more common road conditions. They are not sufficiently complete to permit an analysis of the effect

of each of the variable factors. A description was given of the equipment employed, together with an outline of the procedure followed in obtaining the data.

The authors stated that in considering data of this kind from the standpoint of lighting equipment for a car it must be borne in mind that, because of conditions beyond the control of the car owner, such as large variations in voltage at the lamp, departure from a perfect product in sockets, incandescent lamps, reflectors and cover glasses, and depreciation in some of these elements, the laboratory tests with selected equipment must in general show twice the intensity values which it is desired to insure that the car owner obtain at all times in service.

The data presented were, as already pointed out, what the observers considered the minimum desirable from the standpoints of safety and reasonable convenience in driving under the given conditions. A higher order of intensity was in every case considered to reduce the strain of night driving and to contribute to the safety and enjoyment of the driver and his passengers, while also minimizing the danger to other people on the road.

The discussion centered largely around the enforcement of headlamp laws. It was opened by John A. Hoeveler of Madison, Wis., who said that we are not getting the enforcement we should have. The police cannot handle photometers and the motorist is suspicious if such a device is being used on him. Therefore, testing stations are necessary. In Milwaukee such a station has been in operation for several months. At this station a testing board is rigged up on which there are four translucent bulls-eyes. The two upper ones are for the determination of the non-glare qualities of the lamps and the two lower ones for the determination of the road illumination power. These bulls-eyes are lighted up from behind, and two of them must show light and the other two dark in order that the lighting equipment may comply with the State regulations. The outfit is operated by two police officers, one of whom spots the cars and the other operates the photometric equipment. The whole installation was worked out by the illuminating engineer of the city of Milwaukee, and it was perhaps fortunate that the city had such an engineer, which insured that the arrangement and method of use were accurate and practical. The station will shortly be closed for the winter, but in the future may be operated throughout the year.

Motor vehicle officers send into the station vehicles that seem to produce an inordinate amount of glare. Service stations are being appointed throughout the city for making adjustments of the lighting equipment. A plan of this kind could be worked out in each community, stations being established, for instance, at the county seats, and there would be no difficulty at all in establishing such stations in the larger cities.

#### Developments in Ohio

Dr. Francis C. Caldwell of Columbus, Ohio, said that the lighting situation was particularly acute in the State of Ohio. There they looked upon Massachusetts as a pioneer in the regulation of headlamp illumination. Conditions in Ohio were probably more representative of those throughout the country than conditions in Massachusetts. A new law went into effect in Ohio on Aug. 15. It called (1) for a distribution of light adequate to properly show obstacles in the road 200 ft. ahead of the vehicle; (2) for tests and approval of glare-controlling devices by the Director of Highways, and (3) for the reduction of glare below a certain maximum. There

were no provisions for the enforcement of the law other than the regular police powers of the State. Until recently the control of motor traffic had been in the hands of the Director of Highways. This official has to look after a great deal of highway construction and, as a consequence, is over-burdened with work, which causes him to look upon the control of motor vehicle traffic more or less as a nuisance.

All tests are made with 21-cp. lamps at the Engineering Experiment Station, a State institution. The great problem in Ohio, as elsewhere, was to get people to adjust their glare-control devices properly, and this called for the establishment of test stations. In Ohio no State funds were available for the purpose, but people with commercial interests in lighting equipment were taking the matter up. In Cincinnati and Cleveland these people have induced the automobile clubs to get together with the police and provide the necessary testing stations.

#### Tilting Headlights

There was a strong demand for more light than allowed by the I. E. S. specifications. A tilting headlight would be approved regardless of what illumination it produced when in the non-tilted position. For this the driver was allowed to take the responsibility. One glare-control device was turned down because it gave a very unsymmetrical distribution, with the result that pedestrians on the sidewalk at the right-hand side would get much more than 800 cp.

One of the speakers taking part in the discussion stated that on a certain make of low-priced car on which the bulb is adjusted from the rear by means of a screw and the reflector is held in place by a spring, when the non-glare device is applied to the lamp the position of the reflector relative to the bulb is materially changed, which has a great effect upon the lighting efficiency of the lamp.

Dr. Louis Bell said that he was interested in Mr. Madgsick's paper and the indications it gave that greater illuminating power was required at high speeds. We could not expect pedestrians to wear a red tail-light like the British Tommies were compelled to wear just before the war when marching in column formation.

Mr. Davidson made the assertion that focusing stations were needed. In his locality it was the practice of the police to give motorists whose headlamps showed an inordinate amount of glare 10-day cards which instructed them to go to an adjusting station and have their lights properly adjusted and then come back and report to the police. If they did not come back within the specified time, the police would go out and get them.

Frederick H. Ford of Waupun, Wis., said that, as a lens maker, he would suggest the provision of focusing stations in small towns, located in vacant lots abutting a street. They should be so arranged that car owners could drive there at any time and see for themselves whether their lamps were properly focused.

One speaker pointed out that in some of the cheaper cars, which had headlamp shells of very flimsy material, the lenses were inadequately held and sometimes turned around their axis, which nullified all the good work that the society had been doing. Lawrence C. Porter of Harrison, N. J., stated that the Ford company had recently made a move that was greatly to be commended. In his State the agencies were required to paint on the garage a white rectangle and all cars sold by them had their lamps adjusted so that when the car was spotted at a certain distance from the wall and pointed in the direction of the rectangle the entire beam from the lamps came within the rectangle.

# New Gear Grinder Works on the Generating Principle

Machine includes self contained drive and a 30 inch wheel with plane grinding surface. Handy location of control levers is feature. Three important conditions fulfilled to insure perfect involute generation. Work spindle rotates through a sleeve to which the power is applied.

**I**N the grinding of gears after hardening three different requirements have to be met: (1) The face of the tooth must be ground smooth; (2) the face must be ground to true involute form, and (3) the machine must index accurately so that the teeth will be properly spaced.

A gear grinder designed to meet these requirements has been brought out by the Lees-Bradner Co., and a photographic view of it is shown herewith. With this machine it is possible to grind spur gears with involute teeth of from  $14\frac{1}{2}$  to 24 deg. pressure angle, from 12 to 3 diametral pitch and from 2 to 12 in. pitch diameter. A grinding wheel of 30 in. diameter with a plane grinding surface is used. The wheel is supported on a stationary column and the work is traversed past the wheel by a slide having a reciprocating action. The work is given a rotary together with a correct sliding motion, in order to obtain the desired profile. To obtain this combined sliding and rolling action a segment corresponding to the pitch diameter of the gear to be ground is used, in conjunction with tapes or bands.

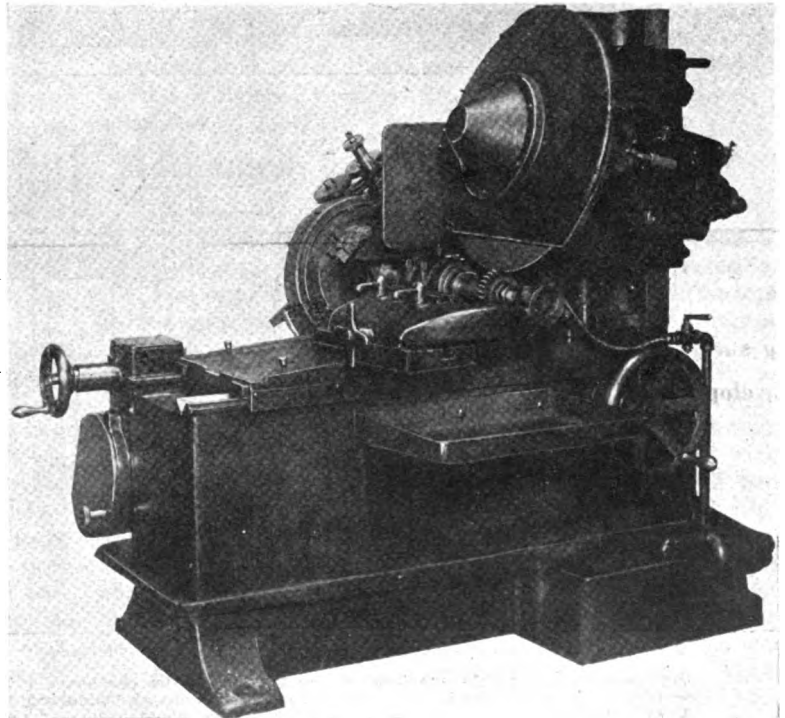
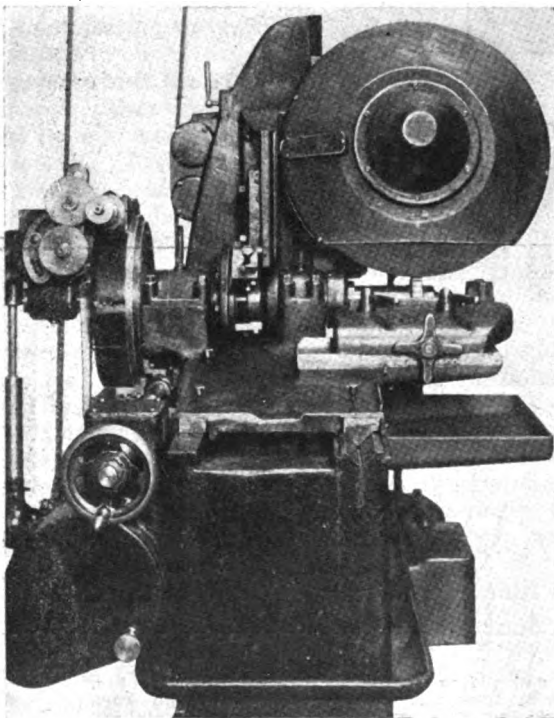
A diamond is used to true the face of the wheel. It is both lever and screw-controlled, and, of course, travels in a straight line to keep the plane face of the wheel true; it is used in conjunction with the wheel spindle micrometer feed.

The drive to the wheel is by an endless belt, self-contained on the machine. This belt is guided by two idler pulleys which are carried in a bracket, with sliding adjustment on the back of the column, to suit any diameter of gear being ground. A single belt is used to drive the machine from a line shaft, but a motor drive may be substituted.

Indexing is by means of hardened and ground plates, secured to the work spindle and completely shielded inside a case. The indexing is automatic and takes place at one end of the slide reciprocation. Setting the wheel at the proper angle is accomplished by means of a worm and segment on the swivel head. A pump circulates the coolant. The work can be held between centers, or supported on a mandrel having a taper shank to fit the spindle and supported at the outer end by the tailstock

## Meets Generating Conditions

To grind an involute tooth profile correctly with the above type of machine, it is necessary that the gear blank and grinding wheel have perfect coaxing motion of generation. Such accurate generating motion is hard to obtain. Three important conditions must be fulfilled in order that a perfect involute may be generated: First, there must be uniform motion between the tool and blank;



Figs. 1 and 2—End and side view of Lees-Bradner No. 10 gear tooth grinder

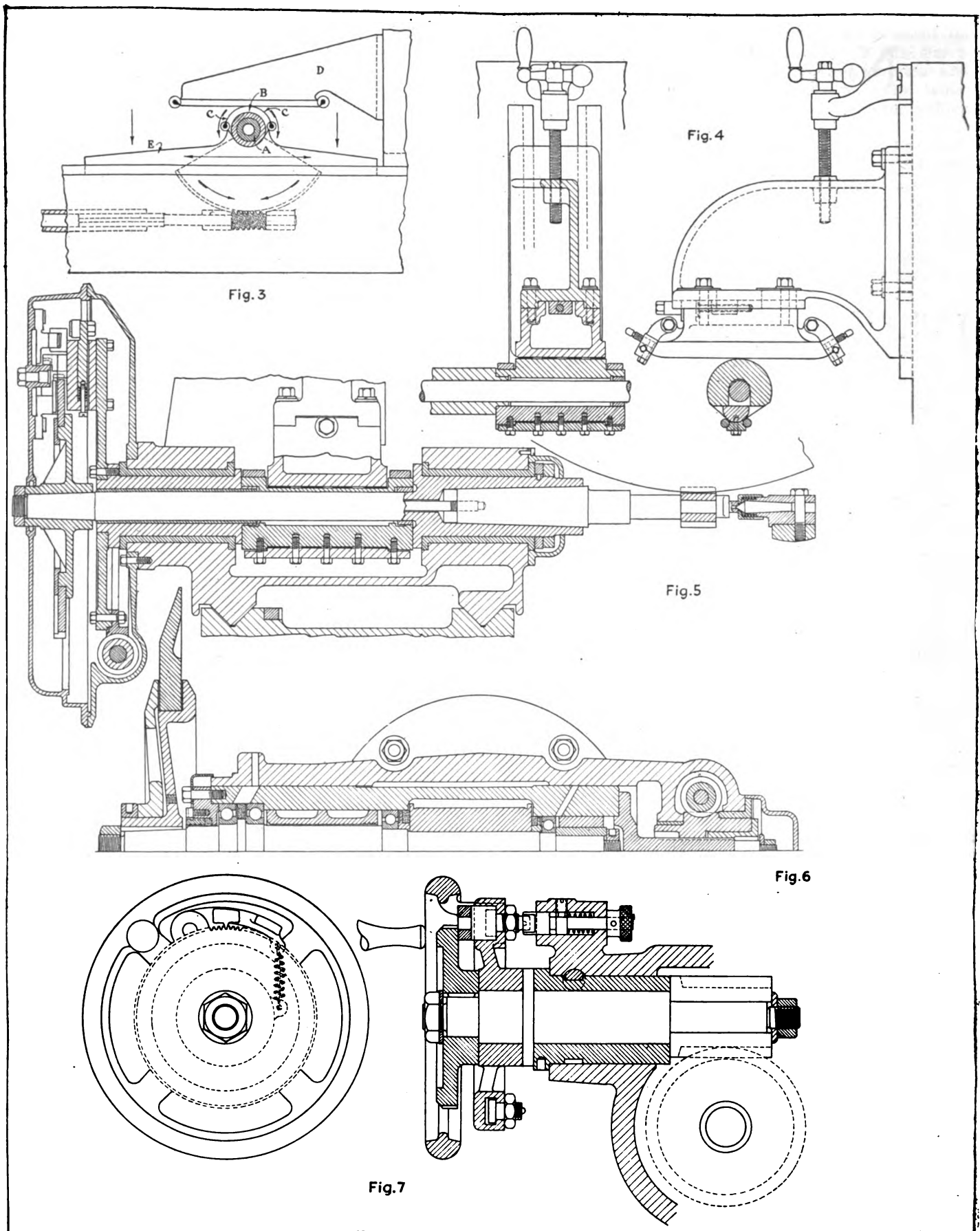


Fig. 3—Diagram of the mechanism for producing the combined rotary and sliding motion for gear generation. Fig. 4—Method of mounting bracket adjustably on column and securing tapes to tape bar. Fig. 5—Section through work spindle showing method of driving work arbor, construction of talstock and work mounted on arbor (gear pinion). Fig. 6—Section through grinding wheel spindle. Note the driving pulley in the center, the method of mounting the wheel on left, and worm and wheel micrometer adjustment for grinding wheel at right. Fig. 7—Micrometer adjustment for grinding wheel, used in dressing wheel and for setting for rough and finish cut



second, centering the tool and blank must be eliminated, and, third, there must be continuity of action between the tool and the gear tooth profile. A disk or segment and a tape are probably the most accurate method of obtaining a correct rotating and sliding connection. The use of tapes and segments is old, but in the past the power has been applied to the work slide as reciprocating action, and this reciprocating action converted into rotary motion of the work spindle by the tapes. In this gear grinder the power is applied to a sleeve through which the work spindle rotates when indexing. When the machine is grinding, the sleeve and work spindle rotate together as one unit.

The sleeve *A* (Fig. 3) carries the segment *B* to which one end of each of the tapes *C C* is fastened. The other ends are fastened to a bracket *D* on the column; accordingly, when the sleeve is rotated first in one direction and then in the other, the tapes will wind on and unwind from the segment, and thus through their pulling action on the bracket cause the work slide *E* to reciprocate. It is apparent from the diagram that there is a uniform torque load to the work spindle by a worm and wheel whose primary function is to rotate the sleeve in reversed directions; also, that there is uniform load on the tapes due to the fact that the frictional resistance of the work slide on the ways is maintained constant by gravity only.

#### Plane Surface Grinding Wheel

The problem of centering the tool and blank is done away with by the fact that a grinding wheel with a plane surface is used when generating. The tapes are anchored to the tape bar which carries the four tapes, two from each end. The bracket is supported and adjusted on the column for different pitch diameters of gears to be ground. These tapes are known as butcher saw steel, and are made of the finest Swedish stock  $1\frac{1}{4}$  in. wide by .025 in. thick. They are all of the same length and are placed in position loosely both on the tape bar and segment, and at the time of tightening up there is an independent end adjustment of the tape bar which is used to move the tapes endwise and in this way turn the segment from its vertical position for the original set-up. To find this position there is a zero mark on the bearing and the sleeve.

The drive for the wheel is from the pulley at the base, then over idlers in the sliding bracket to the grinding wheel spindle and up the stationary pulley at the top of the column. The main pulley shaft drives the gearing in the reverse feed box shown at the right hand end of machine. Speed change gears are used for the number of strokes per minute required of the work slide. The length of travel of the slide is regulated by a trip dog located inside the small circular door at the top of the gear case.

The starting and stopping lever for slide travel is shown at the right hand end of the work slide. This is also operated from the front of the machine. The wheel spindle is mounted on a combination of ball and bronze plain bearings to steady the action with oil films. End thrust is taken by a raised shoulder on the spindle close to the wheel, which shoulder is interposed between two ball bearings, and these are adjusted by the cap screws on the outer side of the flanged end cap.

The diamond of the wheel dresser is mounted in a ball socket container which can be swivelled to any angle, thereby using the diamond face on all its edges. This container is locked in the arm which can be fed either by worm and wheel or by hand, so that either a fast spiral cut, or a slow continuous cut, may be taken on the wheel face. This dresser is carried by the main swivel head

casting, locating the diamond point always in one plane, which is the generating plane, and the adjustment is made endwise of the wheel to the diamond when taking a dressing cut.

#### Changes Over Old Model

The machine here illustrated embodies a number of changes over the original design, including the self contained drive, a 30 in. instead of a 24 in. wheel, the use of four tapes in place of two, and a relocation of control levers for greater handiness.

The operation of the machine is as follows: A segment equal to the pitch diameter of the gear to be ground is located on the work spindle. The grinding wheel is set at the pressure angle of the tooth to be ground. The head carrying the wheel is raised to the correct height so that the wheel will cover the working depth of the tooth. The wheel is dressed with the aid of the micrometer adjustment, and is then moved to the starting position by the micrometer handwheel. There are two positive stop pins located in a circular T slot and these are used in conjunction with a positive stop to locate the wheel in a start and finish position. There is also an intermediate spring stop for the roughing cut. The starting stop is usually set to grind 0.004 in. from the tooth.

The gear to be ground is then locked on the work arbor with a tooth in contact with the grinding wheel face. The machine is started up and the roughing cut is taken, located by the spring stop, usually cutting 0.003 in. from the teeth once around. Then the micrometer is fed up 0.001 in. more to the finish stop, thus making up the 0.004 in. allowed for grinding. This brings the wheel back again into the generating plane and the same position in which it was dressed. When the wheel needs to be dressed again, which is usually every other gear, 0.004 in. is taken off the face. This is accomplished by an independent feed to the micrometer so that the stops for starting and finishing do not have to be disturbed.

This consists of a notched disk and a lever pawl. Releasing this pawl allows the wheel to be fed up 0.002 in. for each notch, so that usually two notches are used to bring the wheel against the diamond the average cut of 0.004 in.

The indexing of a gear is a very important factor in obtaining quiet running gears. The index plates are hardened and ground and are made from masters made by the Warner & Swasey Co. They are said to be very accurate.

#### Running Loads for Anti-Friction Bearings

TESTS bearing on the maximum running loads of ball and roller bearings have been conducted at the National Physical Laboratory recently. The machine on which they were made was kept running at 1300-1500 r.p.m. It seems that at this speed the ball bearings made by a well-known manufacturer will not fail until the shaft which it supports is dangerously loaded. It has not been found possible so far to damage a roller bearing to any serious extent. The tests show that ball and roller bearings properly mounted and protected from moisture or dirt are efficient under high loads, and it is possible that the ordinary running loads adopted are smaller than necessary. One interesting observation that has been made upon several different makes of both ball and roller bearings is that a few hours' running at the nominal maximum loading reduced the friction observed on subsequent running at lower loads. This reduction amounts to 10 or 15 per cent. Whether this is always the case or not we have not sufficient evidence at present.

# The Production of Pressed Steel Wheels Is Successfully Accomplished

This article describes the various operations required in fabricating one type of disk wheel. By proper heat treatment and knowledge of possibilities satisfactory results are being obtained. Great care required to prevent internal strains being set up in the metal.

By J. Edward Schipper

**T**HE constantly increasing use of pressed steel for automotive parts has resulted in some notable achievements in die work and in the use of this material. It would probably not be going too far to say that this is one of the most marked tendencies in automotive design, not only for automobiles, but for trucks and tractors as well. Recent achievements in the cold drawing of metal have far exceeded things that men who are old in the business believed possible. By the correct designing of dies and the proper selection and treating of the materials, some extraordinary results are being obtained.

The problem of using pressed steel for structural parts is not as simple as would appear on the surface. Great care must be used to avoid internal strains in the metal, thus making it impractical or even dangerous to use the finished products. By proper heat treating, however, and by an exact knowledge of what can and cannot be done in drawing the material, results are now being obtained which are satisfactory to many who have been very cautious about using this material heretofore for certain highly stressed parts.

The Gier pressed steel wheel, which is manufactured by the Motor Wheel Corp., offers a good illustration of the use of a pressed steel part in making a highly essential unit of automotive construction. This wheel, which is now being manufactured in quantity, is stamped out from  $\frac{1}{8}$ -in. steel sheet. By proper sectioning of the wheel, sufficient lateral strength has been obtained and an increase in resilience has been secured. This particular wheel has some special features which are of interest. It is so manufactured and designed that it can replace the wood wheel without changing the hub. It has been made interchangeable with the wood wheel by using the wood wheel hub without change and by employing aluminum spacer pieces so that the same width hub is secured and the same bearing mountings employed. In replacing the wood wheel with this stamped wheel, it is therefore possible to simply

remove the wood wheel and to slip the Tuarc wheel on in its place.

Another feature is the forming of the wheel in such a way that the same type of demountable rim employed on the wood wheel can be used on the steel wheel. Thus the installation is brought about with a demountable rim instead of a demountable wheel. It is claimed that this results in a reduction of total weight and an increase in convenience in tire changing since it is not necessary to lift the entire steel wheel.

Another feature of interest in the wheel is that a particular dish shape, employed for lateral stiffness, also permits the valve stem to pass through the dish, giving an accessible valve.

To incorporate these features in a stamped wheel and at the same time to secure the proper stiffness and strength gives a manufacturing problem of particular interest at this time when a very close study is being made of the possibility of pressed steel parts.

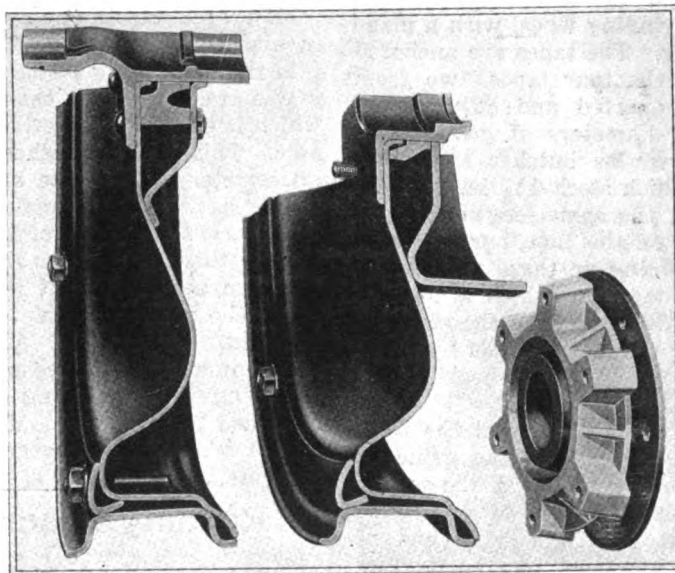
The main operation, that of drawing the disk is divided into three parts. The steel stock is, of course, provided in sheet form. The first operations are to secure the circular blanks. The steel sheets are pickled and sheared into squares and a

center hole for location is drilled. Locating from this hole, the circular blank is cut by means of a rotary shear, leaving an excess of material in the periphery to take care of the drawing operation.

## Making Operations Simple

The first drawing operation on the blank disk is performed on a No. 268  $\frac{1}{4}$  Toledo toggle press with a capacity of 410 tons. The operation, which is shown in Fig. 1, partially forms the disk. In this illustration the circular blank and the form of the disk after the first pressing operation are shown.

The same press equipment is used for the second drawing operation on the disk. This increases the depth of the draw and puts the disk into condition for its final



Sectional view through Tuarc wheel showing construction. The hub is a forging, the spacer an aluminum casting and the other main parts are steel stampings

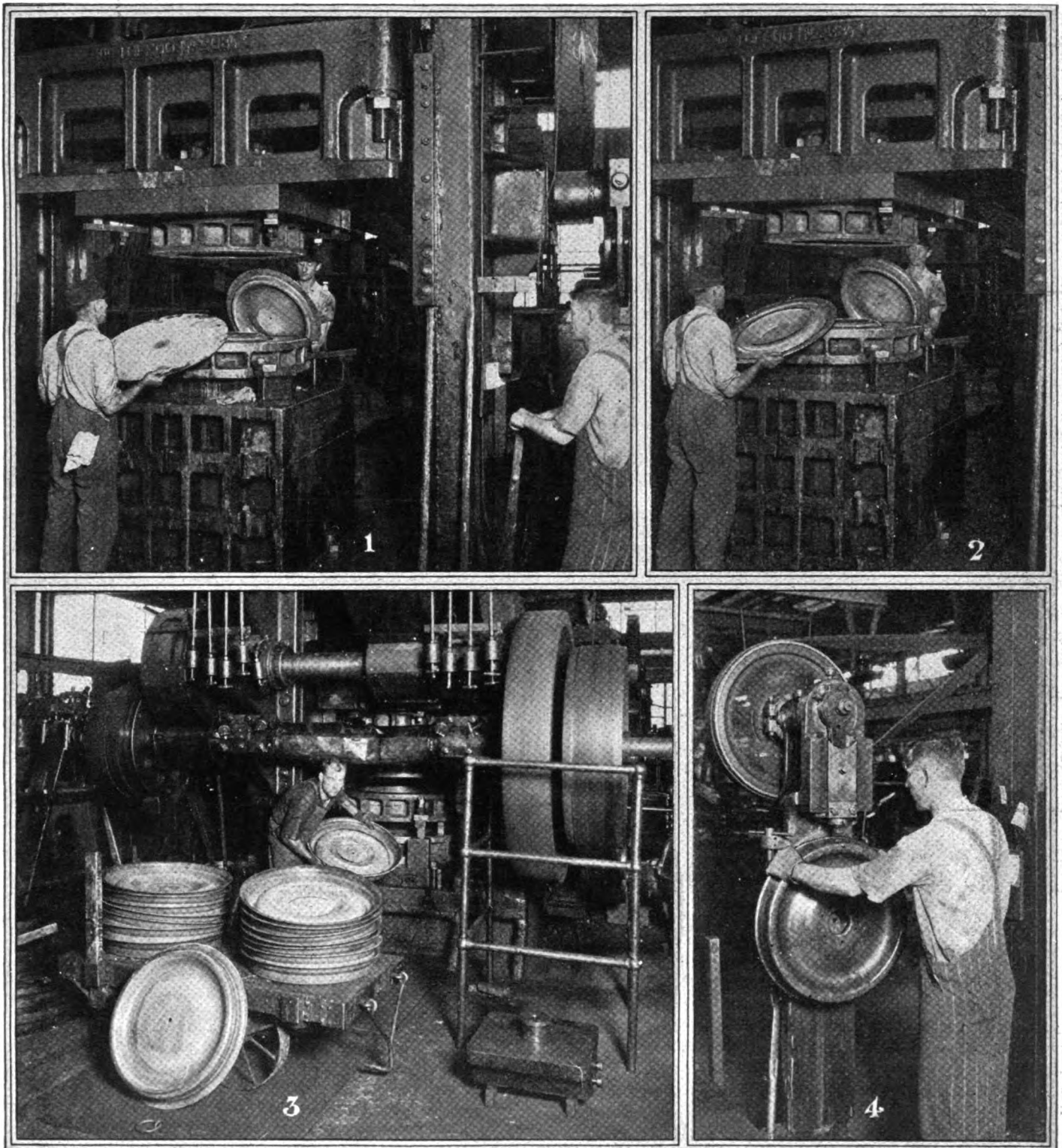


Fig. 1—For this operation on a blank disk a 268½ Toledo toggle press with a capacity of 410 tons is used. Fig. 2—The same press equipment is used for this operation as in the first. Fig. 3—Forming and flattening disk. For this operation a No. 80½ Bliss press is used. The capacity of this press is 1091 tons. In this operation the disk is given its final shape, after which it is ready for center draw, punching for rim bolts, air valve stem hole and driving lugs. Fig. 4—When piercing rim bolts in the disk the bolt is extended through the felloe band and is held in place by demountable clips. The design on the bolt is such that when the nut is tightened on the clamping ring the bolt is drawn in place and forms a component part of the felloe band itself.

forming, which is done in the third operation shown in Fig. 3. This finish forms and flattens the disk. For this operation a No. 80½ Bliss press is used. The capacity of this press is 1091 tons. In this operation the disk is given its final shape, after which it is ready for the machining operation. The heavy press not only puts the final form on the dish in the wheel, but also is a truing operation to bring the wheel to the proper flatness.

After the final pressing operation on the disk, the center opening through the wheel is punched and drawn. The original small center hole which was used for locating the trimming of the circular blank is used to center the punched hole. The operations on the wheel after this center hole is punched and the center draw has been made, are simple machining operations which do not offer any complications. The flash is trimmed off the wheel in a

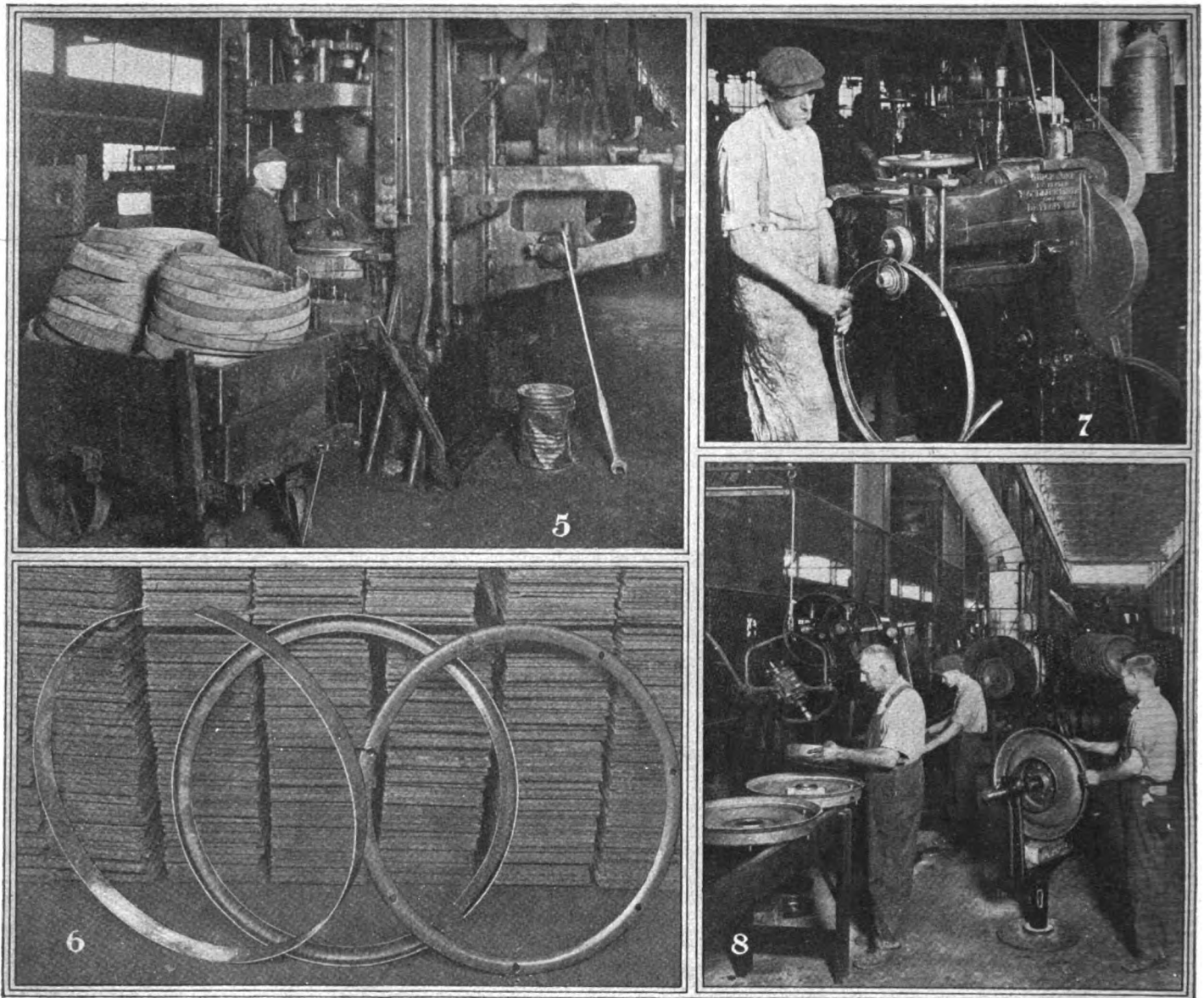


Fig. 5—For the first operation on clamping ring a 78½ Bliss press with a capacity of 453 tons is used. The blank for this operation is a plain hoop of steel. Fig. 6—Clamping ring in three stages. The one on the left is the ring blank; in the center it is shown after the first forming operation, and at the right after the final operation and piercing for rim bolts. Fig. 7—A truing operation on a 10-in. Collier-Smith beader. This brings the clamping ring to its final form and brings the ends together. Fig. 8—Assembling, inspection and paint booth. After assembly, the wheels are tested accurately for trueness; after which they pass to the painting booth. Note the compressed air nut tightener and the bolt clipping machine at the assembly bench

rotary trimming machine and the rim bolt holes are pierced. In some of the wheels for certain types of rims, it is necessary to depress the rim bolt holes and this operation is taken care of on the special machine illustrated in Fig. 4.

The rim bolt is extended through the felloe band and held in place by a demountable clip. The design of the bolt is such that when the nut is tightened on the clamping ring, the bolt is drawn in place and forms a component part of the felloe band itself. The machine shown herewith is a simple toggle punch, the same machine being used for depressing where necessary and for punching the rectangular rim bolt holes. There is also a driving lug hole, valve stem hole and side valve stem hole, all of which are pierced in the disk before it is ready for assembly. The drawing for the hub, which is known as the center draw, and the piercing of the hub bolt holes, are done in one operation.

Compared with the disk, the hub flange operation is simple. The hub flange is formed and pierced in one operation. The operations on the clamping rings, how-

ever, are a little more complex. This ring is also made from sheet steel stock which is first pickled, then sheared into strips and formed into hoop shapes. The hoop-shaped blanks are passed to a No. 78½ Bliss press, having a capacity of 453 tons. This performs the first forming operation on the steel hoop. A second forming operation is performed in the same press, which is illustrated in Fig. 5.

The various phases of the clamping ring are shown in Fig. 6. In the background of this illustration are the steel sheets which are the raw material for the work. The hoop to the left is the result of the first rolling operation after the sheets have been cut in strips. In the center is the ring as it appears when flanged over in the first stamping operation and to the right is the finished clamping ring which has been formed, then bored, pierced and washed to make it ready for assembly.

The ring does not leave the second drawing operation in exactly its final form, as there is a truing operation on a 10-in. Collier-Smith beader illustrated in Fig. 7 which brings the clamping ring to its exact final form and



brings the ends together so as to provide the correct roundness.

The spacing piece which is used between the inner and outer hub flange plate is an aluminum casting which is drilled in a Natco six-spindle drill which also drills the corresponding holes in the hub flange. Beside the drilling operation on this spacer piece, the only machining operations which it requires are boring and facing of both sides.

The assembly of the wheel is carried on progressively. At the present time there are seven men in the assembly line, each with his own operation to perform. The capacity of this seven-man line is not as yet known, as a complete production schedule is only in process of formation. The operations in the assembly are simple and consist of first mounting the spacer inside hub and outside hub on the disk by means of a drift pin and one bolt. Two men take care of this primary assembly passing the wheels to the third man, who inserts the other bolt in the flange. The fourth man has an air-driven socket wrench which tightens

the nuts up to a certain tension, after which they are hand tightened for final tension.

The wheel is then passed to an inspector, who mounts it upon centers and checks the wheel with the indicating point of an amplifier gage resting against the disk. This test is made for roundness of the wheels and must check within .055 in. The variations as the wheels come through the inspection gage, however, do not show, as a rule, above .025 in. After this inspection, the wheels are passed back to the bench where the bolt ends are clipped off on a shearing machine and then, by means of a pneumatic hammer with the same operator, the ends of the bolts are peened over. The wheels are now ready for the priming coat of paint, which is given them in a spray booth immediately adjacent to the assembly line. In fact, the last man on the assembly line who handles the air hammer lifts the wheel from the assembly bench and places it upon the spindle in the spraying booth. A portion of the assembly line showing the inspection is illustrated in Fig. 8.

## Some Newly Developed Electrical Equipment

**M**ENTION has already been made in the news columns of the fact that the Robert Bosch Magneto Co., Inc., will put on the market a line of ignition and other electrical and automotive devices.

Various improvements in design and construction have been made in Robert Bosch magnetos in recent years, mainly with a view of extending the range of operating ability and to make the machines absolutely dustproof and waterproof. The higher range of operating speeds is required by modern engines of the multiple-cylinder type which can be run in some instances at speeds beyond 3000 r.p.m., while others can be throttled down to exceedingly low speeds. On the new models there are absolutely no live parts exposed. The low-tension cable, instead of being connected to a binding post mounted on the interrupter cover, is led into the interrupter housing through a substantially horizontal hole in the molded cover, and the high-tension cables are also connected in such a way that all live parts are fully protected.

The magnetos are made for four-, six- and eight-cylinder engines, in the standard size and also in a larger size for extra large engines. A novelty is a miniature magneto designed for use on cycle motors and motors for scooters. This machine weighs complete only 2¼ lb. Being designed for use on single-cylinder engines, there is only one cable connection—the high-tension connection to the spark plug. No low-tension connection for a switch is provided, as the operation of the magneto is stopped by shifting the interrupter lever to a point beyond the working range.

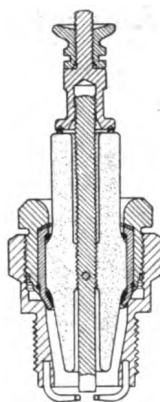
Another new product is a combined magneto and generator specially designed for use on motorcycles. This is probably the most compact combination of this type that has ever been developed, a new principle being made use of in the construction of the magnetic field. The generator is of the standard cylindrical four-pole type and its field frame is made part of the magnetic circuit of the magneto. There are two flat magnets which form the magnet poles, while the cylindrical field frame forms the central part of the magneto field structure. Thus the magneto armature lies close to the generator field ring, and the whole structure is exceedingly compact. At the same time the problem of magnetically insulating the magneto field from the generator has

been eliminated. The generator of the combination has an output of 30 watts and is wound for 6 volts. Its voltage control is such that it can be used without a battery floating on the line.

An impulse starter which requires only a small turning moment to operate and cuts out at a low speed has also been developed.

A spotlight of neat and substantial construction is also being shown by the company. This comes with an integral switch and a universal bracket so that it can be aimed in any direction. Another new product is a double diaphragm vibrator horn. Of the two diaphragms of this device one has a relatively low and the other a high rate of vibration, which combination is claimed to insure both wide carrying range and absence of undue harshness. The horn is much more powerful than the average vibrator horn, and it is said to draw much less heavily on the battery than motor horns, for the reason that inertia effects are reduced to a minimum.

A new spark plug of the spearable type has recently been developed by the Robert Bosch Co. As will be seen from sectional view herewith, the insulator is held in the gland nut, which has its lower flange spun inward. Copper gaskets are provided on the shoulders of the insulator. When the plug is taken apart the gland nut, insulator and central terminal come out together. The insulator is not then absolutely rigid in the gland, but it cannot come out. A gas-tight joint is assured by the lower edge of the gland nut pressing against a conical surface of the outer shell. This is a ground joint and is claimed to be absolutely gas-tight. The central terminal screws into the insulator and consists of a steel outer end and a non-oxidizing inner end. In this new plug there are two electrodes in the outer shell, instead of three, as in the one-piece plug, these electrodes having arc-shaped ends. The plug is deeply recessed and therefore should not readily foul, but should a conducting layer of carbon form on the inner, exposed end of the insulator, the plug can easily be taken apart and cleaned in the usual manner.





# Most Factories Give Trucks Test Before Marketing

Manufacturers replying to questionnaire of AUTOMOTIVE INDUSTRIES agree almost unanimously that dealers should not be required to sell trucks unless the cars have proven their efficiency. Methods applied vary to some extent but in most cases a road test under capacity load is used.

A GENERAL opinion seems to exist among manufacturers of motor trucks that their product should be given a thorough test before it is shipped to a dealer. Results of a survey made recently by AUTOMOTIVE INDUSTRIES showed that most manufacturers hold that not only the public, but the salesman handling an article, is entitled to be assured that it can meet the tests claimed for it in sales talk and advertising literature. Just to what extent these tests should be carried out was a question on which some manufacturers disagreed, although approximately 80 per cent of the factory heads who replied were of the opinion that runs of about 50 miles with a capacity load should be made before a truck is allowed to be sold.

The following questions were embodied in the questionnaire sent to the manufacturers:

- Do you test trucks?
- Should they be tested?
- Do you test under load?
- Each part?

Is the expense of testing charged against the sales or manufacturing department?

A tabulation of the replies to the questionnaire shows the following figures:

- Do you test trucks? Yes, 41; no, 2; blank, 4.
- Under load? Yes, 40; no, 2; blank, 6.
- Each part? Yes, 5; no, 0; blank, 42.
- Expense charged to manufacturing? Yes, 12; no, 0; blank, 35.

From these figures it will be seen that of 47 replies received to this set of questions there were but two manufacturers who said their firms did not conduct tests before allowing trucks to leave the factory. It was interesting to note that the chief engineer of one of these concerns recommended that tests be conducted under load in order to bring out minor defects that might be overlooked in construction and which could easily be remedied if discovered in time. A typical opinion is expressed in the following quotation from one of the replies:

"Concerns which have a due respect for their output will not fail to make satisfactory weight tests before the trucks are turned over to the sales department. Just how a truck can be considered adequately tested before these load tests we do not see."

## Small Defects Important

Many defects can be brought out in a road test of from 50 to 100 miles. While these defects might not seriously hinder the efficiency of the product, they are apt to create an unfavorable impression with the purchaser. As one engineer expressed it, "Even a squeak or a rattle would undoubtedly cast an adverse reflection on a new vehicle." On the other hand, a defect such as would

probably not be noticed by the man who buys a truck might exist. To all outward appearances the machine might be in perfect condition, yet a skilled mechanic who drives it for 50 miles could easily discern that trouble and adjust it satisfactorily at small expense and perhaps save the purchaser considerable time, money and wrath by so doing.

There were seven manufacturers who did not specifically state that their trucks are tested under a load. One replied that a capacity load was not used in all cases. The chief engineer of this concern, however, declared enough of a load was used to discover any lack of power, imperfect springs or defects in transmitting mechanism. One concern tests its trucks with a load 50 per cent greater in weight than the rated capacity.

## Separate Part Tests

Testing each part separately apparently is not a general practice among manufacturers, as but five specifically stated that this operation was carried out. The others, however, did not say definitely that each part was not tested, and the conclusion might be drawn that, while such concerns do not deem it necessary to give all individual parts a separate test, the more important ones are pretty thoroughly examined before they are allowed to become a part of the whole. One company analyzes all raw materials it receives, and, as the parts are manufactured, they are carefully inspected and tested and, when assembled, the truck is given a thorough road test. An official of this company expressed the opinion that "any company which does less is not building their product with as much care as they should."

Another concern that does not test trucks under a load declared this was omitted because of the thorough tests each part is given before it is put into the machine.

The expense of testing trucks generally seems to be borne by the manufacturing department, rather than the sales organization. While there were but twelve specific answers to this last question, all of these said the cost was included as a part of the expense of production. The other companies indicated that the tests were made at the factory and did not indicate that the sales department had any connection with them.

The opinion prevails that it is the duty of the department producing an article to turn it over to the company's salesman or dealer in such condition that there can be no question as to its efficiency. "We do not expect our dealers or Sales Department to have any expense incurred by them," wrote the president of one concern, "but consider it the duty of the Manufacturing Department to deliver the trucks in perfect condition."

One factory has put into effect a system whereby the expense of testing their trucks, under full weight, is

borne by the factory, but should any defects arise within a week or so after it is sold, the expense of correcting these defects should fall within the budget of the dealer.

"We believe," this official wrote, "that the first 200 miles of the truck's life is the most crucial period, inasmuch as there is a greater tendency for things to become worn in and to become loose when the truck is new and seeing its first service. After the truck has run this distance, however, and is again readjusted and everything is made tight, it is ready to go to work.

"We urge upon our dealers that whenever they sell a truck, a certain amount of profit be set aside for this checking up, which should be made after the truck has been driven a week or two. We feel that this expense should be borne by the dealer who sells the truck and should be considered as a part of his selling expense."

Another point mentioned in favor of the manufacturer conducting the tests was the inability of the Sales

Department to properly and economically test a truck.

"So many different troubles arise, due to the inability or inexperience of the sales organization to test the truck, that it does not seem advisable for any sales organization to put any truck to a test unless taken up directly with the Engineering Department of this company."

On the whole, there seems to be little variance in the methods and kinds of tests performed before finished trucks reach the public. Of course, different factories have different systems. It is doubtful, however, if a uniform system of testing could be established, if, indeed, there was any demand for such a system. The product of each factory has individual characteristics, all of which are not contained in trucks made by other companies. Tests that would apply to one truck might not apply to another, and the engineers of various factories have certain ideas in mind when they specify certain tests to be applied.

## Argentine Show Stimulation to Trade

THE enthusiasm with which the automobile, as a universal means of transportation has been received by the Argentine Republic during the past ten years is tersely indicated when a comparison is had in the number of automobiles in daily use at the present time, 75,000, with the number of vehicles employed in 1911, approximately 10,000.

Perhaps there is no country in all Latin-America where the use of the automobile as a real necessity in everyday life has been so generally adopted as in Argentina. Immense areas covered by the farms and ranches out of reach of the railways cause the automobile to be a practical necessity for rapid communication between distant points not served by rail facilities.

The universal demand for automobiles has met with a ready response on the part of Buenos Aires importers, who, for generations past have been accustomed to anticipate the demands of the country and seek to supply the same from foreign sources. So decidedly is this the case that at the present time there are approximately 150 automobile importers established in the city of Buenos Aires alone.

Some four years ago the Touring Club Argentine undertook the inauguration of an annual automobile show, which met with most marked success. This initiative has subsequently been followed up during the months of October and November of each year. The expositions are held in the "Pabellón de las Rosas" situated on Avenida Alvear, near the Palermo Park, the city's most fashionable thoroughfare. The shows have at all times met with the decided support of all automobile, truck and tractor importers and the daily attendance at the show has been made up not only by residents in Buenos Aires, but also by crowds of visitors from all interior points.

It has been impossible to obtain statistics regarding the number of sales effected at these shows. However many sales are closed by the throngs of salesmen attending the various exhibits and without doubt many prospective purchasers, while not placing an order during the exhibition, are nevertheless strongly influenced toward this end by the opportunity of comparing under one roof the merits of the many cars exhibited. From the importer's point of view these shows are also very productive in securing new agency connections for distributing centers, since practically all automobile dealers in Argentina make efforts to visit the exposition. Naturally it is well to bear in mind that the foregoing statements have to do with those expositions held during the past four years

when the general business situation in Argentina was exceptionally good and it is therefore difficult to express an opinion as regards the merchandising possibilities of the forthcoming show to be held next November.

Plans for the next Annual Show during the latter half of November are now being rapidly whipped into shape and even though this show may not be held on a scale commensurate with former expositions, there is no doubt but that the larger and more responsible importers of automobiles, trucks and tractors will place on exhibit their products as in previous years. The possibility exists, of course, that a number of the smaller importers will not take part in the exposition due to their desire for exercising the strictest possible economy in their efforts to tide over the present period of hard times. Moreover, those automobile men who are close observers of the buying psychology of the Argentine people are inclined to be exceedingly pessimistic, knowing as they do the tendency of Argentines to over-spend in times of prosperity and to under-spend when the slightest signs of business depression appear on the horizon.

However this may be, the value of the show in stimulating trade is as well recognized by Argentine dealers in automotive products as it is by their confreres in the United States, and it will be taken advantage of by all of those live manufacturers and dealers who realize the potential possibilities of this market, and, are willing, even at the cost of considerable outlay in time and money, to cultivate this field in the hopes of obtaining a firm foothold here against the time when business has again become brisk.

**A** CAST-IRON research association has been organized in Great Britain and it is hoped that by intensive research the iron foundries may regain some of the trade they have lost in recent years to the drop forging, steel pressing and die casting industries.

In no other country in the world, it is said, has the cast iron industry been more encroached upon in this way than in Great Britain. The malleable cast iron section has suffered particularly. Of the 3000 foundries in the country, 170 produce malleable cast iron. Whereas Great Britain was at one time the largest producer in the world of malleable cast iron, its output to-day is only 66,000 tons per annum, as compared with 1,500,000 tons in America. The average output in Great Britain is but 8 tons per week per foundry, whereas in America it is 100 tons on the same basis.

# America's Power Resources

The power resources of this country are the very basis of our national and industrial greatness, hence a knowledge regarding them should be possessed by every citizen, and especially by manufacturers and engineers. Waste in their recovery and uses aggregates billions of dollars annually, a fact which makes it vastly important to study the subject.

**P**ROBABLY no natural resource is of such great importance to this country as that of power derivable from coal, oil, gas and water, yet the public, including manufacturers, engineers and others whose business it is to utilize these resources is, on the whole, poorly informed if not totally ignorant regarding the status of these resources and their relation to our economic system.

To illustrate this fact, it may be well to point out that if this country were in the midst of great business and industrial activity, it would be facing this winter a severe coal shortage such as that which caused the closing of many plants in the winter of 1917-18. Yet there are few who appreciated the reason for that condition or are aware that it seems certain to recur; much less have steps been taken to prevent its recurrence. Shortage of rail transportation is by no means the only factor in the situation. It is inherent in our outworn system of energy distribution.

This and many other facts of equal or greater significance are set forth in the book by Chester C. Gilbert and Joseph E. Pogue entitled "America's Power Resources."

This volume should, we feel, be studied by every manufacturer and engineer, not as a matter of academic interest but because without the knowledge and perspective given by a study of this kind, it is impossible to grasp the full meaning of the present fuel and power situation, and without such understanding the necessary concerted action among fuel producers, distributors and users which alone can solve the situation, cannot be brought about. The defects of the situation, now temporarily mitigated by the current industrial depression, will if allowed to continue bring about in time an intolerable condition, with serious consequences to the entire industrial fabric of the country.

While the book deals with a more or less technical subject, it is by no means technical in character. While it is written for the layman, it will prove equally interesting to the engineer, and for a book of its kind is unusually readable.

In this review we quote extensively from important portions of the text, supplying only such connecting passages as seem necessary. It need hardly be said that one must read the book in order to secure a complete and thorough understanding of the subject.

The introductory chapter deals with human labor and mechanical work and shows how the development of social consciousness and rising wages have made necessary the increased use of and efficiency in mechanical means for multiplying production. Chapter II, on the foundations of industrialism, shows that

Modern civilization is dependent upon the accomplishment of more work than human labor is capable of performing. This multiplication of human effort is brought about through the utilization of the energy stored up in natural resources—coal, oil, gas and water-power.

The United States possesses the most extensive energy resources of any nation in the world, producing annually three-quarters of a billion tons of coal, one-half billion barrels of petroleum, 700 billion cu. ft. of natural gas, and ten million horsepower of hydro-electricity. We supply nearly one-half the world's coal and over two-thirds of its oil.

It would require the labor of three billion hard-working slaves to accomplish the work done annually in the United States by our energy resources. The use of energy materials gives to each man, woman and child in this country the equivalent of thirty servants. Our type of civilization arises from this organized use of animated energy.

But our energy resources themselves and the means for handling the materials from which they are realized have been left to a haphazard development without plan or order. Furthermore, in bringing into use the materials from which power is developed we have sacrificed a high percentage of these valuable materials. For example:

For every ton of coal produced, our methods of mining have placed a second ton beyond recovery; for every thousand feet of natural gas turned out, a similar quantity has escaped; and for every barrel of petroleum that has seen useful service, several barrels have been wasted. These losses are inherent in the excessively competitive methods of production followed in this country and have caused no great concern, as it has been generally felt that the unmined supplies of the materials were so vast that distant generations alone would feel the loss. Recent inventories of the unused portions of these resources, however, go to show that such is not the case—that our best and most convenient coals will be depleted in a few decades, that approximately half of our petroleum is already used up, and over half of our natural gas is gone.

In addition the mere bulk of energy materials that must be handled has become so great that a critical problem in transportation is created. Coal alone constitutes more than one-third of the freight hauled by our railroads.

Industrialism has outgrown our present inefficient manner of handling the energy contained in coal and rapid changes are due to come as the system is found increasingly incompetent to sustain the forward march of industrial growth.

Beyond this our current utilization of energy materials is for the most part inefficient in the extreme, and the four sources of energy supply have been exploited as competitors, the cheapest and most convenient one being drawn upon.

Thus the limited reserve of oil is being used in place of coal and waterpower; coal is doing its own duty and that of waterpower as well; natural gas, the ideal fuel for homes, is in large part devoted to the crudest of industrial applications; waterpower is largely neglected. For the sake of expediency, our most precious assets are being squandered at an unbelievable rate. The very abundance of supplies has made it unnecessary to take thought or care in their behalf.

We now face a transportation system incapable of accommodating industrial expansion and the requisite growth in coal production at the same time; an oil production which has reached its maximum; a natural-gas output that is on the decline; a water-power development that is stagnant. Yet the demand for an increased energy supply is not to be gainsaid. There can be but one way out—a change in the development of the resources which will give a higher percentage of energy service from the materials brought into use.

The issue has a twofold aspect. Under present methods of dissociated, bulk production, we can neither secure an adequate supply of energy to meet the needs of the immediate future nor hold the price of energy down to levels at which it can be used to fulfill its proper functions. Without an abundant supply of energy we cannot have industrial progress; without a cheap supply social progress cannot be maintained.

The time is rapidly arriving when organized society will take stock in a scientific manner of the drift of affairs and by means of the forces at its command direct its destinies to a favorable consummation. The energy resources lie so concretely at the bottom of human welfare that their cultivation cannot wisely be neglected.

In the third chapter the authors deal with coal which they term the basis of national welfare. It is shown that

Coal is more than accumulated energy; it is a storehouse of valuable chemical products as well, awaiting merely proper treatment to yield valuable commodities with no sacrifice of its energy content. A striking commentary on the undeveloped status of coal is the fact that nearly all of the coal consumed in the world is burned in the raw state, with utter disregard of the products of potential value thereby destroyed. Smoke is the ever-present evidence of this loss.

The nature of coal is outlined and the three principal kinds are defined, while a few paragraphs are devoted to its origin and geological formation. Coal formations underlie nearly a half million square miles of the United States and are widely distributed throughout the country, though the bulk of it comes from comparatively few regions. The character and relative importance of various fields is pointed out. Our coal resources are so vast that less than half of one per cent has been used to date, but estimates as to how long our coal supply will last are beside the point, as the coal mined today is the best in the country. Before long, perhaps within fifty years, much of our high-rank coal will be exhausted.

The practical question, then, is not how long in an absolute sense our coal will last, but when shall we have to make changes in our industrial structure because the conveniently located and high-grade coals, upon which concentrations of industry and specialized uses are dependent, are beginning to run short? That time is closer at hand than is generally realized and is a consideration which demands the fullest utilization of the remaining supplies.

Considerable space is devoted to the important matter of coal mining.

While the early mining of anthracite was very wasteful, marked improvement in engineering practice has taken place with the development of the industry. The mining of anthracite as to efficiency is now in sharp contrast to the conditions under which most of the bituminous coal is still produced.

It is shown that there is great difference between the methods followed in mining anthracite and bituminous coal.

A striking feature of bituminous mining is the lack of developed methods of storage, because of the tendency of the product to crumble and even take fire, which requires a steady flow of coal-cars past the mine mouth so long as the mine is operating. A shortage of coal-cars, in consequence, means a stoppage of coal-mining.

The production of coal in the United States is so wasteful, not only of coal itself, but of labor and capital as well, as to raise the question whether the status of coal-mining is adapted to the conditions under which coal occurs and the needs which coal must meet.

The country's most basic resource is produced through the medium of a thousand disintegrated units, working without concert and under conditions of destructive competition.

Bituminous coal-mining as an industry is beset by conditions which are the occasion of present wastefulness and the justification of apprehension for the future. Scattered and unorganized, most of the individual companies are small and financially weak; inadequate co-operation in engineering practice exists; new technical developments are slow of growth; coal is mined for the most part by obsolescent, long-established methods.

With no means of storage developed, the average mine can produce coal only when railway cars stand ready to receive it; a fluctuating demand, accentuated by seasonal variations, leads to

instability of operations; many mines must close down in slack months, with destructive effect upon the conditions and supply of labor. The supply of labor also is not equal to the capacity of the developed mines; hence a labor shortage always develops in periods of prosperity, when the demand for coal suddenly increases. For years until recently the price of coal at the mine ranged from \$1 to \$1.15 a ton, a figure so low that only the best and most easily obtainable coal could be extracted by the cheapest methods of mining, irrespective of the waste involved; the tonnage of thin-seam and high-cost areas sacrificed in the process amounts to more than half the total coal produced to date. Many districts have been burdened with a leasing system that obligated the company to remove a given tonnage each year, irrespective of market demand or price, with the result that the richest portions were drawn from seam after seam with irretrievable loss to present needs. The fixing of wages on the basis of thick and easily worked seams has imposed severe penalties upon inferior conditions, precluding the introduction of new and improved methods. Added to this, the policy of the Government, as exemplified in its anti-trust laws, has forbidden combinations and restrained co-oper-

### Do You Know

**T**HAT our power resources stand at the very basis of our economic and industrial system?

That many economic difficulties are directly traceable to failure to understand the importance of these resources and to use them intelligently and economically?

That one-third of the country's freight is coal?

That unless conditions are changed, we are certain to experience in times of great industrial activity a coal shortage similar to that which occurred in the winter of 1917-18?

That industrialism has outgrown our present inefficient methods of handling energy contained in coal?

That our petroleum resources are already one-half exhausted and the remainder being consumed with reckless waste?

That three-quarters of the gas produced in this country is natural gas, nearly half of which is wasted with an annual loss of nearly a quarter billion of dollars?

### If Not

and if you would understand the meaning and importance of these and many related facts regarding our fuel resources and their bearing upon our modern civilization,

### You Should Read

the accompanying article and the book upon which it is based.

ation, with the result that large-scale, standardized operations, a paramount and distinctive American achievement, are virtually lacking in the mining of coal.

The trouble with coal-mining is too much competition, resulting in a lack of balance between production, transportation, and distribution. Coal-bearing land is so abundant in the United States that an excessive number of mines have been developed. The productive capacity of the coal industry, in consequence, is far in excess of the requirements of the country. In addition, the demand for coal varies so from summer to winter that for the past thirty years the average working year has been only 215 days in length, leaving 93 possible working days when the mines were idle.

The coal industry is unstable, speculative, and unreliable alike to producer and consumer. The crying need is for stabilization. With proper operation, an excess mine capacity of some 150,000,000 to 200,000,000 tons and an excess labor force of some 150,000 men could be eliminated.

These conditions are particularly undesirable because they concern a product of fundamental importance. In efficiency of production, the coal industry is not to be compared with the other great basic industries, such as the iron industry or the copper industry. The difference is to be attributed to the competitive system of small-unit mining, which has prevailed in this country and indeed been perpetuated against a natural tendency otherwise, by a public policy hostile to combination.

The foregoing facts must be borne in mind in order to understand the need for so reorganizing our coal industry as a public utility rather than along the lines of unrestricted competition. The present system encourages great waste, for competition makes it profitable to mine only the richer portions of deposits, leaving much valuable coal unworked. The advantages of co-operative mining are realized in other countries and should be brought about here.

The great difficulties in the way of adequate distribution of coal by rail will, it is thought, result in the establishment of great power stations in the coal fields and the transmission of the electrical energy there generated to industrial districts where the power is consumed. Congress has authorized a "Superpower Survey" with a view to developing a unified system of electric transmission lines in the eastern industrial zone. This involves the recovery of commodity values in the coal as by-products, a phase of the coal industry which holds great possibilities but which is in its infancy in this country.

Present utilization of coal, therefore, involves a very low recovery of the energy content and an almost total loss of the commodity values present. This, of course, necessitates the production, transportation, and distribution of a much larger quantity than would otherwise be required; concentrates the whole cost, in respect to the consumer, upon the modicum of energy extracted; requires the imports of materials which might be manufactured from the non-energy components; holds back the development of latent possibilities in coal products; besmears with dirt and smoke an untold wealth in civic improvements.

Heretofore the need for a coal by-products industry was not generally appreciated, inasmuch as there was plenty of fuel; transportation difficulties had not loomed up; coal products could be purchased from Germany; nitrate could be imported from Chile; and, in general, the whole matter of coal was taken for granted.

The need for progress in this direction is very great, as will be seen from the following:

Our present annual coal output could be made to more than double its service, or—accepting the current service requirement as a standard—that less than half the output can do the present work and in addition make heavy contributions to the supply of fertilizers, motor fuel, and chemical products. The total loss, on the basis of this estimate, runs well above a billion dollars a year, or over ten dollars for each inhabitant of the United States. Of such measure is the average man's pecuniary interest in the full utilization of coal.

The industrial progress of this country has been sustained by the mining of an ever increasing quantity of coal, until the very bulk of the total has become a critical weakness in this country's industrial life.

As Herbert Hoover has remarked, the coal industry is "the worst functioning industry in the country." For adequate social and industrial advance, this industry should stand at the head of our basic industries, not at the foot.

### Oil, the Accelerator of Progress

Petroleum, the sole source of gasoline, is of immense importance to the automotive industry, hence peculiar interest attaches to Chapter IV dealing with this subject. The magnitude of this energy resource has made possible practically all automotive development.

But since petroleum deposits of the United States have been drawn upon with extraordinary rapidity and the supplies have already suffered serious depletion, the matter of their approaching exhaustion assumes the light of immediate importance. The comforting assertion that such considerations may be safely left to future generations does not apply to petroleum.

The nature, characteristics, geological occurrence and location of fields is concisely covered, and particulars showing the degree of exhaustion of various fields are given. See Fig. 1. The petroleum industry is, it appears, far better organized than the coal industry, but is not co-ordinated throughout.

Considerable space is given to various methods used in the recovery of petroleum from the earth, and particular stress is laid upon the waste brought about by the competitive system of well drilling which puts a premium upon the use of wasteful methods. From 30 to 90 per cent of the oil is left underground, and it is probable that on the average less than 25 per cent of the oil underground reaches the pipe-lines. Some of this waste is unavoidable or inherent in present methods of recovery, but a modernization of laws governing petroleum mining, which now, in effect, are quite largely responsible for the situation, would alleviate at least one great evil.

The system of pipe-lines used to transport petroleum to refineries near the centers of population, the refineries themselves, their methods and system of distribution, are interestingly described. A brief historical outline of the application of petroleum products to commercial and other uses leads to the conclusion that

The prospective demand for motor fuel is so great that it is probable that eventually all the petroleum products now burned as ordinary fuel will be used in internal-combustion engines.

### Concerning Natural Gas

The fifth chapter deals with the important subject of natural gas, its occurrence, characteristics, value, distribution and use. Many automotive manufacturers have made large use of this resource, but the failing supply has already forced the substitution of artificial gas, and is likely to do so in increasing measure in the future. Some industries have been forced to migrate on this account.

The waste which occurs in the exploitation of natural gas reserves and in the use of this valuable fuel is scarcely believable:

The history of the natural-gas industry of the United States "is an appalling record of incredible waste." The annual reports of the Conservation Committee of the Natural Gas Association of America "are stinging indictments of a criminal system, fostered by both the gas companies and the public, that has resulted in wasting more gas than has ever been utilized." Samuel S. Wyer of the Fuel Administration estimated in 1918 that the annual wastage of natural gas in the United States was equal to the current consumption—that is, 800,000,000,000 cubic feet. At 30 cents a thousand cubic feet this an-



nual loss would be appraised at \$240,000,000. The contemplation of such figures is staggering to the imagination.

The waste of natural gas does not concern future generations; these losses are being paid for to-day. In no direction is conservation more critically needed, nor more promising of such immediate returns, as in the realm of natural gas. In a few short months in 1918, the Bureau of Oil Conservation of the Fuel Administration effected economies which resulted in the saving of millions of dollars' worth of this valuable fuel, but with the coming of peace this valuable work, undertaken as a war measure, was terminated.

The cause of this waste and means for checking it are detailed, but cannot be outlined in this review.

### Water Power, an Unused Annuity

Chapter VI, bearing the above title, makes it clear that

Despite the fact that electricity has been in common and growing use in this country for many years, it has effected virtually no change in the basic conventions of coal distribution, and has led to the development of a small fraction merely of the available water-power.

The water-power of the United States, converted to electrical energy, is capable of turning every industrial wheel and illuminating every street and building in the entire country. And, the resource is country-wide in distribution.

The present production of hydroelectricity in the United States represents roughly the equivalent of 55,000,000 tons of coal, whereas nearly 400,000,000 tons of coal go into the production of steam-power and carboelectric power.

Of course, the whole default may be attributed to the Government's lack of action, but the result of ill-advised legislation, while significant, has been exaggerated.

It must not be forgotten that coal and oil have been so bountiful in this country that only the cream of the deposits has been exploited; a project contemplating the development of a water-power site faces competition with such a situation. Our fuels have been mined on such an extravagantly uneconomical basis of opportunism that a superabundance of coal and oil has been maintained on the market.

Fuel resources are fixed in quantity and are in the nature of capital which does not draw interest; waterpower, on the other hand, may be compared to an annuity, the annual increments of which lapse if not currently used. Hence, as a concession to convenience and in the flush of resource wealth, this country has run into the economic impropriety of drawing upon its energy capital while neglectful of its energy annuity.

Commonly as much as a fourth of the coal-fired power employed in centers of population has its energy applied in the form of electricity. Yet, with the rarest exceptions, this energy is transported to the centers of use in the form of coal and there the electricity is generated in steam-power plants. Electric-power usage has merely been appended to the established structure of steam-power practice, with the result that the employment of power has been greatly facilitated, to the further aggravation of the broad problem of transportation. So far the very force that has the capacity to correct the transportation evil has merely served to accentuate it. By virtue of electricity more power is consumed, more raw materials are required, more goods are produced, more coal is freighted.

Particulars concerning the various influences which hold back the development of water power make interesting reading, but space limitations prevent their inclusion here.

Chapter VII is devoted to a consideration of smokeless

fuel, the supply of anthracite and bituminous coal, coke, gas, etc., and the relation which they bear to industry and the need for heat in the home.

About two-thirds of the coal consumed in the United States goes into the production of power which is divided almost equally between the industries and the transportation systems; about one-sixth is used as a raw material for making substances employed industrially, such as metallurgical coke, upon which the iron industry depends, and gas, nitrogen compounds, benzol, tar, and coal-tar products. One-sixth approximately is employed for heating homes and other buildings. It will be observed, then, that the combined industrial requirements outweigh the needs of the home five to one.

It is shown in Chapters VIII and IX that our whole industrial system is dependent upon an adequate supply of power, and that

Transportation is the throat of industry, through which all of its materials enter and emerge. Upon the size and flexibility of this opening depends the rate at which industry can grow. From a broad point of view it would appear that the transportation problem cannot be adequately solved without due attention to the matter of power. Effectiveness of transportation involves three factors:

1. The employment of the equipment best suited to the task.
2. The advance elimination of superfluous weight.
3. The full utilization of the material transported.

The energy in coal is not concentrated before shipment, but is hauled in its substantial, bulky form; while the coal at its destination is not used so as to yield anywhere near its full service.

Energy is virtually the only natural resource product susceptible of concentration that is shipped broadcast in the crude condition. The dictates of demand, it is true, still call for a large proportion of the supply in the crude state, and

to this extent concentration in advance is obviously impracticable. But the order of requirement is changing rapidly, and even now over one-fourth of the call is for the concentrated product—electricity.

Not only are the railroads the chief haulers of energy in bulky form, but they likewise constitute the chief single consumer of this material energy which burdens their lines. The railways burn approximately a fourth of all the coal produced in this country, this item alone representing at least a tenth of their total operating expense.

It is commonly recognized that one of the weakest features in the industrial development of the United States is the over-accentuated responsibility falling upon the railways; any measure tending to lighten this weight obviously strikes at the roots of a fundamental and important issue. A plan for adequate inland transportation in this country is conceived to embrace: (a) airplane service for special mail and for passengers restricted in time; (b) motor-truck service for short-haul freight and in farming districts in co-ordination with parcel-post deliveries; (c) railway service for normal freight and passenger accommodations; (d) trunk-line, deep waterway haulage for slow-moving and bulky freight; and (e) transmission lines for the delivery of electrical energy from the coal-fields and water-power sites, in co-ordination with pipe-lines for the transmission of energy in gaseous form.

The coal applied to the production of power amounts to nearly half a billion tons, and is hauled chiefly by the railways to its multitudinous points of use, although in many instances as much as a quarter of the supply is there turned into electric power. This method of handling coal imposes a tremendous burden upon the railways, leading to congestion and shortages

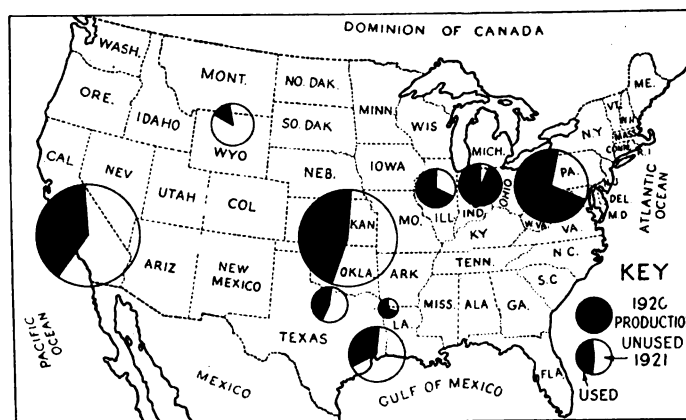


Fig. 1—The eclipse of petroleum. Map shows degree of exhaustion of principal oil fields in the United States

in periods of business prosperity when the demand for coal enlarges and the quantity of other materials demanding transportation at the same time increases. The use of fuel oil and crude petroleum for purposes of steam raising and the like, which is considerable and represents over half of the total consumption of petroleum and its products in point of bulk, sustains a gross overproduction of petroleum, and in consequence contributes markedly to a premature exhaustion of that resource, with initial effects already in sight.

### Fuel Demands of Automotive Transportation

The construction program of the automotive industry affords no prospect of let-up in the pressure of fuel requirements. On the contrary, the injection into the situation of a notable capacity for truck production introduces an element that bids fair to overshadow even the tremendous automobile demand, while the item of tractor manufacture looms ahead with a fuel significance scarcely second in importance. And the production of aircraft, with their high fuel consumption, is scarcely under way. If the drift of these matters be projected into the future unabated, it is evident that the supply of motor fuel will have to be doubled every few years. The automotive industry is young and vigorous, and its continued expansion will place an unexampled burden upon the motor fuel resources of the country.

Those who count upon the discovery of new oil deposits materially to affect the basic situation overlook the fact that already for ten years new discoveries have been failing to do so, notwithstanding the sensational aspects of new developments when viewed separately.

Compared with the large and rapidly increasing annual draft upon the petroleum reserve, the supply seems startlingly inadequate to sustain for any satisfactory period of time the motor-fuel situation as it now stands. Moreover, it is well known, because of greater drilling necessary, that petroleum may be mined only at increasing cost and with increasing difficulty as the resource is depleted. It is already a common belief among petroleum engineers, that the oil output of the United States has reached its maximum, and the end of the present era of flush production in Mexico is in sight.

A big fraction of the domestic petroleum is gone; whether that fraction is one-half, as present knowledge indicates, or is one-third or even one-fourth, makes no difference in the consideration demanded by the situation. The fact remains that the size of the fraction has meaning to people using petroleum to-day and therefore represents an economic factor that must be reckoned with now.

It is, of course, very evident that the present tendency cannot persist to the point of even approximate exhaustion, because conditions, naturally arising, such as price increase, growing imports, and others, will serve to relieve the tension and thus spread the remaining supply over a greater number of years. But of practical importance is the period of economic stress that is ushered in when the resource faces a greater demand than it can fill in the customary manner. That is a period of readjustments to meet the new conditions, and arrives far in advance of physical exhaustion.

In short, as the situation is shaping up, the demand for gasoline is increasing more rapidly than resources and means are being developed to provide this product. Accordingly, a gasoline shortage, accompanied by a rise in price, is a prospect to be anticipated, if no means for relief are brought into action. A marked rise in the price of motor fuel, if not compensated, will retard the development of the automotive industry and hold back the whole field of activities dependent upon its unbroken advancement.

It will soon be necessary to bring coal and hydroelectric power to the aid of a growing number of those activities now dependent upon oil fuel. Benzol and alcohol hold better promise as blending agents in connection with petroleum products than they do as single fuels; but the utmost that may be expected from them in the calculable future is that they will augment by a small percentage the total supply of motor fuel.

Significant additions to the motor-fuel supply from oil-shales are still a number of years distant, and the whole matter cuts little figure in the immediate problem, however large ultimate contributions may turn out to be; although such volatile shale oil distillates as may come on the market may be expected to

find their way into the motor-fuel supply in the form of composite fuels, in much the same fashion as benzol and alcohol.

The automotive industry, theoretically, can stop the change now taking place in fuel by holding fast to the present engine in detail, but this procedure will so limit the supply and increase the price of fuel that in practice the engine will have to give way. It is concluded, therefore, that an era is arriving when the engine will have to make rather radical concessions to fuel, as a relief to a strained situation; and the problem before the automotive industry is, first, to recognize this situation, and, secondly, to establish means for making these concessions with the maximum easement to the supply and price of fuel. Anything short of this will mean just so much of a detriment to the growth of automotive transportation.

The paramount problem, therefore, is to insure, so far as possible, a parallel and complementary development of fuel and engine. This attainment is dependent, in part, upon the degree to which the mutuality of interest as between the fuel-producing industries and the engine-building activities is recognized and turned to use as a motive for co-ordination; in part, upon the degree to which the Government interests itself.

There is need for a steady progress on the part of the engine toward greater thermal efficiency. The average automobile is notably wasteful in its use of fuel, and the fuel supply may see its service doubled without an increase in volume, once fuel economy becomes a paramount issue in engine design.

### Equalization of Industrial Opportunity

This subject is dealt with in Chapter X, and is a phase of industrial economics seldom given adequate consideration.

A co-ordinated and balanced development of the coal and water-power resources of the country will serve to equalize industrial opportunity and therefore to unify the economic interests of the country so that a constructive economic policy agreeable to all sections may win country-wide support. But in addition to its bearing upon national policy, a distribution of power advantages will make for an indirect but very significant gain in the matter of transportation; for industry may then strike a more perfect balance between the location of raw-material sources and markets.

The concluding chapter of the book deals with the subject of industrial evolution, and contains the following significant statements:

We are involved in a wasteful and careless exploitation of our energy resources, which is rushing upon us a premature depletion of our richest sources of supply and creating imminent problems in industrial readjustments of far-reaching significance. We have permitted, unchecked, the development of harmful concentrations of industrial activities in limited areas favored with fuel, to the creation and aggravation of labor problems that seem insolvable. We have seen our transportation system staggering beneath the sheer bulk of energy haulage, with a recent break-down in operation which clearly indicates the incapacity to function in periods of industrial expansion.

As a nation we have failed to sense that the inadequate development of our energy resources is responsible for a large measure of the social shortcomings that are present in our economic situation. The problem at bottom is one of education.

In short, we stand in need of a co-ordinated development of our energy resources to support a sound economic and equitable social advance. We need a system of production for our energy materials which will be in harmony with the geological occurrence of the resources, to eliminate the appalling waste of effort now taking place in their exploitation.

We need a new method of transportation for our bulkiest energy material, coal, which will be in keeping with our form value needs. The development of a common-carrier system of energy transmission lines will fill this want.

We need a revision in the methods of utilizing our energy materials, so as to insure a higher recovery of the energy content and a proper employment of the commodity values for the purpose of reducing the cost of energy. This result may be attained through a furtherance of the principle of multiple production, coupled with adequate attention to the efficiency of the appliances concerned in utilizing energy.

Unfortunately the Government, which should set the lead in this matter, has failed to sense its responsibility.

# Heavy Demand for Motor Equipment in Oriental Nations

Love of display creates market for lavish trappings, loud horns and shiny radiator decorations. Manufacturers of accessories find bigger field for goods in Far East than car makers. Business increasing.

**A** CENTURY rooted sense of the dramatic, a childish love of gawdy or refined display and an inherent craving for the ostentatious in addition to being predominant Oriental characteristics from "somewhere East of the Suez" to points north of the maritime province of Vladivostok are the underlying factors of the motor car accessories market of the Far East. To the Oriental every day is a different act in the whole play, his life, and every moment he feels the responsibility of being the star of the cast.

The same inner prompting which recently brought one of the ruling war lords of the nation of China to have made to his order by an American manufacturer an armored limousine, equipped with machine guns, armor plate, non-shatterable plate glass, and arm slings for body guards mounted on the running boards, governs the lesser lights of the Orient in buying electric horns, dome lights, and radiator ornaments. The same tendency makes limousines popular with the older generation and screaming sportsters the desire of the young.

To the manufacturer of accessories in the United States the Far East, to a great degree, presents a market that is in almost direct contradiction to that of the Western countries. In this section of the world those devices which find increasing favor as "owner driver" accessories are a drug on the market. The element of cheap labor gives to the owner of even the lowest priced car in the Orient the ability to employ a chauffeur. More often there is also a footman. It is a safe estimate to say that 90 per cent of the motor cars in the Far East are chauffeur-driven. The motor car owner in the Far East in the majority of cases knows little and cares less about his car, his chauffeur's knowledge is confined to tinkering with the spark plugs and electrical connections, and if anything goes wrong the car goes to a garage where foreign experts are employed.

The firm belief on the part of the Oriental chauffeur that the majority of trouble in the working parts of the car can be traced to the spark plugs has created a market for these which is comparatively out of proportion to that existing in Western countries. This market is also increased by a demand from the marine activities of the various Eastern ports for use in motor boats.

## "Squeeze" System Helps Market

Because of a lack of care lamp bulbs are also replaced with a frequency unparalleled by any Western country. Often, too, such breaks are not alone due to a lack of care but to a system which has grown up in connection with the motor car industry of the Far East which is the bane of the owner and the delight of the chauffeur.

This system is called in China "squeeze." In the United States it would be a commission. No matter in what business or occupation, the Oriental is always on the outlook for "squeeze." The garage owners, for the most part, have to pay a few cents commission on gasoline, more on

motor repairs and on everything that is done, to the chauffeur. This helps the spark plug market, as the chauffeurs soon learn to unload them. This also increases the sale of tires, lamps, and often moving parts of the engine and car.

Radiator decorations of the most lavish type find a ready sale in the Far East. On the whole the American manufacturer has *not* grasped this idea and has attempted to sell cheap pseudo comical figures when nickel plated, bronze and silver plated decorations of more classical design would have met with immediate favor.

## Electrical Equipment Popular

Electric fittings of every description, step, dome, inside corner and other types of lights with fancy coverings in imitation of cut glass find a ready sale. Dash lights, in fact, lights of any description located any place on the car can be disposed of easily.

The Oriental love of display and personal advertisement finds solace and contentment in electric horns—the larger and louder the better. Hand horns are also fairly popular. The native is a slow moving individual as a pedestrian and it adds considerable to the enjoyment of a spin in a motor to be able to give these people a shock by means of a loud and deep voiced horn.

In China and India the rapidly increasing body building industry is giving rise to new markets for manufacturers of fittings and parts. These markets demand the highest grades of upholstery materials, beadings, window tassels and carpets. In the average native limousine these must all match with a high degree of exactness. Price is no object with the native buyer.

## Most Cars Locally Built

While not within the realm of accessories proper, the styles of cars used will give an idea of the market generally. In the Far East closed cars predominate. For the most part they are locally built because the buyer and owner can have his own whims embodied in the making and also because with native labor these closed bodies can be produced in the Orient cheaper than they can be imported from the United States.

While the motor car business has suffered a slump generally throughout the Far East during the past year, the prospects for the future are taken in all sections to indicate a revival of former activities and constantly increasing business.

**A** DEMONSTRATION of the Case, Fordson, Glasgow, International and Titan tractors was recently held at Haifa, and with the Case tractor at Beersheba. As a result, endeavors are being made on the part of a few landowners in the Beersheba district to combine for the purpose of purchasing a tractor, and it is hoped that others will follow this example.



# The FORUM



## Front Wheel Wobble

Editor, AUTOMOTIVE INDUSTRIES:

Somewhat over a year ago the writer contributed an article to AUTOMOTIVE INDUSTRIES in which some of the causes of front wheel wobble were analyzed. He knew then (and stated) that the subject was treated incompletely and asked for suggestions as to other possible causes.

One such has recently been brought to his attention by Eric Wahlberg, chief engineer Nash Motors Co., the explanation of which was overlooked in the original discussion. It is very readily explained by diagram herewith.

Suppose the front axle be tilted so that the centerline of the king pin strikes the road either in front of or behind the point of contact of the tire with the road. Then if a side force is applied to the tire at the point of road contact, this will have a moment about the king pin axis the amount thereof depending upon the distance AB. On the other hand, the motion of the car will offer an opposing moment directly that the wheel is turned from the straight position, if the king pin is in the same plane as the wheel. With the conventional design of axle there will be a trailing or castering action at all times that the car is in motion because, both the front wheels being outside the king pins, they tend to spread apart in front.

Now the gyroscopic action of the wheel even at low speeds is quite considerable, which means that to deflect it sideways suddenly will require a fair effort. Once deflected the movement of deflection will continue until a sufficient opposing moment is encountered and hence a pendulum wobbling of high frequency can easily be started.

This it is, in bad cases of wobbling, that causes the whole front end of the car to shudder, without any perceptible vertical oscillation, an action that had greatly puzzled the writer and which in the original analysis he realized he could not then explain.

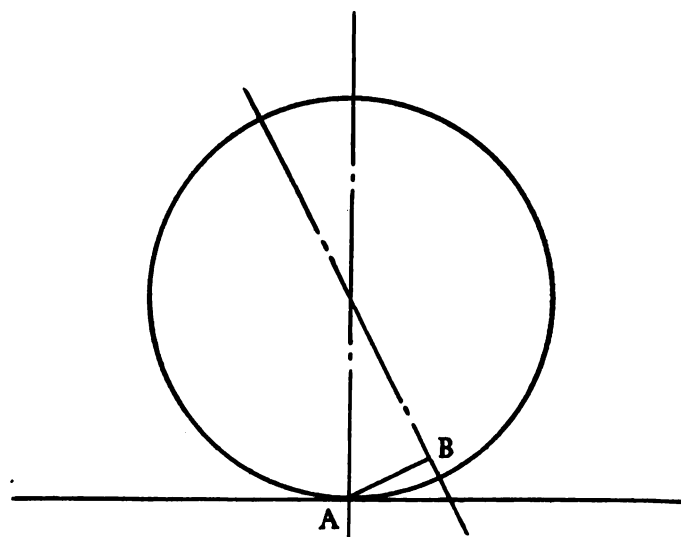


Diagram of front wheel with tilted axle

There are two positive cures for wobble. One is to use an axle with king pins set truly vertical; the other is to introduce sufficient friction to damp out the wobble or rather to "dead beat" it.

Wobble which develops in old cars can usually be cured by tightening up all the joints and connections in the steering. If it occurs in a new car it can usually be traced to excessive castering. If much caster is considered necessary the remaining alternative is to use king pin bearings with a fair amount of friction, not ball or roller bearings.

A. LUDLOW CLAYDEN.

## The Fuel Problem as a Carbureter Problem

Editor, AUTOMOTIVE INDUSTRIES:

While hundreds if not thousands of pages have been written on the fuel problem, I fail to remember any discussion of it on the basis of self-evident and indisputable facts. I want to quote from one letter received by me several days ago from the engineer of a prominent carbureter concern, and also from the circular of one still more prominent. These extracts prove beyond question that the carbureter as applied to-day is really looked on as a metering device.

If these devices were actually productive of fuel efficiency there would certainly be no true grounds for charging waste. This fact is indisputable. But, beyond any question, a lot of the precious liquid gets by without producing results. There is a reason:

A rather clear, if homely, example to show why it is difficult to get fuel economy lies in the fact, as I have several times roughly figured out, that in a truly efficient use of fuel one common teaspoonful should give from 200 to 250 power charges to the cylinders of a medium-sized, 6-cylinder motor. This, based on around 20 miles per gallon, which should be easily possible. To break up a spoonful of liquid into this number of parts means extreme divisibility, and if this is not accomplished, it, of course, means waste.

Now it is another self-evident fact that to get true economy you must trap this excess before it gets into the cylinder or even manifold and not afterward, which would be like locking the barn door after the horse is stolen. It simply means real evaporation or extreme divisibility, which is about the same thing. This is not accomplished to-day, hence the fuel problem.

There apparently exists a rather hazy idea of this matter of vaporizing. Natural evaporation is confused with boiling. The first requires surface, the latter temperature. It is simply a question of surface in relation to bulk. Without hesitation I will say that it is perfectly possible to design a carbureter which will give the required surface and at the same time not only vaporize the liquid fuel but give a homogeneous mixture to the manifold for distribution to any number of cylinders. Not only will efficiency but economy of operation result therefrom. My firm idea is that when there was a

marked decrease in the volatility of fuel, no means were taken from the carbureter side to improve on natural vaporization, but it was left to the engine builder to provide artificial means by boiling, or, as one prominent expert has said in a recent paper, cooking.

I do not believe that a vapor thus supplied can give equality of mixture that is truly efficient and economical.

GEORGE M. BROWN.

## Testing Aluminum Castings

Editor, AUTOMOTIVE INDUSTRIES:

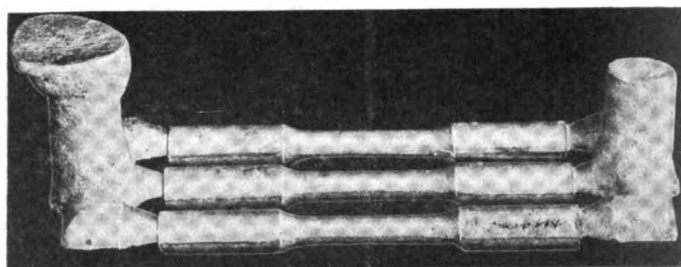
I wish to indorse Mr. Ernest V. Pannell's article on "Testing Aluminum Castings" printed in your issue of Sept. 1. Mr. Pannell has very ably defended the American practice of casting test bars of aluminum alloys in green sand as against the permanent mold method recommended by Dr. Rosenhain in your issue of Aug. 4. It is readily agreed that of two methods capable of giving the same degree of uniformity, the one giving results more nearly comparable with the physical properties obtained in actual castings should be chosen. It is my intention to show that by proper standardization, test bars cast in green sand can be made to show a satisfactory degree of uniformity.

The Engineering Division of the Air Service has adopted a method of casting test bars in green sand, as shown by the accompanying photograph. The patterns, including the gates, are made up on a match plate, thus insuring uniformity of molding. The mold is slightly tilted so that in pouring the metal flows up-hill. The pouring head and riser are 1¼ in. in diameter and a 3-in. cope is used. The results given in the following table represent melts of the standard No. 12 aluminum alloy (8 per cent copper) made up in the McCook Field Foundry, during the period July, 1920 to July, 1921. These results have been grouped according to the copper-aluminum hardener used, since it is believed that much of the variation in results obtained in aluminum castings can be traced back to the hardener used in the preparation of the alloys.

### PHYSICAL TESTS

Aluminum alloy.....8 per cent copper, 92 per cent aluminum

Melt No.	Tensile Strength, Lb. Per Sq. In.	Elongation, Per Cent	Brinell	Scleroscope	Specific Gravity
<i>Cu-Al Hardener—Melt 55</i>					
155.....	21,980	1.50	...	...	...
<i>Cu-Al Hardener—Melt 151</i>					
220.....	20,800	2.3	...	...	...
228.....	21,380	2.5	...	...	...
229.....	20,310	2.0	...	...	...
Average	20,830	2.27	...	...	...
<i>Cu-Al Hardener—Melt 235</i>					
261.....	21,650	2.5	51.3	12.0	...
264.....	21,300	2.5	51.3	12.0	...
356.....	20,890	2.3	57.0	12.5	2.86
357.....	21,610	2.0	59.0	13.0	2.86
Average	21,360	2.32	54.7	12.4	2.86
<i>Cu-Al Hardener—Melt 300</i>					
346.....	24,130	2.50	...	...	...
361.....	22,720	2.35	58.3	14.3	2.86
664.....	21,580	2.35	58.3	14.0	2.84
Average	22,810	2.40	58.3	14.2	2.85
<i>Cu-Al Hardener—Melt 339</i>					
434.....	22,020	3.17	...	...	...
446.....	20,890	3.30	...	...	...
Average	21,460	3.24	...	...	...
<i>Cu-Al Hardener—Melt 437</i>					
466-1....	23,400	3.5	...	...	...
466-2....	22,090	2.67	...	...	...
469.....	19,398	2.16	56.7	15.0	2.90
492.....	18,250	2.70	...	...	...
506.....	19,560	2.0	52.6	15.0	2.86
529.....	19,630	2.5	55.3	14.3	...
Average	20,400	2.14	54.7	14.7	2.88
<i>Cu-Al Hardener—Melt 586</i>					
592.....	21,760	2.7	56.0	12.5	2.85
612.....	21,730	3.0	53.3	11.0	2.85
.....	20,650	3.0	54.0	12.3	2.84
629.....	20,890	2.5	54.0	12.3	2.84
Average	21,240	2.80	54.3	12.0	2.85



Test bars cast in green sand

<i>Cu-Al Hardener—Melt 821</i>					
895.....	22,260	1.50	58.0	13.3	2.85
<i>Grand Average</i>					
Tensile strength	.....	.....	.....	.....	21,300
Elongation	.....	.....	.....	.....	2.49
Brinell	.....	.....	.....	.....	55.4
Scleroscope	.....	.....	.....	.....	13.1
Specific gravity	.....	.....	.....	.....	2.86

The results given for each melt are the average of the three test bars cast as already indicated. The results from the three bars always agree very closely, except where there are obvious flaws, which reduce the strength of any one of the bars. For ordinary purposes, it is not necessary to cast three bars, two being sufficient, one to be used as a re-test in case the first bar shows a flaw. However, for experimental work, we have found it very desirable to cast the three bars in the same mold.

It is a well known fact that the physical properties obtained in an aluminum test bar depend to no small extent on the pouring temperature. In general, the lower the temperature, the higher the physical properties obtained. For this reason it is the practice in our foundry to pour the test bar mold just before pouring the casting, thus the test bar is poured at a slightly higher temperature than the casting, and, therefore, the results obtained are conservative.

E. H. DIX, JR.,  
Chief, Metals Branch,  
Material Section,  
War Department Air Service.

## Better Vehicle Repair Methods

THE second edition of the Automobile Repairman's Helper is so greatly enlarged and so radically changed that it bears little resemblance to the first edition which was printed some two years ago. The contents consist of the Better Mechanics articles, which have been appearing in Motor World for the past four years, and these are edited and arranged in an orderly manner with a complete index so that any subject or any car or truck can be located very quickly. The book is the work of S. Thornton Williams and J. Howard Pile.

The articles were prepared with the thought of assisting motor car mechanics to better methods of care, repair and maintenance of motor vehicles and in the preparation of the material over 2000 shops have been visited in various parts of the country, factory service departments called upon for data and various methods of performing operations observed and studied.

The present edition, including practically all articles up to date, has become so large that it was necessary to divide it into two volumes. The first volume, now ready, takes up building design and layout, systems for saving time and money, shop equipment, standard shop practice on cylinders, electrical systems, batteries, bearings, etc.

Volume II, which is in preparation and will be printed shortly, takes up other problems of the repairshop and gives detailed shop operations on a number of other cars and component parts such as clutches and axles.



# Washington Unemployment Conference Deserves Attention

Fixed habits of work and non-flexibility of men in ability to do more than one job is one factor in the present situation. Tendency of the public is to charge industry with the responsibility for unemployment. Conclusions of conference will develop effect produced by this tendency.

By Harry Tipper

**T**HE opening of the President's conference upon unemployment is a reminder of the fact that we have an unemployment problem of considerable proportions, and that this problem assumes a public character because of these proportions and the impossibility of any single agency providing the alleviation from the attendant troubles.

As members of one of the largest industries, the automotive manufacturers should be very much interested in the deliberations of the conference at Washington and in the proposals emanating therefrom.

The character of the conference indicates the general belief that this problem is of such importance that it requires the consideration of every branch of opinion in the development of either temporary or permanent suggestions for its alleviation. The presence of the manufacturers, labor leaders and representatives of the general groups of the public means an admittance by the political bodies of the public interest in this matter and of the way in which the problem is affected by the industrial conditions of labor outlook.

This is the first time in the history of the United States that the unemployment situation has called for any public and political consideration. While there have been periods of considerable unemployment in the financial crises of the past, they have not been so widespread and they have not attracted the public consideration which has been demanded in connection with this one.

In the period up to the war the United States was possessed of a manufacturing capacity hardly equal to its requirements for domestic consumption. The excess in imports of manufactured articles over the exports of similar products was sufficient to show that the capacity did not quite reach the dimensions of the domestic consumption.

Since the war has ended the manufacturing capacity of the United States is, for the first time, larger than the immediate or probable requirements of the population, and, therefore, the unemployment question demands an attention not so visible at any period in the past.

The difficulty of maintaining continuous employment has grown with the subdivision of the industrial operations and the more rigid specialization in the occupational divisions.

Not so many years ago a machinist was a man who could turn his hand to the operation of any of the usual

machines in the metal trades or the manufacturing side. He was capable of making his own tools and fixtures and of adapting his machine to the production of various kinds of work. His skill, therefore, was fairly flexible and could be turned to a good many things in the course of a year's operation of the factory.

To-day most machinists are only operators of machines, capable of operating a limited range of machinery of the same kind and under similar conditions. Unless there is a sufficient volume of work in their own particular small occupational branch of the business, these men are unable to fill industrial requirements, and it is not unusual to see one department of a factory working overtime, while another department is on short hours.

The trade union development has added to the rigidity of this labor skill by organizing unions in different branches of the industry and defining the measure of skill which permits entry into such a union.

In some lines of industry these definitions have been carried so far that their interpretation has led to a series of functional strikes and many functional disputes arising out of a disagreement as to whether new operations belonged to one branch or the other branch involved in the particular industry. The building trade has been very prolific in these disputes, and some of them suggest the extent to which the definition of work has been carried by the standards of membership in the various organizations.

It is recalled that in building one of the important banks of Chicago, when the steel arrived for the building of the safety deposit boxes, the contractor was able to close the pavement on order from the city, and that he might not be delayed with this work he had the steel dropped to the basement by his regular rigging gang, so that the pavement above could be closed and the other work proceed. It appeared that this work was a part of the work of the safe-movers in one of their branches and they declared the regular riggers should not have been used for the purpose. Therefore, the safe-men called a strike on the building and refused to operate until the pavement was torn up, the steel removed from the basement to the sidewalk and put down in the regular way.

In a building in New York, several months ago, a new device was introduced for the purpose of improving the heating system. A question arose as to whether the erection of this part of the equipment belonged to the plumbers or to the steamfitters. The discussions of this point grew very acrimonious. Finally a strike was called because of this dispute and a month was lost before the question was settled.

These, of course, are extreme cases, but there is a general tendency—accompanying the continued subdivision of operations—to a greater rigidity of skill and a greater dislike for any change in the work which will call for adaptation of that skill to other operations.

This rigidity is primarily a psychological matter arising out of the fixed habits of work that become more difficult to change as they become concentrated upon fewer elements. It is enhanced by the organization of such men into groups and their attempt to define their own work for the purpose of developing standards of membership, apprenticeship and other matters.

The employment problem is very closely associated with this because the rigidity of skill and habit makes it more difficult to use the idle workers in any operations other than those to which their skill has been previously applied.

We are fortunate in this country in that a large part of our working population has not been trained in this specialized skill for more than one generation and retains as yet a measure of adaptability in connection with their work. Coming, as these workers do, from peasant classes and from farming occupations or from parts of the world where industry is not so highly specialized, they have been accustomed to turn their skill to a good many things, adapting themselves to each change of work. This capacity they have not entirely lost, and for that reason there has been a good deal of re-employment from the ranks of the unemployed, reducing the total problem in a measure and increasing the flexibility of the labor organization to that degree.

However, it should be noted that the industrial fabric can be maintained at such a perfect balance as to provide work for every worker at an equal pace in connection with the percentage of total production demanded by the market only when the manufacturing capacity is noticeably less than the market requirements and it is possible to employ all of the workers a reasonable proportion of the time. Considering the surplus manufacturing capacity possessed by the United States as a result of war activities, it is unlikely that we shall require all the labor in the same proportion for a number of years, so that the question of unemployment is likely to remain with us in some proportions, at least, over quite a period of time.

Whatever the manufacturer may think about the matter, or whatever may be the abstract viewpoint of the individual, this conference indicates that political authorities and practical business men believe the responsibility will be placed upon industry, the general population and the political governors in about equal proportions.

The reaction of the public indicates that, from the standpoint of the average citizen, industry must accept a considerable share of the responsibility for unemployment. Any political action in this direction, of course, will simply be in the way of taxing industry or forcing industry to do certain things because of political necessity.

In Great Britain and to a greater extent in other European countries the unemployment problem has required governments to control, subsidize or to engage upon industrial operations to an extent which would have been incomprehensible before the war.

In any case, industry must pay for the lack of employment directly in the industrial difficulties of small profits and slower turnover, while the consumer, of course, is charged with this addition to cost before the transaction is completed.

So long as the income of a proportion of the population is reduced materially by the uncertain character of its employment or the extent of its unemployment, the purchasing power of that portion of the population is diminished, the costs of industry are increased and the amount of product which can be secured is decreased.

Industry works at the best efficiency when everybody is sufficiently employed, but when there is no real shortage of product and no great competitive bidding for service. The balance of industrial employment is probably more effective at a normal product load than it is at any point above or below that. The purchasing power of the population is at its most stable point when industry is operating at normal load.

In a declining market, where every element of cost becomes important because the price cannot be adjusted to the cost, but the cost must be adjusted to the price, any inefficiency arising from partial load, unemployment and destruction of organization add automatically to the cost of the individual unit of production.

From these standpoints the manufacturer is primarily affected by the question of employment, and the methods of alleviating the present unemployment problem should have his careful attention. They may be only suggestions at the present time, without any binding force and with no particular weight, but they will affect public opinion to some extent, suggest further analysis to some of the interested observers, and the conclusions may return to embarrass the manufacturer later if their significance is missed and their tendency lost sight of when they are reached in the present conferences.

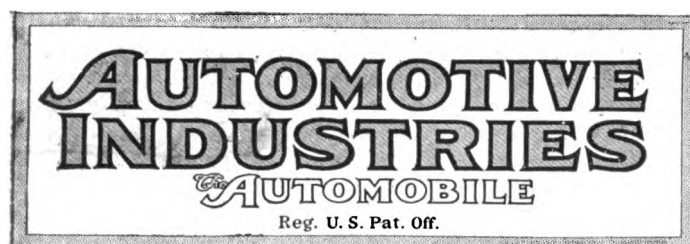
The unemployment problem has reached the consideration of the politicians and the public in a definite way for the first time in the history of the United States, although many suggestions have been made in this direction previously. That fact should warrant the manufacturer in considering the conclusions arrived at by the conference and in considering the effect which such conclusions may have upon his own outlook.

There is a general tendency, undoubtedly, to charge industry with a measure of the responsibility for unemployment and for its solution. Irrespective of its justice, this tendency shows some indications of growth, and the conference will develop in its conclusions the effect produced by such considerations in the deliberations of that body.

THE new number of the *International Labour Review*, the monthly magazine issued by the International Labour Office of the League of Nations, contains figures showing the huge development of trade unionism since 1913, 1919 and 1920 were 16,152,000, 42,040,000 and 48,029,000 respectively.

Of the total of 42,040,000 members in 1919, 34,061,000, or 80 per cent, belonged to European countries. Of the remaining 7,979,000 non-European members, 5,985,000 belonged to the North American Continent. Trade union membership is very marked in the United Kingdom, Germany, the United States, Russia, France and Italy, which accounted in 1919 for no fewer than 33½ million members, while the other 24 countries accounted for only 8¾ millions.

The four great industrial countries—the United Kingdom, Germany, the United States and France—included between them more than 28 million members, or 66 per cent of the recorded world total of trade union membership in 1919.



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## Winter Repair Work

THE news columns of AUTOMOTIVE INDUSTRIES last week told of a movement started by Automotive Service Associations of New York and Brooklyn to avert the usual slump in winter automobile repair work. Their campaign includes spending \$16,000 in newspaper and folder advertising to urge the car owner to have his automobile overhauled during the winter months instead of putting it off until early spring when repair shops are rushed with orders.

To the manufacturer of automobiles who has service stations established in various cities throughout the country this campaign offers a suggestion. Whether or not combined action among the various repair men of the different cities was taken, individual effort could accomplish much. The advantages of such a plan are apparent. Not only would the service station be made a paying proposition during the winter months, but the car owner would also derive benefits in that there would not be the long wait for his car in the spring while other machines were being overhauled. The work would be done at the

time he uses his car the least and the repair man would be busy the year round.

This system, if put into effect, would not likely result in decreased business during the spring, for enough work will come in to keep the shop running at full speed. During the spring the service man can take care of only so much business and he often has to turn away many prospective customers. If it were possible for him to persuade his regular customers to bring in their cars during the months between November and March he would find that his shop would be filled with new customers when the spring rush started.

While primarily the move was started in an association there would be nothing to prevent the individual service man to launch a similar campaign among car owners in his territory.

## Progressive Car Development

IN commenting upon the handicap which the present status of the used car market places upon the sale of new cars a prominent engineer, who is also an executive holding a high position in the industry, recently said that the best if not the only way to overcome this handicap, so far as it affects the near future, is to build new cars which are so far superior to used cars now available that no user will have one of the latter type. To which the immediate rejoinder is, can it be done?

It not only can but it will be done, not, of course, by the conservative sit-tighter who changes nothing until the other fellow shows him that he can't live unless he improves his product, but by the progressive who has vision—who analyzes the shortcomings of that which is, and sets an ideal for the performance of the future product toward which he continually strives.

What, then, is this new car to accomplish which the present-day car fails to do? Primarily, it must be more efficient, not only in respect to fuel consumption—though this is of great importance—but in all factors which enter into the cost of operation. It must return more for each dollar spent upon it. It must be more dependable—freer from difficulties which demand attention by the user and by service departments. It must be accessible and easier to repair when repairs must be made. It must be more comfortable to ride in. It must handle as well as or better than the best we have to-day. This is not all, but it's enough to make food for thought, for experiment. It calls for but little information not now available—simply the intelligent use or combination of facts we already know.

Some people who have given the matter careful study believe that the car which will do 75 miles on a gallon of fuel is in sight. Experimental cars which have done this or but slightly less are already in existence. It is not too much to expect that performance in other respects will undergo a similar radical improvement. Much remains to be done in experimental development before improvements of this character are incorporated in the commercial product, but the manufacturer who is not following work

of this kind and not seeking to do his share in research upon which sound development is based is certain to suffer when he awakens to discover that his product is out of date and in no position to compete with that of more progressive contemporaries.

## Power Resources and Their Conservation

WHEN a person stops to analyze the importance which power resources play in our modern economic system it is not difficult to see why our own country has become the greatest of all industrial nations. It is largely because of our endowment in coal, oil, natural gas and water power that we have achieved this greatness in competition with nations less well supplied with energy resources. There is danger, however, that we will fall into the habit of regarding our fuel resources as inexhaustible; whereas half of our petroleum reserve has already been used, the best of our coal deposits are becoming depleted, and our supplies of natural gas are failing rapidly. In the face of this situation we permit to continue an appalling and largely preventable waste in all our fuel recovery operations, and much the same can be said regarding the utilization of the fuel ultimately recovered.

No revolution in this regard can be worked in a day, but much can ultimately be done by education and by intelligent legislation. The automotive industry is a great consumer of fuel and is responsible for the production of equipment which uses a large percentage of refined petroleum. The intelligent conservation and economical use of our fuel resources is therefore a matter which we cannot safely neglect if we would serve our own best interests.

It is easy to be indifferent—to say that the whole fuel problem will work itself out in time, but indifference is a costly luxury when it concerns so important a matter as fuel, and those who indulge in it must expect ultimately to pay the bill. The wisdom of starting now to study and help work out a solution of the problem cannot be questioned. Read the article in this regard which appears on another page of this issue. We predict that you will find it worth while, to say the least.

## Building Dealer Efficiency

THE schedule of topics announced for the N. A. C. C. members meeting which begins to-day indicates the probability of real progress in connection with an important phase of marketing—that of dealer relationships. Two out of the three topics announced for the general meeting have to do with this subject while the third is directly related to an important dealer problem.

The importance of satisfactory dealer relationships has been strongly emphasized by the experience of recent months, and a careful study of the problems involved is likely to be worth all the time and effort expended in this way. Merchandising costs throughout all industries have increased during recent years

in far greater proportion than have production costs. In fact, the latter have constantly decreased while the former have constantly increased. The efficiency with which the dealer organization functions in relation to the manufacturer has a strong bearing on these costs.

The facts are fully recognized by the majority of manufacturers, and definite progress is being made in many instances. The entire problem, however, is rather complex and a more fundamental analysis of the various factors is still necessary.

## Increasing Punch Press Production

THE advances made during recent years in the production of pressed metal and stamped parts renders the punch press of constantly growing importance in production operations. There is, however, one definite objection to this machine. It is extremely dangerous to operate under ordinary conditions.

In many punch press operations it is necessary for the operator to place his hands between the jaws of the press twice. In a brief talk before the automotive section of the National Safety Council, A. L. Kaems of the Simmons company emphasized this danger in a striking manner. He put it in this way: "We have devised all kinds of safety devices, such as two-hand trips, push-buttons, gate-sweeps and others that have prevented many accidents, but just the same way as the railroad companies make us cross their tracks, so are we making our employees place their hands underneath the ram of the press twice every operation. Suppose a man does 1000 pieces per hour. That would mean his hand would be in the danger zone 2000 times per hour. In 8 hours it would mean 16,000 times and in 300 days 4,800,000 times. . . . You will agree that when a person is compelled to flirt with danger 5,000,000 times per year and is not injured he is just lucky."

The great production usefulness of the punch press renders specially necessary a more careful study of safety methods in connection with it. The difficulty with most of the safeguards devised has been that they tend to decrease the speed of production. Since most punch press operators are working at piece-work rates, this fact has, of course, led them to disregard or to render ineffective the safety devices. Where the operators were on a day-rate basis the management has been loathe to install such devices because of the decreased rate of production involved.

As pointed out by Mr. Kaems, however, a little careful study of individual operations will enable the manufacturer to find means of pushing or sliding the work into the die in 90 per cent of the cases. Some months ago AUTOMOTIVE INDUSTRIES described in detail how this has been accomplished at the Simmons plant. The idea is entirely practical and is comparatively inexpensive. The danger of injury to the operator is eliminated and the production of the machine is materially increased in practically every case. A more careful study of safety methods for this important machine will increase production and reduce costs.

# Peerless Negotiations Consummated

## Active Management Assumed by Collins

Approximately \$4,500,000 Involved—Initial Payment 20% With Rest in Serial Notes

CLEVELAND, Oct. 3—Richard H. Collins, who recently resigned as vice-president and director of the General Motors Corp. and president and general manager of the Cadillac Motor Car Co., through the purchase of a substantial block of stock today assumed the active management of the Peerless Motor Car Co., it is announced by Roland T. Meacham, investment broker, through whom the negotiations were closed. Approximately \$4,500,000 is involved in the deal.

### New Directors Chosen

At a meeting of the directors of the Peerless Truck and Motor Co. immediately following the signing of the contract, Collins was elected president and general manager of the company. Resigning directors included B. G. Tremaine, F. S. Terry, Lewis Kittredge, Theodore Frech, Geo. Y. York and Harrison Williams. These were succeeded by R. H. Collins, Wilbur H. Collins, C. E. Sullivan, F. A. Trester, F. J. Miller and A. C. Earhart. The following directors remained on the board; H. A. Tremaine, Roland T. Meacham, Walter C. Baker, W. H. Staring and Geo. B. Siddal.

The deal is the result of negotiations which had been under way for several months and definitely sets at rest reports that Collins would only become a stockholder in the company without assuming active management. Under the terms of the agreement signed to-day, Collins agrees to purchase from B. G. Tremaine and his associates, who have virtually been in control of the Peerless company, a minimum of 50,000 and a maximum of 80,000 shares for \$50 a share.

### Meacham Makes Statement

The initial payment will amount to at least 20 per cent and the rest will take the form of serial notes bearing 6 per cent interest and secured as collateral by the stock purchased. The fact that Collins expects to come here at once to live and assume active control of the company indicates to the financial district that he soon will be in the saddle in preparation for the 1922 season.

In making the announcement, Meacham said:

"I think this is the biggest thing that has happened to Cleveland industry in the last five years. Collins has long admired the Peerless principles of engineering, and has reached the conviction, after an intimate study of Peerless design and construction, that the line thoroughly embodies the quality ideals which have been his inspiration during his entire career.

"It has also been known to his intimates for a long time that Collins has had a high regard for the city of Cleveland, its people, its industries, its way of doing business and its future.

"With characteristic promptness, he has already formulated definite plans for the expansion of the Peerless business. Details of these plans will be announced from time to time."

### All Time to Plant

Collins stated that he would give his entire time and attention to the big Peerless plant in Cleveland and that the company would continue to manufacture eight-cylinder motor cars.

"I am a firm believer in the principle," he said, "that the director or general manager of a big business like the Peerless Company is only a trustee, who must at all times be mindful of the interests of the four groups that make for the success of any enterprise, the stockholders, because they furnish the capital to carry on the business; the men who make the product, because they give it its intrinsic value; the men who sell it, because the success of the manufacturer depends on the success of the merchants who put the product in the hands of the public and the men who buy it, because after all, a large body of satisfied owners is the greatest asset that any business can possess and this satisfaction results solely from the policy of giving the customer a full dollar's worth of value."

### Collins Versatile

Collins is considered one of the most versatile men in the motor car industry. While much of his effort has been along merchandising lines, he has a knowledge of manufacturing second only to his knowledge of selling cars. He went to the utmost pains to gain his intimate knowledge of manufacturing because he has always held that only by knowing what was going on in the factory could he most intelligently interpret his product to the buyers outside.

As absolute dictator of the policies of the Cadillac Motor Car Co. he doubled the company's yearly sales revenue, opened a branch house in Chicago, whose business expanded so quickly that within less than a year it was necessary to double the floor space of the buildings; planned and finished in Detroit a new sales and service building and designed and erected a new Cadillac factory that is said to be the world's most modern automobile plant.

When Collins' resignation from the Cadillac Motor Car Co. was accepted a few months ago, it was pointed out as a

(Continued on page 695)

## Merger Is Completed By Steel Companies

New Corporation Has Outstanding 300,000 No Par Common and \$10,000,000 Preferred

MASSILLON, OHIO Oct. 3—Steel mill properties with combined assets in excess of \$20,000,000 have been brought together in the merger just completed of the Central Steel Co., the National Pressed Steel Co. and the Massillon Rolling mill Co., all of Massillon.

The new corporation takes the name of the Central Steel Co. and the following officers have been elected: Chairman of the board of directors and president, R. E. Bebb; first vice-president, F. J. Griffiths; second vice-president, C. C. Chase; third vice-president, H. M. Naugle; secretary and treasurer, C. E. Stuart.

The reorganized company has outstanding 300,000 shares of no par common stock and \$10,000,000 of preferred stock. The merger of the three companies brings the Central Steel Co. into prominent position among the steel producing corporations of the country with complete modern equipment and facilities for producing all kinds of commercial alloy steels, hot and cold rolled sheets, hot rolled strip steel and light structural steel sections in a combined annual output of 450,000 to 475,000 tons of finished material.

Several new buildings and new machinery were recently added to this property, most of which was put in operation last March. The plant as it is operating produces approximately 50,000 tons of sheet products annually and the arrangement is such that an increase of 50 per cent in production can be achieved without additional buildings or power equipment. The Massillon rolling mill plant was designed and functions especially as a producer of sheets for the automotive industry.

## Irish Fordson Plant Increases Its Output

LONDON, Sept. 5 (By Mail)—After spending \$3,250,000 on the Fordson tractor enterprise at Cork, south Ireland, which was started in war time with the marked good-will and help of the local people, and amid much grumbling by interested parties on this side, it looked recently as if the enterprise was doomed to an inglorious end. Production fell off and the number of hands diminished to a few score. Trade has revived, however, and the works are increasing production, with nearly 1000 employed.



# Earl Motors, Inc., Succeeds Briscoe

## Car Will Also Bear Name of Executive

### Arrangements Are Made Through Chicago Bankers for \$5,000,000 Additional Capital

JACKSON, MICH., Oct. 3—The Briscoe Motor Corp. and the Briscoe car will be supplanted in the automotive field by Earl Motors, Inc., and the Earl car, both the company and the car being named for Clarence A. Earl, former vice-president of Willys-Overland, who became president of Briscoe in March last. Five million dollars in additional capital will be put into the business, arrangements for handling the finances having been perfected by Earl with Chicago bankers during September.

In announcing the reorganization, Earl said the Briscoe directors had voted unanimously for the introduction of the new capital, necessitated through the fact that the distribution end of the business had been expanded by the addition of 20 new distributors and 240 dealers in the past six months, both the new financing and the new policies will come before the stockholders' meeting of Oct. 20 for final ratification.

Enclosed models of the Earl car, which will reflect a general improvement in the former Briscoe line, will be ready for delivery Oct. 15. Open models will be ready Nov. 1. For the present Briscoe cars are being produced, though most divisions of the factory are busy on producing parts for the new car.

### Discusses Outlook

Discussing the outlook for business, Earl said:

"The action our board of directors has taken is really our first step toward expansion to meet a demand which we are certain will develop by the first of next year. The minimum capacity of our plants today is 15,000 cars annually. With general business conditions pointing to a strong revival of activity inside the next 90 days, we are laying plans to double our minimum and we are confident we will have all the business we can possibly handle in 1922 and more.

"In expanding our resources at this time, we are producing a new car with labor and materials purchased at present day costs."

Resources of Earl Motors, Inc., will include nine plant buildings and equipment covering 53 acres of floor space in Jackson, Mich., and an additional assembly plant located at Brockville, Ont., which has been producing cars for Canada and the British dominions.

The board of directors as now constituted consists of Earl as president; John Fletcher, vice-president of the Fort Dearborn National Bank, Chicago, treasurer;

directors, H. F. Wardwell, president of the Burnside Steel Co., Chicago; L. B. Patterson, vice-president of the Edward Tilden & Co., Chicago; Horace Delisser, chairman of the Ajax Rubber Co., New York City; Wallace G. Kay, Kay & Co., Detroit; J. Fletcher Farrell, Sinclair Refining Co., New York; J. Wissenback, Chicago, and L. E. Latta, secretary.

The factory executive personnel includes Kelly R. Jacoby, vice-president in charge of sales; J. R. Findlater, vice-president in charge of Pacific Coast territory; Walter J. Mery, comptroller; David Minard Shaw, advertising manager; Allen T. McKay and R. M. Cowham, assistant general sales managers; Clarence L. Thurston, export manager; Victor Jantsch, chief engineer; W. B. Jameson, general factory superintendent; C. A. Woodruff, purchasing agent; J. L. Blyth, director of service; R. M. Chapman, assistant secretary; Leroy C. Allen, assistant treasurer and W. M. Zerby, traffic manager.

### Built Up Willys

Earl is 47 years old and started his business career with the American Hardware Co. of New Britain. With this company he advanced to the position of vice-president, which he held until he resigned to become vice-president and general manager of the Hendee Mfg. Co. of Springfield. Oct. 1, 1915, he was elected vice-president in charge of manufacturing of the Willys-Overland Co., and until his resignation in December of last year was virtual head of the corporation's interests in Toledo.

The progress that the corporation made during the years of his association attests his ability in the production field as well as his high rank as a manufacturing executive. Soon after the beginning of this association circumstances forced him into fields other than within the immediate scope of manufacturing and resulted in his assuming nominal control of the Willys interests and with general supervision over all matters with the exception of policy and financing.

## Senate to Discharge Federal Truck Debt

WASHINGTON, Oct. 3—Senator Townsend of Michigan has introduced a bill in the Senate for the relief of the Federal Motor Truck Co. of Detroit. The bill would authorize the Government to pay the sum of \$11,117.78 to enable the company to pay and discharge a liability for that amount on account of certain material purchased by it to be used in the performance of a contract with the War Department, a contract that was thereafter canceled by the Government without provision being made for the discharge of such liability.

## Truck Market Shows Return of Business

### No Curtailment Noted in Passenger Car Plants—Collections Continue Good

NEW YORK, Sept. 30—Business in the automotive field continues surprisingly good considering the fact that September usually is one of the duller months. There has been no material curtailment in production in passenger car plants and the truck market is showing signs of life as is evidenced by the resumption of dividend payments by the Republic Truck Co.

Makers of parts and accessories report that their business for September is better than it was for August. This is particularly true of orders for unit parts such as frames and engines. Sales by parts makers in August were slightly better than in July.

Particularly encouraging is the fact that collections are good and that past due accounts gradually are being whittled down. The volume of notes outstanding is steadily decreasing. The finances of the industry rapidly are becoming stabilized.

### Co-operation Apparent

Retail sales of passenger cars in most sections of the country have remained practically stationary for the past three or four months. The natural tendency from now until the first of the year will be downward but surprising interest is being shown in enclosed models.

There is evidently throughout the industry a keen desire to co-operate. This is demonstrated by the decision of the members of the National Automobile Chamber of Commerce to discuss at their annual meeting this week the question of how they can help dealers finance themselves through the winter and what can be done by manufacturers to help solve the used car problem.

The Automobile Underwriters Conference has accepted the contention of the automotive industry that due recognition has not been given in the past to the "moral hazard" in automobile insurance and that this has been largely responsible for the heavy losses incurred in the past two years.

## Marked Gain Shown By Willys-Overland

**Present Daily Output 300 Cars—  
Recent Payments Reduce Loans  
to Less Than \$20,000,000**

TOLEDO, Oct. 3—Retail sales of Overland and Willys-Knight cars have made a marked gain since the last price reduction and since a reorganized sales policy has been announced to some of the dealers. Sales for the first three weeks in September were 223% as compared with the same period in the previous month. Shipments from the factory increased 116% over the same period in August.

Along with the increase in general business has come considerable betterment in the financial position and the company officials are looking forward to a year of capacity business beginning next March. The changes made in the sales policy are quite revolutionary and have not been fully announced as yet.

### Efficiency Increased

It is understood, however, that most of the distributors of the company will be eliminated and the intermediate profits divided between the factory and the local dealers. This action follows the complete survey made of the field by President John N. Willys, who has been on the road for several months. He has increased representation of the Overland products by 410 dealers scattered throughout the country. It is hinted that the new alignment of dealer policy will be an economical change for the factory and result in placing Overland dealers in a position to meet competition with a big increase in business.

Production at the present time is 300 cars a day. The organization of factory methods under the management of Vice-President Charles B. Wilson has resulted in increasing efficiency so that 2.55 Overlands are now being produced with the same number of men as were formerly required to make one car.

Officials report that they have on hand cash amounting to \$8,000,000 and that loans have been cut to less than \$20,000,000 with recent payments. Inventories have been reduced to about \$18,000,000. When market conditions become more stable this item will be reduced to less than \$15,000,000.

### Distributors Dropped

NEW YORK, Oct. 3—Confirmation has been obtained of reports current for the past ten days that the Willys-Overland Co. had decided to eliminate distributors from its merchandising organization although no official statement has been made by the corporation. It is assumed that the purpose of this radical change in policy is to produce more intensive sales effort on the part of the dealers.

It is understood that Guy Simon in Detroit and one or two other distributors will be retained. Harry B. Harper,

president of the Overland-Harper Co. of Philadelphia and former president of the National Automobile Dealers' Association has turned over his large holdings in Philadelphia to the factory.

A considerable number of new factory branches will be established and in nearly every case this territory will cover several States.

The new Philadelphia branch of Willys-Overland, succeeding the Overland-Harper Co., will be managed by George D. McCutcheon, who has been head of the Denver branch. Before going to Denver McCutcheon was branch manager for Buick at Atlanta.

## Drake Is Appointed to Advise on Census

WASHINGTON, Oct. 4—J. Walter Drake, president of the Hupp Motor Car Corp. and director of the National Automobile Chamber of Commerce, has been named a member of a committee of trade and craft organizations to confer with the Bureau of the Census regarding a general schedule for manufacturers for the census of 1921. This committee is the outgrowth of conferences here in July with Secretary Hoover and officials of the Census Bureau. Modifications of the tentative schedule, which has been devised by the Census Bureau, will be suggested by this committee.

Because of its simplicity, the new schedule differs from past schedules and also varies with regard to the amount of information called for. As outlined, the new schedule covers the following items: Name and particulars of establishments as to location and lines of products; persons employed as salaried employees, including managers, clerks, etc., and wage earners, including piece workers; time and operation and products which will be detailed for the particular industries.

## 13 New Names Appear on New York Show List

NEW YORK, Oct. 6—Ninety-three companies manufacturing passenger automobiles will draw for space in the New York show at headquarters here of the National Automobile Chamber of Commerce this afternoon. Thirteen new names appear on the list and eight which have shown heretofore will be absent. The new companies are: Stanley Motor Carriage Co., Noma Motor Corp., Leach-Biltwell Motor Car Co., Cortland Cart & Carriage Co., Bournonville Rotary Valve Motor Co., Essex Motors, Yellow Cab Mfg. Co., C. H. Wills & Co., Handley-Knight Co., Durant Motors Co. of N. Y., Inc., Rickenbacker Motor Co., Kelsey Motor Co. and Ogren Motor Car Co.

The companies which have had displays at the show heretofore and which will not participate this year are: Allen, Brewster, Cunningham, Daniels, Lorraine, Piedmont, Scripps-Booth and Winton.

## Locomobile Works Through Branches

**Company's Program Provides for  
Production of 4 Cars Daily  
and New Prices**

BRIDGEPORT, CONN., Oct. 3—Approval has been given to the plan for the continued operation of the plant of the Locomobile Co. here following the termination of the contract between the company and Hare's Motors, which had been in charge of the property for the last eighteen months.

The announcement of the company's program carries also a new schedule of prices made possible through modifications in the costs of labor and material. These prices are as follows:

	Old Price	New Price
4-passenger touring.....	\$8,600	\$7,600
7-passenger touring.....	8,600	7,600
Limousine .....	10,000	9,150
Sedan .....	11,700	11,000
Cabriolet .....	12,000	10,700
Coupe .....	11,400	10,500
Sport type (Double Cowl)	10,700	9,500
Landulet .....	10,000	9,150

### No Distributors

Under the new plan the company in merchandising its product will sell either through factory branches or dealers trading directly with the factory. It is understood that production will be limited to four cars a day. The factory is ample to take care of such a schedule.

Election of officers has resulted as follows: Elmer H. Havens, president; F. R. Hickman, vice-president and treasurer; E. A. Travis, general sales manager, all Bridgeport residents. Havens is a banker, prominent in the iron and steel industry in New England. His election has been in behalf both of the stockholders and of the other financial interests identified with the continued operation of the plant. Hickman was formerly identified with the company, having been in charge of its finances for many years. Likewise Travis returns to a post he filled for many years.

### Plans Outlined

In a statement of the company's plans, embodied in a letter to the trade, Travis says:

"We desire to assure you that our plans call for strict adherence to the best traditions of the Locomobile company. We take justifiable pride in the prestige our product has earned through the years of pursuit of a well-defined policy of concentrating all our efforts upon a very limited number of vehicles, and building that number supremely well.

"We contemplate no radical changes. We shall build only the one chassis, the '48,' mounting upon it the standard types of coach work with which you are familiar; also designing through our custom body department particular types of bodies for patrons whose requirements are not met by our standard coach work. Our plans call for a gradual extension of the present activities in our plant."

## Fisk Gets Contract To Tire Durant Cars

**No Fixed Number Stipulated—  
Record Established in Getting  
New Car on Market**

NEW YORK, Oct. 3—Durant Motors, Inc., has signed a contract with the Fisk Rubber Co. under which all its four cylinder and six-cylinder models will be equipped with Fisk tires, both cords and fabrics. The clincher quick detachable type will be used. The rear wheels of inclosed jobs will be equipped with cords. No fixed number of tires is provided for in the contract but they will be supplied as needed.

### Competition Keen

There was keen competition for the Durant tire contract and negotiations have been under way for months. Several statements have been made unofficially crediting various companies with having obtained the business. Reports were heard some time ago that F. A. Seiberling, former president of the Goodyear Tire & Rubber Co., might become associated with Durant in the production of tires. It is understood there were some conversations on this subject but nothing came of them.

The Long Island City plant of Durant Motors, Inc., has gone into quantity production this week and is turning out from 50 to 60 cars a day. Actual production on a considerable scale was started Sept. 27. Ten cars were turned out that day and 13 the next. The output has steadily increased since then and it will be expanded as rapidly as possible.

Durant is proud of the showing made in getting the Durant Four on the market seven months after his engineering staff got to work on it. This is said to establish a record.

### Lansing Starts Nov. 1

Credit of this achievement is given to F. W. Hohensee and A. P. Sturt, the chief engineer. Both these men went with Durant from Chevrolet. It was Hohensee, who was general manager of production, who was responsible for getting operations under way on a quantity basis in the Chevrolet plant at Tarrytown in less than two years. This was regarded as a record until he took over the Durant job. The experience gained in the Chevrolet undertaking was used to the best advantage in Long Island City. While installation of the conveyor system at Tarrytown took seven months it was only a matter of weeks in the Durant plant.

Production in the Lansing plant will start as scheduled Nov. 1. A few men are being taken on every week in the Muncie plant of Durant Motors of Indiana, formerly the General Motors Sheridan factory. The work of redesigning the Sheridan which will be known as the Durant Six, is nearing completion but no date has been set for beginning production at Muncie.

The Durant organization considers the

fact that it is now in quantity production sufficient answer to the contention of the Illinois Securities Commission, which has refused to allow the sale of Durant stock in that State on the ground that it is purely speculative. It might be stated that no formal application ever was made for permission to sell stock in that State, although inquiry was made as to what procedure was necessary and some stock was sold there.

The report from Springfield, Ill., that Durant Motors was refused incorporation papers is without foundation. The company never has made application for incorporation in Illinois and has no intention of doing so.

Friends and admirers of Durant are pointing to the fact that he has accomplished in the present period of depression a feat similar to that he put over in the panic period of 1907 when he went right ahead with construction work on the great Buick plant which at that time was the largest automobile factory in existence. He was warned at that time that there would be no possible market for the number of cars the plant was designed to turn out but disregarded this advice and went serenely ahead in the firm belief that there were unlimited future possibilities for the sale of automobiles.

It is significant that development of his present venture began after the period of depression was well under way and it is equally significant that his first factory is getting into production just as the corner has been turned and the business outlook is decidedly more hopeful.

## Grand Prix Entrants Restricted by Ruling

PARIS, Sept. 22 (*By Mail*).—A piston displacement of 2 litres (122 cubic inches) has been adopted for the 1922 Grand Prix automobile race. The cars must weigh not less than 1653 pounds and the distance to be covered will be about 310 miles. This rule automatically eliminates all foreign competition. The French club has adopted as a basic principle that the race shall only be held if the competitors are 33 per cent French. With the 22 cubic inch rule for 1922, they are guaranteed a 100 per cent French race.

In addition to the speed test for purely racing cars, an interesting touring car race will be held on a limited fuel allowance. Officially known as the Touring Grand Prix, the race will be for a distance of 500 miles with four-passenger sporting type cars, having minimum body dimension, running on an allowance of gasoline equivalent to 13.8 miles per American gallon.

### NO NEW ROLLS-ROYCE

LONDON, Oct. 3 (*By Cable*).—Rolls-Royce, Ltd., denies reports that it has ready for production a new four-cylinder 20 hp. car. The model which has been built is being used only for experiments as a part of the company's research program.

## Predicts Few Types by British Makers

**Lanchester Head Believes Individual Character of Automobile Will Be Continued**

NEW YORK, Oct. 4—George H. Lanchester, who for 12 years has been responsible for the development and design of the Lanchester car manufactured by Lanchester Motor Co., Ltd. Birmingham, England, has been in America for several weeks studying the requirements of the American market for high priced automobiles. Lanchester is a brother of Fred W. Lanchester of worm gear fame and considered one of the leading engineers in Europe and one of the best mathematicians in the industry.

### No Mass Production

George Lanchester believes that the individual character of the British automobile, which was a dominant feature previous to the war will be continued notwithstanding much that has been said since the armistice on British companies undertaking mass or quantity production of automobiles. So far the British concerns that since the armistice have aimed at quantity production have not succeeded, and Lanchester does not believe there is much possibility of any English concern succeeding in quantity production in the sense that American makers have carried it on.

Lanchester looks for a continuation of the individual character of car by the British manufacturer, and believes the strength of the British industry lies in this individuality. He believes that the majority of British firms will specialize on one or two models at the most, and that the wide range of models which characterized British makers previous to the war will not be continued, although at the present time there are several British manufacturers who are adding smaller models to their present wide line. Lanchester believes that this is merely a temporary situation due to the depression in the high-priced market and that some of the manufacturers are taking advantage to experiment with the smaller car field.

### Lanchester Car Pioneer

The Lanchester car, which has always been a leader in individuality in the British field, was a pioneer in cantilever spring suspension, having used this form continuously since 1901. The use of a three-speed forward planetary gearset has also been a distinguishing feature. It has used the hour-glass type of worm-driven rear axle for many years, which was developed by Fred Lanchester, whom the industry recognizes as the father of worm drive. The Lanchester car, a six-cylinder design, with cylinders 4 x 5 in., is marketed in two wheelbases, 130 in. for four-passenger cars and 150 in. for other models. The chassis price is £1,950 for either wheelbase.

## Allen Creditors Vote To Liquidate Affairs

**No Financial Interests Found to Underwrite \$1,000,000 Necessary to Continue Operations**

COLUMBUS, Oct. 3.—At a meeting of the creditors of the Allen Motor Co., which has been in the hands of George A. Archer and William C. Willard as receivers for almost a year, a decision was taken to liquidate the affairs of the concern. This decision was made because of the difficulty of disposing of cars of a company under receivership.

This action was in line with the recommendation of the receivers, who submitted a report on the operation of the plant and the business since they have been in charge. It is claimed that more than \$1,000,000 additional capital would be necessary to finance the company properly if it was decided to continue operations. No financial interests have been found that would undertake to underwrite that amount.

The claims against the company are approximately \$1,900,000 although the amount is not fixed because of contingent liabilities as a result of many contracts for parts and bodies. All of the larger creditors were represented at the meeting. Judge Oscar W. Newman and Judge Schroth, representing the receivers have tried to finance the company so that it could continue. Application will be made to Judge J. E. Sater in the Federal Court for permission to sell.

## Olympia and White City Exhibitors Total 520

LONDON, Sept. 20 (By Mail).—Against an entry of 750 exhibitors for the Paris show next month, Olympia and White City for the November show have a total entry of 520. Car exhibitors will number 139, body building exhibitors 55, tires and wheel makers 39, and accessory and component makers and importers 266.

At the forthcoming Commercial Vehicle Show, Oct. 13-22, there will be 76 exhibitors of vehicles, 92 exhibitors of accessories and components, and 23 of tires and wheels.

There will be closed order as to price of cars and carriage-work ruling during the car show, meaning that the prices published in the official catalogs are to remain untouched for the period of the event. Another rule cancels the erst-while facilities for trial runs and re-entry to the exhibition. As at last year's show admission to either section of the show will frank the holder of the card of admission to and from both sections free of cost including the journey from or to White City and Olympia.

### KENNERDELL RESIGNS

NEW YORK, Oct. 1.—Richard Kennerdell, Franklin, Pa., who for eight years has served as chairman of the contest

board of the American Automobile Association, has placed his resignation in the hands of President George Diehl, to take effect immediately.

Chairman Kennerdell during his eight years has been a strong supporter of clean motor contests and his resignation at this time, due to differences of opinion with President Diehl, is a matter of regret. Former Chairman William Schimpf, of Brooklyn, N. Y., who preceded Kennerdell, has temporarily assumed the chairmanship.

## Ohio Farmers Active in Light Truck Field

COLUMBUS, Oct. 3.—With the coming of colder weather and a slight improvement in industrial conditions, increased inquiries for motor trucks are being received by Columbus and central Ohio dealers. A better tone appeared shortly after the first of September and has been improving since then.

During the dull period there was some business in the light delivery wagons and lighter style of trucks, but the heavier vehicles were very dull. Now there is a decided activity in the heavier lines of trucks, including those of 2½ to 5 tons. Despite the restrictions on the use of trucks which limits the weight and load to 10 tons, deals are frequently made for the purchase of 5-ton vehicles. Owners are confident that the coming session of the Ohio General Assembly will amend the law to make the maximum load 12 tons as it is in many States.

Farmers are showing a disposition to buy trucks, although not of the heavy varieties. The usual farm truck is the 1½ to 3-ton sizes. Farmers have not had as bad a year as they had believed and the corn crop as a whole has come out well.

## Dealer Organization Increased by Liberty

DETROIT, Oct. 3.—Liberty Motor Car Co. is increasing its dealer organization following a change in distribution plans affecting several important localities. Latest appointments include dealerships in Syracuse, Houston, Wilkes-Barre, Pa.; Pittsburgh, Springfield, Ill.; Terre Haute, Vincennes, Danville, Troy, N. Y., and Windsor, Ont. Spotty business conditions are found by the company throughout the country, though Southern business as a whole is reported better. Open car business is holding up surprisingly for the season of the year, the company ascribing this to popularity of sport models.

### HANDS BACK WITH LIGHT CAR

LONDON, Sept. 29 (By Mail).—G. W. Hands, founder of the Calthorpe Motor Co., Ltd., at Bordesley, Birmingham, will produce a two-seater light car with dickey seat to retail about \$1,500. It is promised for the Olympia Show period. Hands has motorcycle interests also. The present Calthorpe is one of the best known modern light cars.

## Australian Buyers Expect More Cuts

**Wool Situation Which Has Been Retarding Sales Factor Shows Improvement**

SYDNEY, AUSTRALIA, Aug. 24.—Although most of the automobiles have been reduced in price 50 to 60 pounds sterling or \$250 present exchange, this has not caused any stimulation in sales as buyers are looking for something more in price reductions. At the same time most of the automotive dealers in Australia are getting low in stocks of cars, which perhaps accounts for the small price reductions, the majority of the dealers feeling that it was not necessary to make a sacrifice with so small a stock. There are exceptions where some importers are heavily stocked.

Perhaps the main factor retarding the sale of automobiles has been the inability to sell Australian wool. The farmers have not yet recovered from their losses of the previous years. The wheat farmers have all they can do to meet their financial obligations. This year the whole of Australia is well under crop and while some of it has been severely damaged by excessive rains, the average conditions are good. If the farmers receive one-half as much per bushel as a year ago they will be well satisfied and many will be in a position to buy automobiles. It is estimated that about 50,000,000 pounds sterling represents the amount of money the wheat crop will bring and this will have a similar influence in stimulating recovery of trade throughout Australia.

In the wool market prices are a little higher than pre-war prices and are considered satisfactory. Another factor that is improving the wool situation is that the shares of the British Australian Wool Realization Association, Ltd., have been made negotiable on the stock exchange. This association has issued shares to all holders of unsold wool representing the value of the wool so held and after the wool is sold the shares are liquidated or bought back by the B. A. W. R. A. This has aided in the recovery of business and automobiles have commenced to move as a result.

## 49 Per Cent Franklins Are Enclosed Models

SYRACUSE, Oct. 3.—During the first eight months of this year 49 per cent of the cars shipped from the factory of the Franklin Automobile Co. were of the enclosed type, an increase of 9 per cent over the corresponding period in 1920.

Officials of the company say that the demand for enclosed cars is not confined to cities and towns of the North where the climate is severe, for a careful analysis made by factory statisticians has shown that the sedan type is equally popular in California and Maine and in rural sections as well as in cities.

## Standard Parts Asks To Pay New Dividend

Permission Sought to Distribute  
Among Creditors Second  
\$1,000,000 in 60 Days

CLEVELAND, Oct. 3—The Standard Parts Co., through Receiver Frank A. Scott, has applied to the United States District Court here for authority to pay the creditors another 10 per cent dividend on their claims. The corporation has been in the hands of receivers for more than a year, and Scott's application is received in the financial district as another distinct step toward the ending of the receivership.

If Federal Judge D. C. Westenhaver passes favorably on the application, the company will distribute to creditors \$1,000,000. Approximately 60 days ago Scott distributed another like amount. After paying these \$2,000,000 it is announced that the company will have left in the treasury ample working capital. A hearing on the application to pay will be held on Oct. 15.

### Claims Reduced

Undisputed claims against Standard Parts aggregate \$9,197,000, while there were contingent liabilities of \$1,250,000. These, the application states, have been reduced through adjustments by \$510,000 and the receiver believes they will be reduced further. As a result the total claims against the company are placed at approximately \$9,500,000.

There is good news for the small creditors of the company in the application, for the court is asked for permission to pay in full all claims not exceeding \$100. There are 748 such claims, aggregating \$22,619.

Creditors some time ago proposed a plan whereby they would take over the plant, and at the hearing on the initial application for authority to distribute a 10 per cent dividend, a determined effort was made to have the plan adopted, but it failed. The favorable showing made by the receiver is expected to end all efforts on the part of creditors to take over the plant, especially as stockholders regard the plan unfavorably.

The company is receiving many inquiries for its various products, and one of the factory executives says business conditions are very healthy. "We are going into the winter confident that parts and accessories business will steadily grow, and also with the realization that our customers' shelves are practically empty," he states. The company has one or two plants for sale, but the two dividends were paid from liquidation of inventory and factory operations.

### DEALERS ASK BANKRUPTCY

NEW ORLEANS, Oct. 3—Frank & Weinberger, composed of Theodore Frank and Frank Weinberger, who are the local agents for the Premier and Velie cars, have filed a petition in volun-

tary bankruptcy in the United States District Court here through their attorney, Bertrand I. Cahn. The petition lists the liabilities at \$426,846 with assets of \$144,625. Among the larger New Orleans creditors are the Hibernia Bank with a claim of \$90,000, Marine Bank \$20,000 and the Citizens Bank with a claim of \$11,000.

## No Excessive Stocks Held in South Africa

NEW YORK, Oct. 1—Improving conditions in South Africa, with denials that excessive stocks of cars are held in the customs houses, are reported by the National Bank of South Africa. From Pretoria, the bank reports as of July 30 that the Motor Traders' Association has experienced somewhat better conditions in its sales and the stocks of cars are being liquidated, members of the association having reached the stage in some cases when they will have to begin importing again.

"In view of the damaging effect produced by exaggerated reports as to the number of cars in bond at the coast, and more particularly at Cape Town, a member of the association made extensive investigations in the early part of the month (July) and discovered that the total number of cars in bond at Cape Town was only 360," the bank states. The five months ending May 31 saw the importation of 1052 cars, valued at \$371,863, as against 4187 valued at \$1,065,945 during the same period last year.

## Tractor Sales Grow Under Harvester Drive

CHICAGO, Oct. 3—Tractor sales under the force of the International Harvester Co.'s "Tractor-a-Week Drive," one for each of its branch houses, are showing an increasing number and the drive is a success. As a result of this concentration of sales forces on one line there has been a noticeable drop in other lines handled by the company. For instance, motor trucks, which were selling at the rate of 100 a week before the tractor drive was started, have fallen off to 80 and 85 a week.

On the assumption that there will be a decrease in the price of building materials of perhaps 10 per cent between now and spring, it is announced that there will be no work done on the large new factory of the International Harvester Co. at Fort Wayne, Ind., this year.

### ALL-AMERICAN NOT SOLD

CHICAGO, Oct. 3—The factory site and buildings of the All-American Truck Co. was not sold at auction Thursday, as advertised. A second mortgage for \$50,000 controls the situation and the real estate will go to the holder of this claim. This is the third time the company has been in receivership and this settlement of the concern's affairs is said to mark the end.

## Favors Wadsworth Bill for Air Control

Satisfactory as Emergency Measure, Coffin Tells S. A. E. in  
Urging Legislation

DETROIT, Oct. 3—The Detroit section of the S. A. E. was urged by Howard E. Coffin at the first fall meeting to take early steps toward recommending to Congress the necessity for immediate action on legislation establishing control of the air. Enlistment of private capital in development of commercial air service, he said, cannot be successfully negotiated until such legislation is enacted.

Coffin commended the bill introduced by Senator Wadsworth of New York as satisfactory from an emergency standpoint, while awaiting the formal report of the American Bar Association on the status of air control. To-day, he said, "the only law effective in this country affecting aviation, is the well known law established by Mr. Newton several hundred years ago."

### Laxity Criticized

He criticized the laxity which to-day permits anyone to fly any sort of plane, comparing this with the care exercised in the supervision of elevators in buildings. His talk preceded a showing of the official Army and Navy motion pictures portraying the sinking of the German war ships by Army and Navy air craft.

Dr. H. C. Dickinson of the Bureau of Standards, Washington, spoke on the activities of the department in automotive research and asked for the co-operation of the private research departments of the factories in reaching conclusions. He said much of the study is of general character and should be accessible for the benefit of the entire industry.

The Detroit section will vote at the November meeting on the question of affiliating with the other engineering societies of the city in a general organization, with a central headquarters and a paid secretary. The views of the national society in regard to a movement of this kind will be sought in the meanwhile and announced at that time.

## Deny Myles-Standish Injunction Petition

TOLEDO, Oct. 1—At a hearing in Denver before the Circuit Court of Appeals the Myles-Standish Co. sought leave to ask the District Court for a modification of the sweeping injunction for unfair competition that was granted to the Champion Spark Plug Co. in the U. S. District Court at Omaha on Dec. 3, 1920. The court denied the petition of the Myles-Standish Co., leaving in full form and effect the injunction entered by the District Court.



## White Readjustment to Aid Production

### Automotive Business in Cleveland District Continues to Evidence Upward Trend

CLEVELAND, Oct. 3.—Business is going steadily forward in the Cleveland district, according to many signs that may be read easily.

The White Co. is making certain readjustments in its plant that it was unable to make during the war period or the years immediately following, owing to pressure of business. During this time extensions and additions have been erected which have increased the total floor area from 406,371 sq. ft. in 1914 to 1,271,181 sq. ft.

#### Sales Plan Successful

In preparation of an early return of normal business a rearrangement of methods is in progress for the purpose of facilitating production, thus placing the company in a better condition to meet requirements. Since the sales department was placed in the hands of a committee of four vice-presidents, each with a definite territory, results have been more satisfactory and August sales were 10 per cent in excess of those for July. September business is keeping up.

The truck business is improving, which is taken as an indication that all lines are in on the revival. The International Truck Corp., for instance, sold more Mack trucks in September in Cleveland than it ever did in any other month in history of the organization.

#### Parts Business Does Well

Secretary A. O. Williams of the Cleveland Automotive Trade Association, which is a clearing house for reports on business, says that the parts and accessories business is going well. The Poulson Rubber Co., which manufactures tire accessories, is working night and day at its plant. The Sterling Manufacturing Co., producing the Sterling ammeter, has more orders than it has facilities for manufacturing at present. The Pennsylvania Rubber Co., the A. J. Cooper Co., the M. & M. and Philetric report that salesmen are bringing in orders and that there is no longer the grind and strain that was felt some time ago in doing business.

As for the retail business, the Nash-Ohio Co. is behind with deliveries; the same is true of the Paige, Packard and Buick 4. The Dodge agency sold more trucks in September than it has done in any previous month of the local company's history.

#### BLACK & DECKER SALES PLAN

BALTIMORE, Oct. 3.—An arrangement to sell its product on a time payment basis has been made by the Black & Decker Mfg. Co. The plan, which was put into operation Oct. 1, permits dealers, garagemen and other users of the

company's products to buy them on the basis of 23 per cent down and the balance in monthly installments for a six months' period without interest charges. Jobbers, through whom Black & Decker products are sold exclusively, will receive immediate cash payment in full from a banking corporation which is handling the financial end of the plant. In case a buyer wishes to pay cash he will receive the usual discount allowed by his jobber for immediate payment.

### Austin Motors Denies Rumors of Shut-Down

LONDON, Sept. 20 (*By Mail*).—A rumor was afloat on the Stock Exchange last week-end to the effect that the Austin Motor Co. at Birmingham would close part of its works until spring, the inference being that the step was due to lack of orders. Sir Herbert Austin has promptly denied this rumor and has asserted that the business is moving steadily upward.

There is fair hope that the company will maintain its program and chassis types unaltered for two or three years, concentrate on improving details and strive to get down sales costs, which, of course, must be preceded by a drop in manufacturing costs.

### Mexico Gets Largest Shipment of Ford Cars

DETROIT, Sept. 30.—The largest single shipment of Ford motor cars to Mexico was made by the Houston branch on July 26, when 340 cars were shipped to Cia Importadora del Auto Universal, S. A., Mexico City. It is noted in connection with the shipment that special railroad arrangements had been made to speed it along, as under existing conditions in the Mexican money market, it is imperative to get the cars delivered to buyers as quickly as possible.

Foreign automobile conditions are reported brighter by the company. All foreign plants had an output of 6140 for August. At Buenos Aires production made the most important increase that it has for some time. Ford Motor Co. of Canada turned out 2773 cars and trucks. Production in all plants, domestic and foreign, totaled 118,100 for August. Kearny, N. J., had the highest production of the assembly plants, with Detroit second and Philadelphia third.

#### DISTRIBUTOR IN BANKRUPTCY

DETROIT, Oct. 3.—W. D. Block Motor Co., Marmon and Lexington distributor of this city, has filed a bankruptcy petition in Federal Court setting forth liabilities of \$261,691.67 and assets of \$127,294.11. In the petition as filed by Louis F. Dahling, following a stockholders' meeting of Sept. 20 it is declared that "many defaults are occurring in the payment of notes and it is necessary that collection be enforced or the cars recovered from defaulting purchasers." The Security Trust Co. has been named receiver.

## Avoids Receivership By Dealer Contracts

### Suit Dismissed Against Auto- motive Corp., Tractor Manufac- turer Operating Toledo Plant

TOLEDO, Oct. 3.—After the Automotive Corp., Toledo, manufacturer of tractors and about to place upon the market a small light automobile, had shown that it had valid dealer contracts for \$2,500,000 worth of tractors, a suit, brought by a stockholder in Federal Court asking for a receiver, was dismissed.

Previous to this action the officers of the company against whom state warrants charging violation of the "blue sky" law had been sworn were released from this charge by the municipal court here where the cases were marked off the docket.

President Hulin of the corporation produced the books of the company at the hearing before Special Master Fordyce Belford. After this an agreement was drawn by which the case was withdrawn by the stockholder and he was guaranteed release from all liability for damages arising out of the bringing of the suit.

The company has a new plant here. It has manufactured only a few tractors and is not operating up to production at the present time.

### National Tractor Show Is Postponed a Week

CHICAGO, Oct. 3.—The dates for the seventh National Tractor Show and Educational Exposition to be held in the new exhibition building at the Minnesota State Fair Grounds, Minneapolis, have been changed from Jan. 30 to Feb. 4, to the following week, Feb. 6 to 11 inclusive.

The dates originally fixed made a conflict with the Chicago Automobile Show, the result of which would have been that some accessory and parts manufacturers would be compelled to choose between the two shows in the matter of making an exhibit.

The postponing of the tractor show one week later will avoid this conflict and will make the tractor show run concurrent with the Minneapolis automobile show. It is reasonable to believe that the tractor show will profit to some extent at least by reason of the crowds which will be drawn to Minneapolis for the motor show.

#### SAXON CUT SPURS BUSINESS

DETROIT, Oct. 3.—Decreased prices in Saxon cars effective last week have resulted in a spurt of business which officials believe will continue for some time. Several new distribution contracts have been signed, and the company finds several points now selling where business had been dormant in recent months.

# Production Running on Even Keel

## Bulk of Business In Enclosed Models

### October Plans of Most Companies Impose Heavy Burdens on Body Makers

DETROIT, Oct. 5—Production of cars in the Detroit district during September continued on practically the same basis as August production with a slight decline in low and medium priced cars due, according to executives, to price uncertainty caused by a recurrence of price reductions among a number of important lines.

In the higher priced field practically every company reported increases over August, Cadillac, Lincoln, Packard, Wills-Ste. Claire and Roamer coming under this listing. Packard reports a favorable gain in truck business which promises to be sustained in October. Other heavy duty truck manufacturers also find increased cause for optimism.

Cadillac will increase its output in October to 75 or 80 a day. The new model is declared to be meeting with favorable sales response generally.

Packard will continue its September production of Twin and Single sixes in October.

Lincoln came through with its first 400 month and is looking to better this in October.

Wills-Ste. Claire reports September shipments running as high as 30 daily and looks for continuance in October.

Barley September business surpassed August and the company looks for a 50 per cent increase in October.

Studebaker, which again came through with an 8900, or capacity, month, is the notable exception to the general decrease in the medium priced car field. Sales are holding up strongly and the company looks for high production in October, but it declares difficulty is being experienced in getting enclosed bodies.

With most of the companies the large bulk of October business is going to be in enclosed models and this is imposing a heavy burden on the part of body makers to meet the demand. All of the larger body factories are working to the limit of capacity. An indication of the rush of body business is seen in the fact that despite the opening of the Fisher Ohio Body Co.'s new plant in Cleveland, where bodies for all companies in that district will be made, all of the Detroit plants are in full operation. Briggs Bros. has doubled its capacity by taking over the Everitt plant here. American Body is working extra shifts to meet demands.

Hudson under the influence of lower prices has enjoyed a better sales month

than in August and looks for still further increased business in October following the announcement of its new models. Increased production schedules have been laid down for both Hudson and Essex.

Hupp will increase its production in October after a falling off in sales in September.

Liberty looks for a stronger business in October with the additions made to its sales organization during September.

Saxon also, with an increased distributor organization and a new low price level on its cars, looks for a strong October business.

Reo declares September car business to have been fair but light truck business at a high mark. October business will be benefitted by the introduction of its new models and it looks for a general brightening.

Oldsmobile is pursuing an aggressive sales campaign among its distributor organization, making special effort to promote sales of enclosed cars. September shipments ran at the rate of 55 daily and October business is looked to exceed this if weather conditions are favorable.

Paige during September maintained an average of about 60 per cent of normal in its production schedule, which was under the August average.

Scripps-Booth continues on its schedule maintained during the past several months.

Oakland business after a vigorous start in September, fell off toward the last of the month. The month was the second best the company has experienced this year. October business is expected to react favorably.

Ford Motor Co. finished September with a total of 95,000 cars, a decrease of about 20,000 under August. Sales are continuing high, the company asserts, and 90,000 has been set as the schedule for October. This may be altered, the company declared, to meet either an increase or decrease in sales.

Dort business in September was quiet but general improvement is looked for in October, the South holding out a special field for sales, the company finds, owing to improved conditions in that section and also better weather.

Dodge business in September held to its regular schedule of 550 daily and this schedule will be continued for the first part of October.

### HOLDS SALE CONFERENCE

CLEVELAND, Oct. 4—The annual sales conference of the McGraw Tire & Rubber Co. has been held at the company's general offices here with managers from all sales districts in attendance. The purpose of the meeting was to adopt new distributing policies which have been furnished for the ensuing sales year.

## Jackson Creditors Agree to Combine

### Informed That 14 Companies Will Be Included But Identity Not Disclosed

NEW YORK, Oct. 5—Creditors of the Jackson Motors Corp. agreed at a meeting in Jackson last week to accept the proposal that the Jackson company be included in a proposed \$50,000,000 automotive merger. While they accepted the plan the creditors were left completely in the dark as to the companies with which Jackson will be associated. They simply were informed that 14 corporations would be included in the merger.

The promoters of the consolidation are surrounding their negotiations with secrecy until the plan is presented to the stockholders of the companies whose directors have agreed to the plan. Several companies mentioned in this connection were approached in reference to the combination but declined to enter it.

It has been reported that the Salisbury Axle Co. would be included but this statement was denied emphatically by C. A. Dana, who is president of the Spicer Mfg. Co. which owns the common stock of Salisbury. Strength was lent to the report by the fact that a certificate of dissolution of the Salisbury Axle Co. was filed at Albany a few days ago but Dana explained that this company was an old corporation which preceded the one whose stock they purchased of the Spicer company and that this dissolution was merely a formality. The Spicer company also controls the Parish Mfg. Co. and the same interests dominate the Sheldon Axle Co.

Ralph Van Vechten, vice-president of the Continental and Commercial Bank of Chicago, who was reported to have been prominent in the negotiations for the merger, has telegraphed AUTOMOTIVE INDUSTRIES stating that he has not been connected with the proposal.

## K-W Ignition Loses Suit Against Ford

CHICAGO, Oct. 5—The United States Court of Appeals to-day reversed a decision of Judge A. B. Anderson at Indianapolis, giving the K-W Ignition Co. a verdict of about \$2,000,000 against the Ford Motor Co.

The Ignition company charged that the Ford factory had manufactured for its own use ignition cells on which the K-W company held a patent.

The Appellate Court held that the defendant had not been notified of any infringement of patent rights.

## Uniform Motor Laws Aim of New England

### State Representatives Plan to Lead Way Toward Effecting Agree- ment on Policy

BOSTON, Oct. 3—New England is going to take the lead in efforts to bring about uniformity of motor laws as a result of a meeting here when representatives of the states gathered and listened to addresses on topics along those lines. While the meeting was joined with the National Safety Council, the conference was distinct in that those attending were not members of the organization.

John N. Cole, chairman of the Department of Public Works for Massachusetts in charge of motors and highways, presided. He stated, in outlining the scope of the conference, that motor trucks were the most important part of present-day transportation because of their flexibility.

"Lack of uniformity has caused and is causing more accidents every day than people realize" said Secretary Harry Meixell, Jr., of the Motor Vehicle Conference, New York. "This is due to the fact that it is a most difficult task to get cities, towns, counties and states to agree upon laws where one is required to give away any of its authority to another."

He outlined the Uniform Motor Vehicle law, and told of the movement to interest states in the project. The movement is gaining slowly, and it is expected a number of states will adopt it eventually, because of the vital need for it.

D. C. Fenner of New York, chairman of the motor vehicle conference committee, pointed out that motor truck transportation on the highways could be rendered far more safe if it were made subject to scientific laws uniformly adopted by all of the states and rigidly enforced.

### MAIBOHM MAKES CHANGES

SANDUSKY, OHIO, Oct. 3—The Maibohm Motors Co. announces the following price changes effective immediately:

	Old Price	New Price
5-passenger phaeton.....	\$1,575	\$1,395
Roadster .....	1,575	1,395
Sport roadster .....	1,675	1,395
4-passenger sport.....	1,850	1,595
Coupé .....	2,395	2,295
Sedan .....	2,395	2,295

A year ago the price of the phaeton was \$1,695, with the others in proportion, making a total drop of \$300 in twelve months.

### WHITE HICKORY TRUCKS CUT

ATLANTA, GA. Oct. 4—A 50 per cent reduction has been announced on all models of White Hickory motor trucks, manufactured in Atlanta by the White Hickory Wagon Mfg. Co. This truck is

extensively used in the Southeast. Following is the new scale of prices:

	Old Price	New Price
Model E, 1 ton.....	\$2,450	\$1,225
Model H, 1½ ton.....	2,750	1,375
Model K, 2½ ton.....	3,350	1,675
(150 inch wheelbase)		
Model K, 2½ ton.....	3,450	1,725
(168 inch wheelbase)		

### Davis Reduces Prices on Four of Its Models

RICHMOND, IND., Sept. 30—Effective Oct. 2 the following prices are announced on the 1922 models of the Davis Six, manufactured by the George W. Davis Motor Car Co.

	Old Price	New Price
Touring .....	\$1,895	\$1,695
Sport .....	2,095	1,995
Fleetaway .....	2,150	2,050
Man o' War.....	2,150	2,050

The reductions are from the prices which have been current since last January. Increased production on the three last models together with decreases in the current costs of materials have made the cuts possible. Production at the factory has been steady throughout the year and for the first eight months of 1921 passed the production records for the same period last year.

### NEW REVERE PRICES

LOGANSPOUT, IND., Oct. 5—New prices have been announced by the Revere Motor Car Co. as follows:

	Old Price	New Price
Roadster .....	\$4,850	\$3,850
5-passenger touring.....	4,650	3,850
4-passenger touring.....	4,650	3,850
Sedan .....	6,500	4,500

### ALLEN CARS REDUCED

COLUMBUS, OHIO, Oct. 1—The Allen Motor Car Co. has reduced prices on its touring, roadster and sedan models. The old and new prices follow:

	Old	New
Touring .....	\$1,385	\$1,195
Roadster .....	1,385	1,195
Sedan .....	2,195	1,845

### BEGGS LOWER

KANSAS CITY, Sept. 30—The Beggs Motor Car Co. has made the following reductions on its models:

	Old Price	New Price
5-passenger .....	\$1,775	\$1,520
Coupé .....	2,675	2,320
Sedan .....	2,775	2,420

### GRAMM-BERNSTEIN DROP

LIMA, OHIO, Oct. 3—The Gramm-Bernstein Motor Truck Co. has reduced the price of its Model 10 speed truck from \$1,495 to \$1,365.

### VELIE DOWN

MOLINE, ILL., Oct. 3—Effective immediately, the Velie Motors Corp. announces reductions on its five passenger touring car and roadster, Model 34, from \$1,385 to \$1,235, f.o.b. this city.

## Decreased Thefts Due to Dyer Law

### Vigilance of Authorities Con- tributes to Reducing Number Stolen in 1920 10 Per cent

ST. LOUIS, Oct. 3—Thirty thousand and forty-six automobiles were stolen in 1920 in 28 "index" cities of the country and 21,273 of them recovered, according to the annual compilation of the National Automobile Dealers' Association. The number stolen was 3012 less than the number stolen in 1919 but was 2001 more than the number stolen in 1918. In 1918 cars unrecovered were 21 per cent of the number stolen; in 1919 they were 26 per cent and in 1920 29 per cent.

Chicago took the lead from New York with the number stolen, although a higher percentage of cars remained unrecovered in New York. New York had 5179 stolen; Chicago 5527. New York recovered only 2717 of her stolen cars while Chicago recovered 4340. Dayton had the unusual record of having recovered more cars than she had stolen.

The Pacific Coast cities kept up their yearly good work of recovery. There were 4877 cars stolen in Los Angeles, San Francisco, Oakland, Portland and Seattle and 4175 recovered. The unrecovered cars were 16.4 per cent of the total stolen, or approximately 50 per cent of the average for the country.

The number of thefts in the cities covered decreased 1919-1920 about 10 per cent while the general increase in the number of automobiles throughout the country was about 20 per cent during the same period. A considerable part of this decrease is attributed by the N. A. D. A. to the deterring effect of the national motor vehicle theft law (the Dyer law) which was put through Congress at the instance of the N. A. D. A. and to more stringent laws in the States for the punishment of motor car thieves.

However, a good part of the better showing is due also to vigorous activity of the peace authorities.

The subject of theft is being watched vigorously by the N. A. D. A. and the N. A. C. C. because of the theft insurance rates now having become so high.

### American Bosch Occupies Own Home in New York

NEW YORK, Sept. 30—The new home of the New York branch of the American Bosch Magneto Corp. is a ten-story building erected in the center of automotive sales and manufacturing interests in the city. It is of fireproof construction, being built of steel, stone and concrete throughout. Four of the floors are occupied by the corporation and the upper parts of the building will be rented exclusively to automotive concerns. A large service station and installation garage is located in the basement and the sales and stock rooms, occupying the ground floor, are spacious.

## Moline Equity Kept By Willys-Overland

Will Be Considerably Diluted  
According to Statement of  
Banker Interested

NEW YORK, Oct. 5—Since the plan for the reorganization and refinancing of the Moline Plow Co. was announced there have been persistent reports that "Willys is out of Moline." It can be said on authority that John N. Willys personally never was interested in the plow company except as a subsidiary of the Willys-Overland Corp. Under the reorganization Willys-Overland will retain its equity in the Moline Plow Co. but as one of the bankers interested expressed it, "this equity will be considerably diluted."

In September, 1918, G. A. Stephens, former president of the Moline Plow Co. made an announcement which said:

"The Stephens interest, except F. G. Allen and family and F. G. Allen remaining in charge of the business, have sold their holdings in common stock to John N. Willys for \$150 per share and will receive in payment therefor stocks paying 7% cumulative preferred dividends quarterly, in following proportions of the following companies: Willys-Overland, 55%; Electric Auto-Lite Corp., (now Willys Corp.), 30%; Curtiss Airplane & Motor Corp., 15%.

"The Stephens family has arranged with the purchaser of their stocks that the opportunity is offered to all holders of the Plow company common stock to exchange their stock for the above stocks in the proportion mentioned, and to receive the above stocks in the ratio of 1½ for their common stock.

"The Willys-Overland Co. reserves the right in the case of fractional shares to pay either scrip or cash. It is part of this agreement that dividends on the three preferred stocks mentioned shall accrue from the date of agreement, Sept. 6, 1918. We are advised that the policy of the new management will not be to pay cash dividends on the common for a period of years in order to permit improvements of plants, to take care of the largely increased output and the building up of sufficient reserve and to safeguard this extended business."

As a result of these negotiations the Willys-Overland Co. acquired slightly more than 82 per cent of the Moline Plow Co. common stock.

On the basis of \$150 a share, the Stephens interests received \$12,300,000 worth of Willys securities. Since that time there has been a very material decrease in the value of the Willys stocks. In the absence of any definite information regarding the amount of stock he owns personally in his own companies it is impossible to estimate the personal losses of Willys on the Moline transaction.

## Good Winter Business Sighted in Arkansas

LITTLE ROCK, ARK., Oct. 3—Automobile men in this section of the country are now breathing the air of refreshing optimism. While most sales have been of the more conservative

priced cars, there have been many high-priced cars sold, and dealers over the State are expanding by making improvements and adding new lines, and evidently planning for a big fall and winter business. The cotton and rice crop is coming along and is bringing a good price.

Dealers report that collections are decidedly better, with cash not as hard to get as in the summer. Three months ago it was predicted that not more than 35 per cent of the 1920 debts would be liquidated. At present there is every indication that payments will exceed 75 per cent and that this year's cotton and rice crop, with other farm products, will aid very materially in putting men, who have been carrying burdens of debt, back on a sounder financial footing.

## Collins Obtains Peerless Control

(Continued from page 686)

significant fact that during his entire service there was never even a suggestion of a strike or labor disturbance of any kind in the Cadillac plant. This record resulted from his intimate, personal co-operation with his co-workers in all departments, which created a spirit of loyalty in the manufacturing and selling organizations.

Collins began his automobile career back in the early days of the industry as general manager of the Kansas City branch of the Buick Motor Co. He directed Buick distribution in this important territory with such pronounced success that, three and one-half years later, he was called to Flint, to assume the bigger responsibilities of general sales manager of the Buick company. His achievements in helping to rehabilitate the Buick company, in improving the car, strengthening the factory and distributing organization, multiplying Buick sales many times and putting Flint on the industrial map, have already been recorded among the most sensationally successful accomplishments in automobile history. He later was appointed assistant to W. C. Durant as president of General Motors Corp., maintaining offices in New York and Detroit for the management of the large affairs of the corporation, before becoming president and general manager of the Cadillac Motor Car Co.

On two previous occasions the control of Peerless changed. In 1915 it passed to a New York City syndicate headed by Harrison Williams. The preferred stock was purchased for \$105 a share and the common stockholders were paid \$175 a share and in addition a \$50 bond per share. In 1918, B. G. Tremaine, F. S. Terry and certain associates went into the open market and purchased back control of the company, the managing interest thereby returning to this city. The plant during the boom times of the war and immediately following had 400 men on the payroll. Tremaine retires from Peerless to devote all of his time to the business of the General Electric Co.

## INDUSTRIAL NOTES

Clark-Turner Piston Co. of Los Angeles is establishing factory branches at important distributing centers throughout the country with the purpose of effecting a twenty-four hour service. Appointments of these distributors who will handle warehouse stocks cover Kansas City, Freeport, Ill., and New York City, with another to be made for the Southern States.

The American Motor Parts Co. is transferring its unit from the R. & V. motors plant at East Moline, Ill., to the new factory located in the Ideal Milling Co. plant, with no appreciable reduction in its production schedules. R. & V. Motors disposed of a large section of its plant to the Troy Laundry Machine Co., which is now taking possession.

Ajax Rubber Co., Inc., is operating its Trenton, N. J., plant at practical capacity with three eight-hour shifts a day, and its Racine, Wis., plant somewhat slower on a two eight-hour shift basis, representing a substantial increase over earlier in the year. Shipments are said to equal production with finished goods on hand at the lowest point possible.

The Fulton Tractor Co., a new organization to manufacture a tractor invented by J. F. Fulton which uses no cog gears, has purchased the plant of the American Window Glass Co. at Anderson, Ind. Production of twenty tractors a day at the end of a ninety-day period is promised by the company, which also asserts that it is fully capitalized.

The Raleigh Motors Corp. of Bridgeton, N. J., manufacturer of the Raleigh car, has secured a plant at Reading, Pa. J. R. Sutterlee, president; Leroy Sutterlee, secretary and George Quimby, production engineer, who visited Reading recently, state that they will start production as soon as their equipment arrives and the plant is remodeled.

B. F. Goodrich Co., Akron, shut down the first three days of October for inventory taking purposes. It is believed that following this production will be gradually increased to a more normal basis.

The Eagle Motor Truck Corp. has dedicated a large addition to its plant in St. Louis. Invitations were extended to all stockholders, truck owners and operators in the city.

Kearney & Trecker Corp., Milwaukee, has removed its New York branch office to Room 371, the Hudson Terminal Building, 50 Church Street, New York City.

Buckeye Reliner Producing Co., Lima, Ohio, is preparing to increase the national and international orders and double the amount of its working force.

Hare's Motors, Inc., announces the removal of its executive offices to the Canadian Pacific Building, New York City.

The American Forge Co., Chicago, has changed its corporate name to the AmForge Co.

## DODGE GETS WINDSOR PLANT

WINDSOR, ONT., Oct. 5—Dodge Bros. Motor Car Co. of Detroit has leased a wharf and building from the Canadian Pacific Railway in Windsor, Ont., and is assembling cars there. It is understood that a Canadian company is being incorporated and the location of an automobile factory in Canada is probable.

## Farmers Opposing Reimportation Tax

### Possibility That Graham Measure May Be Defeated Though Senate Bloc

WASHINGTON, Oct. 4—Opposition to the so-called Graham Resolution, which would impose a tax of 90 per cent on re-importations of surplus war supplies, including motor trucks and automobiles, has been expressed by the Oklahoma Farmers Union and the State Farm Bureau Federation. The resolution is now pending on the Senate calendar owing to the fact that objection by Senator Pomerene and others prevented its passage before the summer recess of Congress.

It is the contention of the Farm Bureau Federation that many concerns importing automobiles have contracted to deliver to the farmers automobiles at \$500 each which now sell in this country for \$1,100 or more, and this purchase price includes ocean freight and commission. The organized farmers insist that they can obtain motorized equipment for their farms at a saving of 50 per cent of the wholesale price by purchasing the reimported goods. As a consequence, they are against the Graham Resolution, which would protect the motor truck manufacturers and dealers in this country from this form of foreign competition. If other farm organizations join with these two groups, it is barely possible that the so-called agricultural bloc in the Senate will defeat the Graham measure.

The prospect of delay in the enactment of the Graham bill is particularly disturbing at this time to dealers who have felt the effects of this competition. The Graham measure was designed to provide protection during the time the tariff bill was under discussion. There is a measure in the House tariff bill which provides for assessment of heavy duties on re-imported war materials. It was incorporated in the bill because of the country-wide agitation conducted by organized automobile dealers and manufacturers.

### Poughkeepsie Factory of Fiat on Market

NEW YORK, Oct. 5—The factory at Poughkeepsie formerly used by the Fiat Automobile Co. has been placed on the market by individuals who now own it. The plant originally was used for the assembling of Fiat cars. Most of the parts were imported from the parent factory at Turin, Italy, but some of them were obtained in this country. With the outbreak of the war importation of parts became impossible and the assembling of cars ceased. The Fiat company now is importing complete cars. The parent company is not directly interested in the Poughkeepsie plant.

## September Shipments Show Slight Decrease

NEW YORK, Oct. 5.—Reports of September shipments of cars and trucks made to the National Automobile Chamber of Commerce by its members show that there was a decrease of 4 per cent as compared with last month, but they totaled 85 per cent of September, 1920. In the same month last year shipments were 16½ per cent less than in August. The September shipments compare more favorably with the same month last year than those of any previous month for 1921. The shipment figures by months for this year and last follow:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
January .....	25,057	6,485	29,283	3,185	....	93
February .....	25,505	9,986	43,719	7,507	....	99
March .....	29,326	16,287	57,273	9,939	....	75
April .....	17,147	20,187	64,634	14,197	....	1,619
May .....	21,977	18,608	74,286	15,193	....	2,381
June .....	22,516	20,269	60,746	18,834	8,350	3,947
July .....	23,082	19,470	52,342	15,320	8,702	3,725
August .....	23,386	20,350	34,060	14,290	7,095	3,565
September .....	20,804	20,150	24,431	13,550	5,469	3,580

### Branches Supplant Two Studebaker Distributors

CLEVELAND, Oct. 4—George E. Willis, who has been in charge of the Studebaker's export business and but recently returned from a trip to Germany and Russia, has become head of the Studebaker distributing agency in the Cleveland district, succeeding Aaron Du Roy and Joseph O. Hahn in the active management of the Studebaker Sales Co. The following officers were elected at a meeting of the directors: A. R. Erskine, president; H. A. Briggs, vice-president; George E. Willis, general manager; F. C. Kenny, treasurer, and A. G. Rumpf, secretary. Regarding plans, Willis says, "Aside from the change in officers, the Studebaker Sales Co. of Ohio will be conducted along the same lines as heretofore. Eventually it is the intention of the Studebaker corporation to establish a direct factory branch in this city and to liquidate the Studebaker sales company."

PITTSBURGH, Oct. 4—According to Aaron Du Roy, he and Joseph O. Hahn have sold their entire holdings in the Studebaker Sales Co. to the Studebaker Corp. of America. Du Roy has handled the Studebaker line in the western Pennsylvania territory since 1909. He and Hahn formed the sales company five years ago and handled the Studebaker in the State of Ohio, western Pennsylvania and part of West Virginia, the Studebaker corporation being interested in the company. The B. F. Stout building has been leased for a long term of years to house the factory branch which will supplant the sales company.

### PRIZE FOR BEST AIR MOTOR

NEW YORK, Oct. 4—A dispatch from Paris says the French committee for aeronautic propaganda has decided to create a prize of one million francs for the commercial aviation motor which best satisfies tests, in a competition to be arranged, in point of durability, regularity, simplicity, dismounting and in regard to upkeep.

### Snead Vice-President, H. P. Macdonald, Dies

JERSEY CITY, Oct. 5—The death is announced of H. P. Macdonald, a vice-president of Snead & Co., manufacturers of Snead cushion drives. He was born in Louisville, Ky., in 1880 and was graduated from the Massachusetts Institute of Technology in 1901. He went with Snead & Co. the same year, serving successively as assistant superintendent, general superintendent, chief engineer and vice-president. He was a member of the Society of Automotive Engineers and several other engineering societies.

Macdonald was responsible for a series of inventions relative to the electrical heat treating of ferrous and non-ferrous metals by means of internal resistance. This system was used extensively during the war for the heat treating of steel tubing for airplanes made by the Allies.

Edward M. Huggins, formerly assistant chief engineer of Snead & Co., has been promoted to chief engineer and Ira S. Snead, general sales manager, has been elected to the office of vice-president left vacant by the death of Macdonald.

### Suggests Dealers Get Rediscount Rate Data

WASHINGTON, Oct. 5—Suggestion has been made by Governor Harding of the Federal Reserve Board that automobile dealers in the principal cities inquire of their banks as to what the effect of lower rediscount rates at Federal Reserve banks would be on rates of interest charged by local member banks and then furnish the board with a synopsis of findings. This data will be used by the Federal Reserve Board Advisory Council, which is a statutory body authorized to make recommendations in regard to discount and rediscount rates. Their recommendations had much to do with tightening up credit on automobile dealers and manufacturers in the spring of 1920.

Indications are that the banks will bring about changes to ease the credit situation.



## Seiberling States Plans For Future

### Crisis in Past Came Because of Failure to Anticipate Reaction

CLEVELAND, Oct. 4.—Frank A. Seiberling of Akron, who built the Goodyear Tire & Rubber Co. from a puny corporation to the leading concern of its kind in the world, and who at 61 is now starting to build up another gigantic business, came to Cleveland last week and gave to *Finance and Industry*, a business paper, his plans for his industrial regeneration.

True, Seiberling has aged considerably since the day he borrowed the capital to start the Goodyear plant, but he is just as full of initiative, optimism and fight as he was when he made the initial endeavor.

Although his new start upward is just in its infancy, he already has practically acquired plants which will provide 5000 casings and 6000 inner tubes daily. In the closing days of his career at the Goodyear plant he was expanding production by building new plants and factory additions when the market for raw materials and finished products was at the peak. He did so because the market was at his heels daily, demanding more and more tires.

#### Tells of Collapse

The crisis came to him, he says, because of a failure to anticipate the day and the hour when the reaction would come. Continuing about his collapse at the Goodyear plant, Seiberling says:

"We all sensed the coming crisis; but no one saw it. The business was expanding rapidly. Why, in the first half of 1920 we were in volume of business, 50 per cent ahead of the first six months in 1919. Manufacturers were tramping on our heels to get tires. We tried to keep pace with the requirements of the trade of our old customers. Demand kept mounting; no one foresaw the precise moment when it would end. Well, it arrived. We tried to get money to help us past the crisis in anticipation of a broader program of financing. We found that it was impossible to do any long time financing in the latter part of 1920. We were forced to temporary financing. The purpose of such financing was to save the community of Akron and the cotton mills and other interests with whom we had contracts from the calamity of a receivership for Goodyear. I did not want the responsibility for forcing the cotton mills into bankruptcy placed on Goodyear. We made the best terms that we could and saved the company. I went thru with that bargain to the last. Officially I got out of Goodyear on Friday May 13. I stayed on two weeks longer to clear up certain matters. I gave all the assistance I could, because—well you see—I nursed Goodyear up from nothing to leadership in its line—and it meant something to me."

In the last days of his leadership of Goodyear, Seiberling was expanding and building up his factories at the fag end of a boom period. Now we see him in a different rôle. He has started out to

buy when others are out of the market. That means low prices for the factories.

Here's a quotation on this point from Seiberling: "The year 1922 will see wonders performed in improving processes and perfecting units. It is apparent that by taking old plants at low valuations, the obsolescence will have been charged off. With these plants I will be contented for the present. Some day I hope to build the most efficient rubber plant in the world."

There's plenty of cheer in this statement by Seiberling: "We are on the eve of startling developments, both chemically and mechanically, in the tire business. These developments will be of great value to the tire business and the public, for they will reduce the cost of operating cars on pneumatic tires."

#### Country on Economic Basis

The speaker asserted that he and his brother, C. W. Seiberling, are re-engaging in the rubber business for two reasons: First, because it is the business they know and, second, it offers the best future opportunities. Seiberling then reviews the boom times of the war and the abnormal demand that brought great expansion. Now, he says, the country is getting down to an economic equilibrium. He predicts that the number of automobiles and trucks in use will grow next year from 9,000,000 to 10,000,000 and that it will steadily increase to 15,000,000.

He says that the growth in the number of automobiles does not mean that the tire industry is to grow in units in the same proportion.

"On the contrary," he states, "the development in the tire industry is likely to be in the quality of the product—increasing the mileage of tires. By that I mean a reduction in the cost per mile run; so that the number of tires produced may increase very little over the number heretofore turned out."

"We have acquired a plant at New Castle and have made an offer for the Portage Rubber Co., near Akron. With these two plants we would have a capacity of 5000 casings and 6000 tubes a day. I am proposing to take over the Portage plant for \$750,000. It will be paid in preferred stock of a corporation to be organized to own that plant. The common stock of the Portage plant will go to a holding company that I am organizing for operating purposes. The holding company will own the New Castle plant in fee, having paid for it in common stock at its present appraised value. Later I plan to offer securities to the public to the extent necessary to cover requirements of working capital."

#### GEORGIA RAILROAD SUFFERS

ATLANTA, Oct. 3.—Automobile truck competition may force the Gainesville Midland Railroad of Georgia into the scrap pile, according to a recent letter to a newspaper at Athens, Ga. written by W. B. Veazy, receiver for the road. The territory in northeast Georgia served by the railroad produces ample business to make it pay, but the extensive use of the motor trucks for inter-city transportation in that section, Veazy states, is slowly ruining the business of the railroad.

## Tests Aid Sales in South Africa

### Spring Season Now Realized As Time for Excellent Business Possibilities

JOHANNESBURG, Sept. 15. (*By Mail*)—The month of August saw the finish of the Transvaal Automobile Club Reliability Trials from Johannesburg to Durban. The start was made on July 30 and the trials extended over three days. The distance to Durban is 410 miles and the roads passed over were in varying states of repair. Altogether the trials have done a great deal for the cause of motoring in South Africa. A Buick Six, driven by A. Williams, General Motors representative, took first place in the professional class and was awarded 197.6 marks out of a possible 200. The weight of the car was slightly over 2½ tons loaded and the gasoline consumption 23.45 m.p.g. A Talbot was placed second, with a Scripps-Booth third.

As an aftermath to these tests several attempts were made to lower the road record from Durban to Johannesburg. In its class the Hupmobile stands first at 14 hours 41½ minutes for the distance of 410 miles. The difference in altitude between Durban and Johannesburg is 6000 feet. The Chevrolet holds the best time for its class with 15 hours 21 minutes to its credit. A Nash stock model was driven from Pretoria to Durban and back without a stop, a distance of 892 miles, in 36 hours.

#### Further Cuts Expected

The cause of transportation has received impetus from the different events mentioned above and dealers are making preparations to capture as much of the spring trade as possible. On account of the genial climate that prevails in South Africa dealers have not made spring a special season for sales, but they have realized that it is a season when much excellent business can be done.

Still further price cuts have been notified by some of the tire companies and gasoline has come down in price, no less than two reductions being made recently. The reduction of running costs will help the dealers with sales this year, as running costs have been a bar to a number of sales during the past twelve months. Car prices appear to be stable for a time now, but buyers have been nervous of late on account of further price cuts being expected by them. Dealers, however, are advising the public that prices will remain on the present level for some time.

English cars and trucks are entering the market and creating competition. The Wolsley cars and Leyland trucks are being extensively placed throughout the country. Wolsley are building special colonial models for this country and the Leyland people are adapting their trucks to suit conditions here.

## MEN OF THE INDUSTRY

**William M. Sweet**, a director and vice-president of The Klaxon Co., has relinquished his other duties with the General Motors Corp. to devote his entire attention to the Klaxon interests as vice-president. From 1907 to 1916 Sweet was general manager of the M. A. M. A., resigning to become assistant to A. P. Sloan, Jr., president of the United Motors Corp.; later also becoming assistant secretary and assistant treasurer. In 1918, when United Motors was consolidated with General Motors Corp., Sloan became vice-president of the latter corporation and Sweet continued as his assistant, later becoming assistant secretary of the corporation. Sweet is a vice-president, director and member of the executive committee of Bearings Service Co. Since 1910 he has also been a director and member of the executive committee of the A. A. A., and during the past five years has been vice-president of the Metropolitan Council of that association.

**Murry Irwin** has been elected president of the Advance Manufacturing & Tool Co., making screw machine products and automobile parts in its plant in Cleveland. R. H. Lord has been chosen secretary and treasurer. The other two directors of the corporation are Joseph G. Fogg, former president, and H. W. Sissen, both of whom are lawyers. Irwin, before coming to Cleveland, was sales manager for the Lewis Spring & Axle Co. at Jackson and general manager for the Adams Axle Co. at Findlay, Ohio. The Advance company was incorporated with a capital of \$200,000 and all of the stock has been sold. It has been in production in Cleveland for three years.

**A. M. Leonl**, who brought the P-T tractor wheel to this country from Italy some years ago and who later designed the 3-4 plow Tloga farm tractor, has secured an option on the American patents on the Pavest road and farm tractor, which was described in AUTOMOTIVE INDUSTRIES of Dec. 18, 1919, and Jan. 1, 1920. Mr. Leonl plans to produce a machine specially suited to orchard work and rice cultivation.

**H. J. Edwards** has been appointed supervisor of the Detroit district for the Maxwell Motor Sales Corp. and the Chalmers Motor Car Co. Edwards was connected for many years with the Union Carbide & Carbon Co., both as sales manager and as general manager of several of their subsidiaries, notably the Prestolite Co. Prior to that he was eastern manager for the Moline Plow Co.

**Fritz R. Lindh**, formerly chief engineer of the Graton & Knight Mfg. Co., in which capacity he was in charge of all field research and testing at the factory as well as all field engineering service, has joined the sales organization of the Chicago Belting Co. He will be in charge of the Pittsburgh direct factory branch with headquarters in that city.

**Chas. E. Wagner** has joined the sales staff of the Maxwell Motor Sales Corp. and the Chalmers Motor Car Co. Wagner has been with the Willys-Overland Co. for the past nine years, serving in many capacities ranging from that of factory representative to distributor.

**H. R. Sturgeon**, who was connected with the John N. Willys Export Corp. as advertising manager and previously had been in the advertising department of the Willys-Overland Co. at Toledo, is now associated with the John O. Munn Co. as vice-president.

**H. R. Averill** has become associated with the Cole Motor Car Co., Indianapolis, in the capacity of special representative. Averill

has spent twenty odd years in the automotive industry and was recently identified with the National.

**E. E. Aldous**, for twenty-seven years connected with the American Steel & Wire Co., Chicago, has been named the company's representative in the St. Paul-Minneapolis-Duluth territory with headquarters at St. Paul.

**Curtis W. Keegin** has been appointed by the Cincinnati Ball Crank Co. as district manager for Michigan. Keegin was formerly with the Hyatt Roller Bearing Co. and Continental Motors Corp.

**George C. McMullen**, formerly Pacific coast representative of the Timken Roller Bearing Co., industrial division, has been placed in charge of the division.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

Last week's statement of condition of the Federal Reserve Banks showed a continuation of the improvement in the reserve ratio which has been unbroken since early in July, with the exception of the first week in September. Gold reserves increased \$14,338,000 from the figure of the previous week, total reserves increasing \$15,589,000 to \$2,878,685,000. Deposits increased \$25,795,000, while Federal Reserve notes in actual circulation declined \$17,480,000. The ratio of total reserves to deposit and Federal Reserve note liabilities combined rose, accordingly, from 68.7 per cent to 69 per cent. Total bills on hand increased \$21,041,000, as compared with a decline of \$48,123,000 in the previous week.

There were no striking developments in the local money market last week. The range of rates on call loans was from 5 per cent to 6 per cent, compared with 4½ per cent to 5½ per cent the previous week. The higher range may be attributed to preparations for the usual month-end settlements. Outside the Stock Exchange loans were made at 4½ per cent. Quotations for time money remained unchanged, with only a light volume of transactions effected. Corresponding stability was shown in the market for commercial paper.

The Government report of the condition of the cotton crop as of Sept. 25 established a new low record of 42.2 per cent. The new indicated yield is 6,537,000 bales, representing a reduction in estimated yield of 500,000 bales from the estimate of Aug. 25. It is evident that approximately normal consumption in the next twelve months would draw heavily upon the large carry-over from last season.

The number of commercial failures in the United States in September, as reported by *The Credit Guide*, declined about 5 per cent compared with failures in August. Average liabilities also declined. The volume of bank clearings last week was substantially greater than in the previous week. These figures are indicative of the rather general improvement in trade which has been under way for some weeks.

N.A.C.C. Considers  
Problems of DealersUsed Car Question and Finances  
Held Most Important in  
Discussions

NEW YORK, Oct. 6—Problems of vital concern to the automobile dealer were considered by the directors of the National Automobile Chamber of Commerce at their monthly meeting yesterday and the discussion was continued at the annual members' meeting to-day. Solution of the used car question was considered of most importance and bearing directly on this was the subject of dealer finances. It was contended that manufacturers are taking their losses on their inventories and that dealers are taking theirs on used cars.

Reports received from all sections of the country on business conditions indicated that trade is best in the East and South but that truck sales are improving in Nebraska, Missouri and New York. There still is a scarcity of credit for dealers.

Five more applications than last year were received for space in the New York show. Space was drawn this afternoon. All the applicants will be taken care of in this city but it probably will be necessary to leave a few out of the Chicago exposition.

**J. A. Haskell**, vice-president of the General Motors Corp., was elected a director to succeed W. C. Sills.

Durant Motors of New York was elected to membership in the chamber.

A report on tire standardization, accepted by the Society of Automotive Engineers and the Rubber Association of America, was submitted.

## DUER NAMED RECEIVER

NEW YORK, Oct. 6—Edward R. Duer has been appointed receiver for the Rubber Corp. of America in an action filed by the Equitable Trust Co. which holds a note for \$70,000. Liabilities are listed at about \$900,000 and the assets are approximately \$1,030,000. It was said that the object of the receivership was to conserve the assets of the company so that it either could be liquidated or reorganized in conjunction with the Empire Tire & Rubber Co. of Trenton.

## BURT, REPUBLIC DIRECTOR

NEW YORK, Oct. 6—At the annual meeting of stockholders of the Republic Motor Truck Co., Inc., the only change made in the directorate was occasioned by the resignation of A. H. Ide of Troy, N. Y., and the election in his place of T. A. Burt of Urbana, Ill., who will represent large holdings of Republic stock in the Chicago district.

## PETITION AGAINST WAYNE

DETROIT, Oct. 6—An involuntary petition in bankruptcy has been filed in Federal Court against the Wayne Tractor Co. by creditors.

## METAL MARKETS

**W**HILE minor price changes in the steel market are a probability rather than a possibility, the consensus of opinion in conservative quarters is that no radical making over of values will take place during the last quarter of the year. There are those who see in the rate of operations which has been attained by sheet mills justification for further advances, but the sentiment among representative producers of a diversified line of steel products (for many of which there is still very little demand) is to let well enough alone. If the smaller sheet mills, many of which are dependent upon other producers for their supply of sheet bars, should succeed in elevating the sheet market further, they will be called upon to pay proportionately increased prices for sheet bars, so that in the end they would not be so much the gainers. Moreover, advances in the case of many steel products imply advances in the wages of operatives, which are based on a sliding scale figured on the preceding month's average sales levels. Such advances are hardly conducive to what adjustment remains to be made in the matter of wage schedules generally. In spite of the insistent demands for immediate downward revision of freight rates, there is little likelihood of worthwhile results being achieved during the remainder of the year. The fact is altogether too frequently overlooked that the slight rebounds which have taken place of late in steel prices were not so much due to the enhanced demand as to the fact that deflation in the pig iron and steel markets was based on anticipation of at least partial deflation of freight rates and fuel prices and, when these failed to materialize after a reasonable length of time, the slightest revival of demand was bound to result in a recoil of prices. Automotive interests have been consistent in their attitude toward the market in the last few months and continue to be so, refusing to commit themselves beyond the tonnages which their operating schedules call for. While the desire to avoid carrying a large amount of raw material undoubtedly accounts in a large measure for this attitude, this policy also appears to be the most sagacious one to follow amid the present conditions in the steel market.

**Pig iron.**—Although pig iron interests continue to nurse assiduously the "little boom," as they call the return of more representative buying and further advances are prognosticated, restraint is being more and more imposed by increased production, a number of furnaces heretofore idle preparing to resume operations. Automotive foundries display slight interest in offerings and are not perturbed by the avowed unwillingness of furnace representatives to book orders for deferred shipment.

**Steel.**—"Independents" have advanced their price for sheet bars to \$32.50, which affects chiefly non-integrated sheet makers. The Corporation's sheet bar price is nominally \$35. Some of the Youngstown district sheet mills, flushed by the return of 66% to 75 per cent operations, are obtaining a bonus of \$1 to \$2 a ton for immediate deliveries, overnight shipments, which they were only too glad to make a few weeks ago, having disappeared. Automobile body makers still have considerable tonnages of sheets coming to them at prices below the present market. Demand for No. 22 gage full finished body sheets has eased off, the market remaining notably unchanged at 4.35c. Pittsburgh. Cold-drawn steel bars are in fair demand by passenger car builders, but only small lots

are wanted. The same is true of cold-rolled strip steel. Bolts and nuts are in routine inquiry with prices rather flexible.

**Aluminum.**—The market continues weak and entirely in buyers' favor.

**Copper.**—Domestic consuming demand has improved and, in addition, producers are supporting the market, weaker holders of resale lots having previously liquidated their stocks.

**Tin.**—Primary markets display more optimism, which London encourages.

**Lead.**—The market continues steady, with battery makers buying somewhat more freely.

**Zinc.**—Fair demand for galvanizing purposes is noted. Brass mills still have large tonnages of scrap to fall back upon.

## FINANCIAL NOTES

**Ford Motor Co. of Canada** did business to the amount of \$37,836,473.40 in the year ending July 31, 1921, according to Gordon M. McGregor, vice-president and general manager. After provision had been made for all expenses and for income tax the net profits transferred to the surplus of the company were \$2,121,501.11, in addition to which should be added \$231,127.96, balance remaining in the 1920 business profits tax reserve. Total assets are given as \$18,835,405.69. The output for the year was 46,832 automobiles and 3063 tractors, compared with 55,616 cars and 2335 tractors for the year previous.

**Kelly-Springfield Tire Co.** declared the regular quarterly dividend of 3 per cent on the common stock, payable Nov. 1 to stock of record Oct. 14. Regular quarterly dividend of 2 per cent on the 8 per cent preferred stock also has been declared, payable Nov. 15 to stock of record Nov. 1.

**Erie Tire & Rubber Co., Sandusky,** is solvent with assets of \$800,000 in excess of liabilities, according to a complete audit of the company's affairs from its inception until June 30 of this year, filed by Receiver H. R. Greenlee.

**Moon Motor Car Co.** board of directors has declared the regular quarterly dividend of 1% per cent on preferred stock outstanding, payable Oct. 1.

**Hupp Motor Car Co.** has declared the regular quarterly dividend of 2½ per cent on the common stock, payable Nov. 1 to stock of record Oct. 15.

**Fisher Body Co. of Ohio** has declared the regular quarterly dividend of \$2 on the preferred stock, payable Oct. 11 to stock of record Oct. 4.

Stockholders Approve  
Sunnyhome Dissolution

**NEW YORK, Oct. 5**—Stockholders of the Sunnyhome Electric Co., one of the units of the United Motors group of the General Motors Corp., have approved a resolution to dissolve the company. Claims must be filed by Oct. 19.

General Motors Corp. denied last May that it proposed to sell the Frigidaire Corp., the Sunnyhome Electric Co. and other units not directly connected with automotive products. It was stated then that the sale of the Frigidaire refrigerator would be extended through the sales organization of the Delco Light Co. and that the Sunnyhome company would be consolidated with the Delco company. The dissolution of Sunnyhome is the final step in the consolidation.

Trade to Far East  
Is Well Under Way

## Orient and Latin-America Markets Held Most Important in Foreign Field

**NEW YORK, Oct. 4**—That the Far East and Latin-American markets were the most important in the foreign field was the consensus of opinion expressed here to-day by export managers of the National Automobile Chamber of Commerce at the first monthly luncheon of the present season. The meeting to-day was called especially to introduce William I. Irvine, trade commissioner of the automotive division of the Bureau of Foreign and Domestic Commerce, to the local exporters.

Irvine, after outlining the work the new division hopes to perform and asking the co-operation of the automotive companies, requested the opinion of the members as to which markets should receive particular attention at this time and which likewise could be counted as offering the greatest potential trade for the American companies. Both the Orient and Latin-America were suggested by the exporters present, some of them stating that Latin-America was the more important at this time while others stood out for the Far East. All were positive, however, that these sections should receive careful attention and that sales efforts should not be slackened the slightest. That conditions were improving in each territory and that a resumption of business on a larger scale was imminent was the apparent belief of each speaker.

Irvine plans to leave Washington shortly after the new year on an investigating trip throughout the world.

To Buy Portage Plant  
with Preferred Stock

**AKRON, Oct. 5**—F. A. Seiberling, who will purchase the plant and equipment of the Portage Rubber Co. of Barberton, Ohio, for \$750,000, announces that payment will be made in preferred stock of the corporation which is to be organized. The common stock of the Portage company will go to a holding company which is being formed for operating purposes. The holding company also will own the plant of the New Castle Rubber Co.

It is proposed later to offer certificates to the public to the extent necessary to cover working capital requirements. The two plants have a combined capacity of about 5000 casings and 6000 tubes daily.

## U. S. TRUCK DIVIDEND

**CINCINNATI, Oct. 6**—The United States Motor Truck Co. has declared its regular quarterly dividend of 1% per cent. The company reports that in the first four days of October it booked and had on hand more unfilled orders than in any like period in the past eight months.

# Calendar

## SHOWS

Sept. 28 - Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Grand Central Palace, Auspices of N.A.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.A.C.C.

Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Oct. 10-22—Olympia, England, Truck Show. Nov. 4-12—Car Show. Nov. 28-Dec. 3—Motorcycle Show.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

Nov. 26 - Dec. 3—Shanghai, China, Automobile Show.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Nov. 15-17—Kansas City, Second Annual Meeting of American Petroleum Institute.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 17-20, 1922—Chicago, American Road Builders Association.

## S. A. E. MEETINGS

Detroit, Oct. 21, Nov. 13, Dec. 23, Feb. 24, March 24, April 28, May 26.

New York, Jan. 10-13, 1922—Annual Meeting.

## Northwest Analysis Puts Wyoming First

### Percentage of Increased Car Registrations in That State Slightly Exceeds Oregon

PORTLAND, ORE., Sept. 30—If a comparison of the rate of increase in the use of motor vehicles may serve as a criterion the State of Oregon is at present enjoying a greater degree of prosperity than any other State of the Pacific Northwest, excepting Wyoming, according to Sam Kozar, secretary of state for Oregon, who has made public figures which he obtained through a sweeping analysis of the situation in Arizona, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming.

"Registration of motor vehicles in Oregon for the first seven months of 1921 show a greater percentage of increase in comparison with the total registrations during the year 1920 than is shown by the available official records of any other western state except Wyoming, and eliminating California, for which similar records are not available," said Kozar.

Such a comparison shows, his report indicates, that during the first seven months of 1921 there were registered in Oregon 105.3 per cent of the number of cars registered during the entire previous year of 1920. Figures for the other States show the following percentages: Arizona 95.24 per cent, Idaho 93.58 per cent, Montana 89.61 per cent, Utah 100.84 per cent, Washington 90.63 per cent, Colorado 96.4 per cent, Nevada 99.05 per cent and Wyoming 105.75 per cent. The last three mentioned States have provided figures only to cover the first six months of 1921 and thus would make a slightly better showing if July, 1921, registrations were also included.

A study of motor vehicle registrations in proportion to population, also made by Kozar, shows that in this regard

Washington is in the lead among the far western States, excluding California, for which statistics are not available for such a comparison, while Oregon is third. Giving his figures on this feature of his study Kozar says:

"Official figures received from eight other western states show that during the first seven months of 1921 Arizona registered one motor vehicle to every 9.67 persons, Colorado one for every 7.27 persons, Idaho one to every 8.49, Montana one to every 9.05, Nevada one to every 7.39, Oregon one to every 7.54, Utah one to every 10.56, Washington one to every 7.14 and Wyoming one to every 8.6 persons. The states mentioned thus rank in the following order in ratio of motor vehicles to total populations: Washington, Colorado, Oregon, Idaho, Wyoming, Montana, Arizona, Utah."

## Twenty-three Makes for Commodore Salon

NEW YORK, Sept. 30—Twenty-three makes of American and foreign high grade cars will be exhibited at the automobile salon which will be held at the Hotel Commodore, this city, from Nov. 27 to Dec. 3 and at the Drake Hotel, Chicago, coincident with the National Automobile Show there the latter part of January. There will also be ten custom body builders. Because of the demand for space cars will be exhibited in the lobby and on the mezzanine balcony of the Commodore as well as on the entire second floor.

## COVENTRY MAKES NO RETURN

LONDON, Sept. 16 (By Mail)—The receiver and manager of the Coventry Premier (Limited) since it went into involuntary liquidation has issued a notice to the stockholders pointing out that the proceeds are insufficient to repay the debentures in full, so that there will be no return to either class of shareholders. The company's assets were absorbed by the Singer interests in Coventry. The latter's output is a light car and its report recently issued shows a good return on the capital.

## Kansas City Shows Accessories Gain

### Cars Also in Demand—Commodities with Recognized Name Have Largest Demand

KANSAS CITY, Sept. 30—The upturn in the automotive industry of this territory is reflected in the monthly bulletin of the Federal Reserve Bank, which shows a gain of about 16 per cent in distribution of accessories in August, over July. There is still a deficiency of more than that amount from the distribution of August, 1920, partly taken up in decline in prices. September, judging from casual reports, is showing a marked increase over August, in both accessories and cars. One distributor reported the best August business in his branch's history; and many distributors are having good success, while retailers are in some cases having larger volume in cars than ever before.

The distributors and dealers who are enjoying the largest business are those with established plants here, handling well known cars, whose prices, whether high or low, have been readjusted. Expensive cars seem to be selling proportionately as well as less expensive cars.

From many diverse quarters, the report comes that commodities having the benefit of public or trade knowledge of the name and quality are being asked for. Clothiers, for instance, are turning to brands which they are sure of, through their long acquaintance with names and reputations.

## INDIANA TRUCK DISSOLVED

MARION, IND., Sept. 30—The Indiana Truck Corp. has wound up the affairs of the Indiana Truck Co. which it succeeded with the same management. The company dissolved was incorporated in 1906 and was succeeded by the present company in 1916.



# AUTOMOTIVE INDUSTRIES

## *The* AUTOMOBILE

Vol. XLV  
Number 15

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Thirty-five cents a copy  
Three dollars a year

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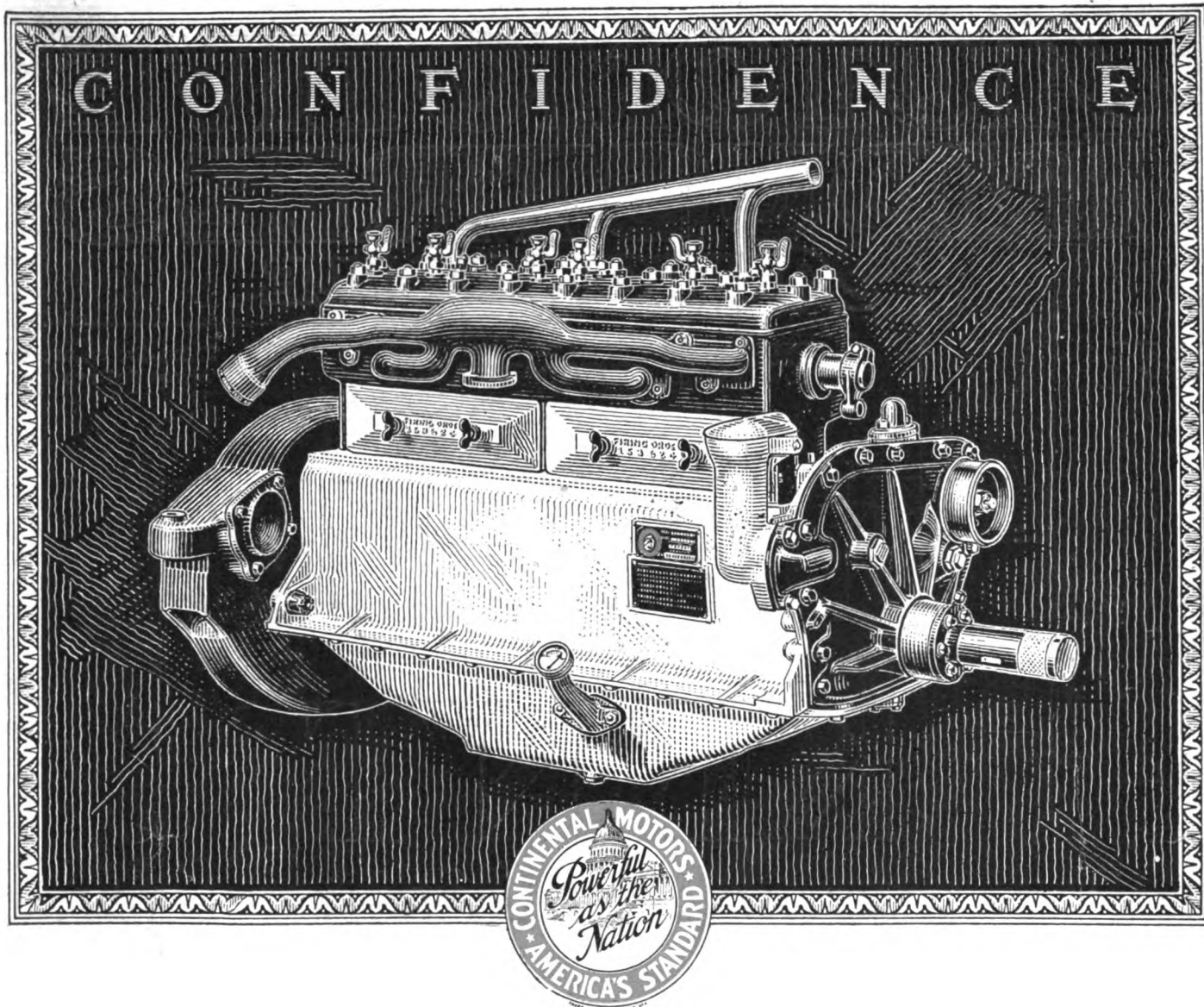
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gation to strive for even greater achievements in the future. ¶ It is to be expected, therefore, that the product whose manufacture is characterized by such a spirit, will operate with unique precision—precision that unavoidably creates the impression that the motor, itself, possesses CONFIDENCE in its own ability—precision that is bound to enhance universal respect for that well known symbol of excellence—the Continental Red Seal.

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Largest Exclusive Motor Manufacturers in the World

# Continental Motors

STANDARD POWER FOR AUTOMOBILES, TRUCKS AND TRACTORS

# AUTOMOTIVE INDUSTRIES

## THE AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, OCTOBER 13, 1921

No. 15

## Trend to Light Cars and Fuel Economy in Paris Show

Engineering efforts to give greater economy of operation are in evidence, but price reductions are few. 4-cylinder models predominate to a greater extent. Three-speed transmissions extensively used on more powerful cars. Only two English cars shown.

By W. F. Bradley

PARIS, Oct. 8.  
**T**HE Paris automobile show, the second held since the Armistice, was officially opened to the public by the Minister of Public Works in the Grand Palais, on Wednesday last, with a record number of exhibitors representative of the entire French automobile and accessory industries. The names of 830 exhibitors are given in the list and of these about 80 per cent are French. Owing to the great demand for space, it was necessary to erect a special building for trucks and tractors. Only two English cars were shown. The American industry is represented by the Pierce-Arrow, Cadillac, Standard and Buick. Practically all of the Italian makers are showing their products.

These figures indicate that the Paris show, like the Berlin show, was largely national in character. No attempt at the exclusion of foreign cars was made, of course, as in the case of the German show, except that German manufacturers were prohibited from exhibiting. The small number of British exhibitors indicates that the Britons will be content with concentrating their efforts on the Olympia show. Thus the Italians are the only foreign makers to exhibit as a body. This is probably due to the very poor

home market which has faced the Italian makers during the last few years.

French manufacturers insist that the present high taxes on gasoline are a large factor in retarding the trade. These taxes, together with the high import duties which France has placed upon foreign cars, are doubtless responsible to a large extent for the decline in the international flavor of the Paris salon. The American makers have evinced considerable interest in the show, nevertheless, since they outnumber the British exhibitors, despite the fact that they have extremely unfavorable exchange conditions in addition to the other difficulties presented.

French manufacturers are hopeful that the show will mark the end of the industrial depression. It is believed in some quarters that the wish is largely father to the thought so far as this is concerned. The past 18 months have been so disastrous that even the most optimistic are merely hopeful rather than assured. The factors underlying the depression are such, however, as to indicate that the show itself can have little more than a helpful influence on the condition of the industry. As noted previously, the manufacturers believe the high gasoline taxes to be responsible for a large measure of sales resistance,

while other factors of similar nature have served to make marketing difficult.

There is a definite feeling, however, among those closely in touch with the situation that a real buying campaign may set in following the salon. This feeling is based upon an observation of the visitors to the show and of the live interest which has been shown in many of the exhibits. Aside from the hindrances to selling mentioned, there has been something of a general disinclination to buy, similar to that experienced in the United States. The interest stimulated by the salon is expected to have a very favorable effect in overcoming this attitude, and there are already some indications, after the first few days of the show, that these expectations will be fulfilled to some extent.

French manufacturers are hopeful that the show will mark the end of the industrial depression, but the past 18 months have been so disastrous that it is more a case of hopefulness than of assurance. The impression prevails, however, that, after the first few days of the show a real buying campaign will set in. Manufacturers insist that if the government would remove the present high taxes on gasoline a great impetus would be given to trade.

In a technical way, much effort has been made by the French industry to attract buyers. In view of the fact that the public desires greater economy of operation, practically all makers are producing smaller and lighter designs. The dominating type at the show is a light, 4-passenger, 4-cylinder car of 120 cu. in. piston displacement or less, with a nominal rating of 10 horsepower. Some of the firms which have always been catering to the high-class trade and never previously have built cars of this type, have entered this class. Panhard, for instance, offers a 4-cylinder Knight engined car of 60 x 105 mm. cylinder dimensions (2.36 x 4.13 in.). Voisin also shows a 4-cylinder Knight engined car of 60 x 110 mm. cylinder dimensions (2.36 x 4.33). Darracq, Delage, Delaunay-Belleville, Delahaye and Chenard-Walcker are other firms building smaller cars than they have ever turned out before. Citroen, while continuing his present model, has placed on the market a 5-hp. 2-seater with a 4-cylinder 55 x 90 mm (2.16 x 3.54 in.) engine, which sells complete for 8500 francs (\$653 on the basis of the current rate of exchange). For the manufacture of this car Voisin has secured control of the Clement-Bayard factory.

Very few reductions in price have been announced, the makers declaring that rock bottom figures have been reached, and it is believed that competition is causing some of the smaller makers to sell below manufacturing cost. The price of the Citroen 4-seater is now 13,900 francs (\$1,000).

Talbot-Darracq has put out a 12-hp. 5-passenger car at 22,000 francs (\$1,585), this being one of the cheapest 6-cylinder models shown. The Lorraine-Dietrich 6-passenger sells at 28,750 francs (\$2,075). Fiat has reduced the price on the 10-hp. 4-passenger model to 21,500 francs (\$1,550).

Four-cylinder models are in a greater majority than at any time in recent years and are followed by the 6-cylinders. Only two 12-cylinder models are being exhibited, a luxury type Voisin 12 with an all-aluminum

engine of the Knight sleeve-valve type and a Fiat 12 with overhead valves and the camshaft in the crank chamber. Lancia, another Italian maker, is showing an 8-cylinder chassis which has the peculiarity that the two cylinder blocks of the V-engine make an angle of only 14 deg. with each other. Bugatti, who claims to have been the first to have turned out an 8-cylinder in-line engine, of 3 litres (183 cu. in.) piston displacement, is showing a sport model of this type. Panhard is showing a new 8-cylinder in-line Knight-engined car and Fonck also shows an 8-cylinder in-line model. No other multi-cylinder engines have made their appearance. Ballot is marketing duplicates of his 2 litre (122 cu. in.) racing jobs with sport bodies.

The most outstanding feature of the show is the use of front wheel brakes by 35 different firms, 23 of which are working under Perrot license. Bugatti, Rolland-Pilain and Voisin are using hydraulically operated brakes, while on the Slim car compressed air is used for applying the front brakes. Among the important firms which have recently adopted front-wheel brakes may be mentioned Panhard, Fiat, Hotchkiss, Rochet-Schneider and Farman. There are several instances in which front brakes are fitted to chassis with a rating of 15 hp.

or less, and buyers in a great many cases now insist on these brakes. Servo brakes, by which is meant brakes which are operated by other than muscular energy, are used on several cars, including the Ballot, Panhard, Bignan and Chenard-Walcker. The Mallot servo brake, with which it is impossible to lock the wheels, is used by Chenard-Walcker and Bignan. There is a slight increase in the proportion of overhead valve engines, the overhead valve design being used particularly

in conjunction with detachable cylinder heads. Most of the overhead valves are operated by pushrods. The great majority of the entirely new models are fitted with Delco electric equipment, but none of the modified or remodelled cars take this equipment.

Three-speed transmissions are coming into more extensive use on the more powerful cars, while the majority of the cheaper and smaller models retain the four-speed gearbox. A great deal of development work seems to have been done on springs. Only three firms—Berliet, Lorraine-Dietrich and Bellanger—are adhering to the American type of car with large engine and of cheap production, whereas all of the other makers are turning out the European type of cheaper car with the smallest possible engine.

**FIGURES** made public by the Controller General of Civil Aviation in Great Britain show that from May, 1919, to March, 1921, 63,975 civilian airplane flights were made in the United Kingdom, averaging 19 minutes per flight. The planes flew a total of 1,593,700 miles in the 23 months.

More than 170 tons of freight and 110,388 passengers were carried.

Goods imported by airplanes during that period totalled in value 818,553 pounds sterling and exports aggregated 402,776 pounds.

In France civilian airlines imported 2,041,400 francs worth of goods during the first quarter of this year. Exports by air amounted to 660,200 francs.

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**T**HE exceptional interest shown by the public in the Paris show has made French manufacturers hopeful that the worst of their depression is past. The high gasoline taxes, which continue to hinder sales, are reflected in the engineering trends at the show. The dominating type is a light 4-passenger, 4-cylinder car of 120 cu. in. piston displacement or less. The French automotive engineers have made definite efforts to attract buyers through designs which make for fuel economy.

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# New German Car Has Novel Design Features

The clutch design of this 30 hp. Protos is entirely new. The method of locking the gears in position is unusual. Cylinder block is an excellent example of German engineering and foundry practice. There are no control hand levers on steering wheel. Four-cylinder engine used.

By Benno R. Dierfeld

**T**HE large Siemens electrical manufacturing company in Siemensstadt, near Berlin, about seventeen years ago established a branch factory for the manufacture of automobiles. Its line of cars have been sold under the trade name of Protos and have enjoyed a wide market. A number of the chief components of the latest 30-hp. Protos model are illustrated herewith. The car is fitted with a four-cylinder 80 x 130 mm. (3.15 x 5.12 in.) engine.

The four L-head cylinders of the engine are cast in a block, with the heads integral. The crankcase is divided horizontally. Cooling is by thermosyphon circulation, ample water spaces being provided. The aluminum fan is driven by a fabric belt. The crankshaft is carried in three babbitt bearings in the upper half of the crankcase. The pistons are of cast iron with three rings, and the piston pins are fixed in the piston bosses. The valves have adjustable tappets and are enclosed by large aluminum cover plates. The camshaft is driven by an enclosed, silent chain which also drives the high tension magneto. The latter is a special enclosed type built by the Siemens concern, and is located at the right hand side.

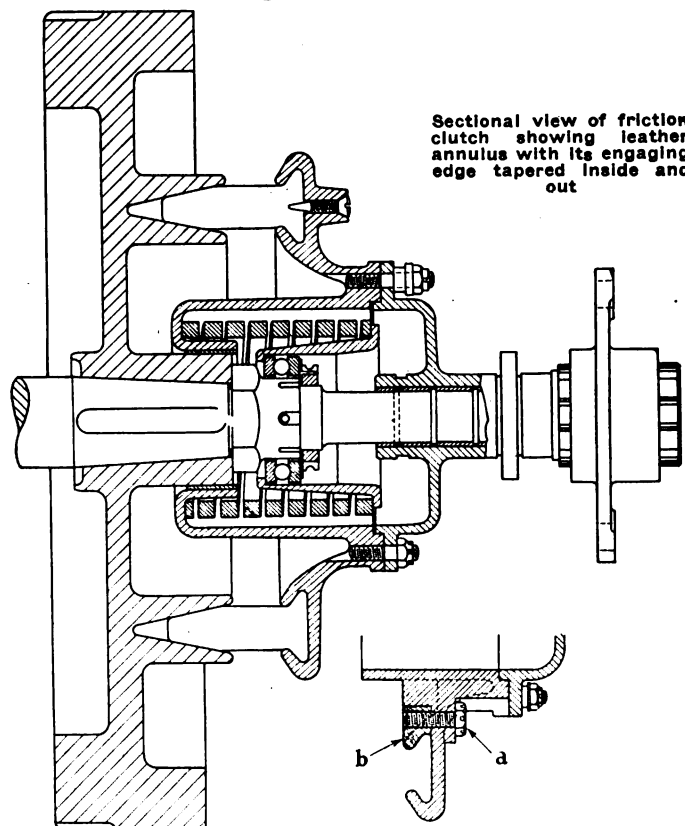
An electric generator is arranged on the right hand side and driven by a fabric belt from the front pulley; between the crankcase arms extend cast aluminum filler plates or continuous webs which form bases for the magneto and generator and replace the usual noisy sheet steel underpan. The Zenith carburetor is located on the left hand side, the mixture passing from it through a cored hole in the cylinder block. Lubrication is by a circulating system with gear pump. One of the illustrations shows different sections of the cylinder block. This is a very fine example of German engineering and foundry practice. The arrangement of the internal gas passages and the ample water space can be clearly seen from these drawings.

The flywheel is made from a forging, the objects being to obviate all danger of bursting and to eliminate or at least minimize the rejections which are said to be numerous with cast flywheels; its rim has the usual gearing for the electric starter.

The clutch is an entirely new design. The flywheel is formed with an annular Vee groove that forms the female double cone. The male double cone consists of a number of suitably cut leather disks, which are held to the aluminum clutch plate with a dovetail joint and are further secured by screws. This leather double cone with the clutch plate is pressed against the flywheel by means of the usual coiled clutch spring. When the clutch is en-

gaged there is no axial thrust on the main bearings of the crankshaft. Declutching is effected by means of a divided coupling sleeve on the hollow clutchshaft. In order to remove the leather disks, screw *a* in the clutch plate is loosened, after which the filling piece *b* in the dovetailed groove may be removed and the screws loosened. The coupling sleeve is lubricated by means of a snap lid oil cup. The transmission has four forward speeds and reverse and several sections of it are shown. There are three shifter bars with the usual forks engaging into slots on the gear hubs.

Quite interesting is the manner of locking the gears in position. For this purpose the shifting lever shaft is provided with a lever *A*, having two arms *A<sub>1</sub>* and *A<sub>2</sub>*. The lower end of arm *A<sub>1</sub>* engages between the two lugs on the upper side of the shifter bars and the lower end of arm *A<sub>2</sub>* carries the sickle-shaped piece *S*. Furthermore, there is arranged transversely to the shift bars a locking bar *B*, with two milled notches *D* and *E*. The shifter bars also have two lugs on their under side. The sickle-



Sectional view of friction clutch showing leather annulus with its engaging edge tapered inside and out

The Protos has never been sold in this country but became somewhat known here through its participation in the New York-Paris race in 1908. It arrived in Paris first but was disqualified because of having used the railroads in the western part of the United States, and a Thomas car was declared the winner.—EDITOR.

shaped piece *S* of the gear shift lever engages in the notch *D*, where a guide roller *R*, for the straight side of *S* and a spring loaded roller *R*, for the curved back side of *S* are provided.

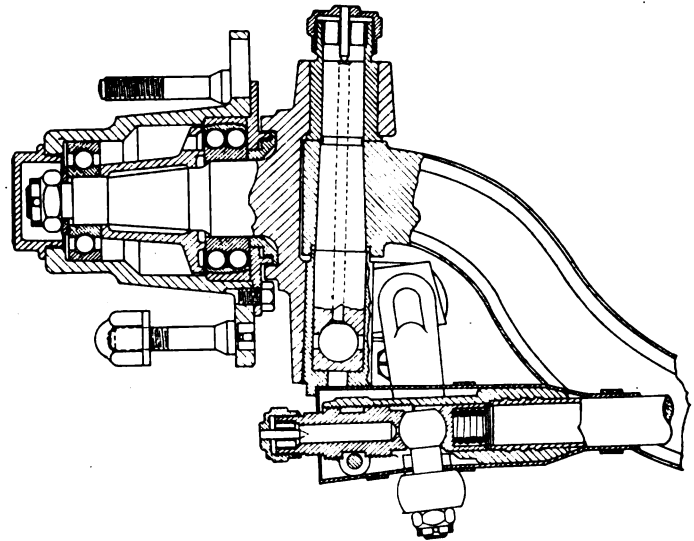
As soon as the gear shift lever is moved axially, piece *B* is moved axially too, because the sickle *S* engages in notch *D*, and its milled notch *E* opens the way for the middle gearshift bar, while the other two shifter bars are locked by piece *B*, engaging their lugs on the under side. Now the shifter lever can be swung sideways and the desired gear engaged. Finally, the spring-loaded roller engages the corresponding notch on the back side of the sickle *S* and locks the gear in position.

When any forward gear is engaged the two reversing gears are at rest, thus consuming no power.

All transmission shafts run in ball bearings; the transmission case has a cover with which the gearshift gate is cast integral, thus facilitating the mounting of the transmission in the chassis. Lubrication of the transmission is entirely with oil, the supply is replenished through a snap cover filler *O* so arranged that the oil level in the transmission case is limited as to height, thus avoiding oil waste or power loss due to too high an oil level. The oil cup on the upper part of the transmission case serves to lubricate the universal joint.

The brake at the rear of the transmission is operated by pedal, shaft and toggle; its shoes are lined with cast iron. Adjustment can be effected at the pedal and by a small hand wheel on the brake itself.

The combined universal and slip joint runs in oil and its case encloses the pulley of the speedometer drive. The drive shaft runs in ball bearings in the torsion tube; the front bearings are lubricated by an oil tube from the

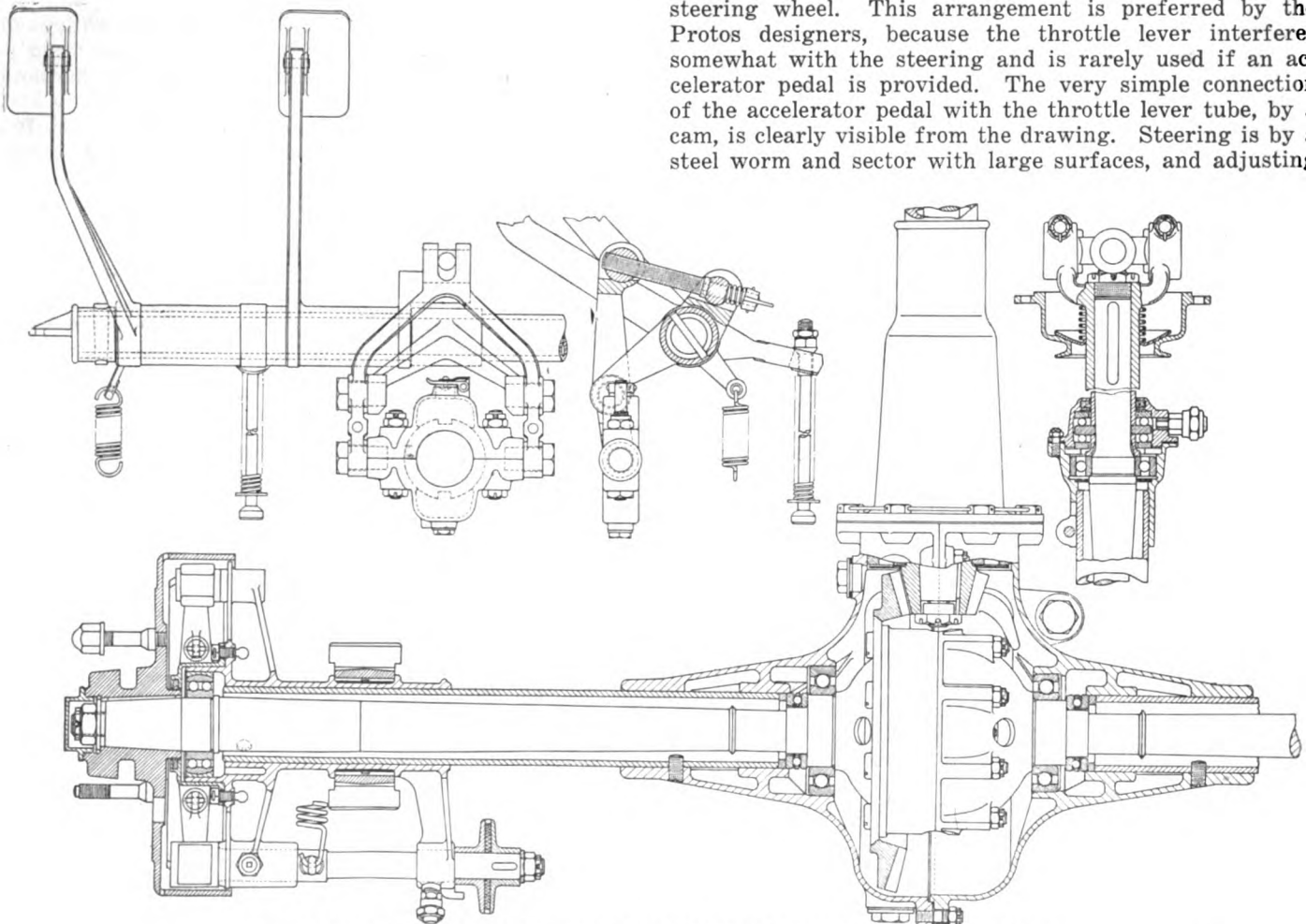


Front axle end, knuckle and inner hub

transmission case. The rear axle housing is of cast steel with pressed-in steel axle tubes; the bevel pinion shaft runs in one large and one small ball bearing, the thrust being taken near the universal joint.

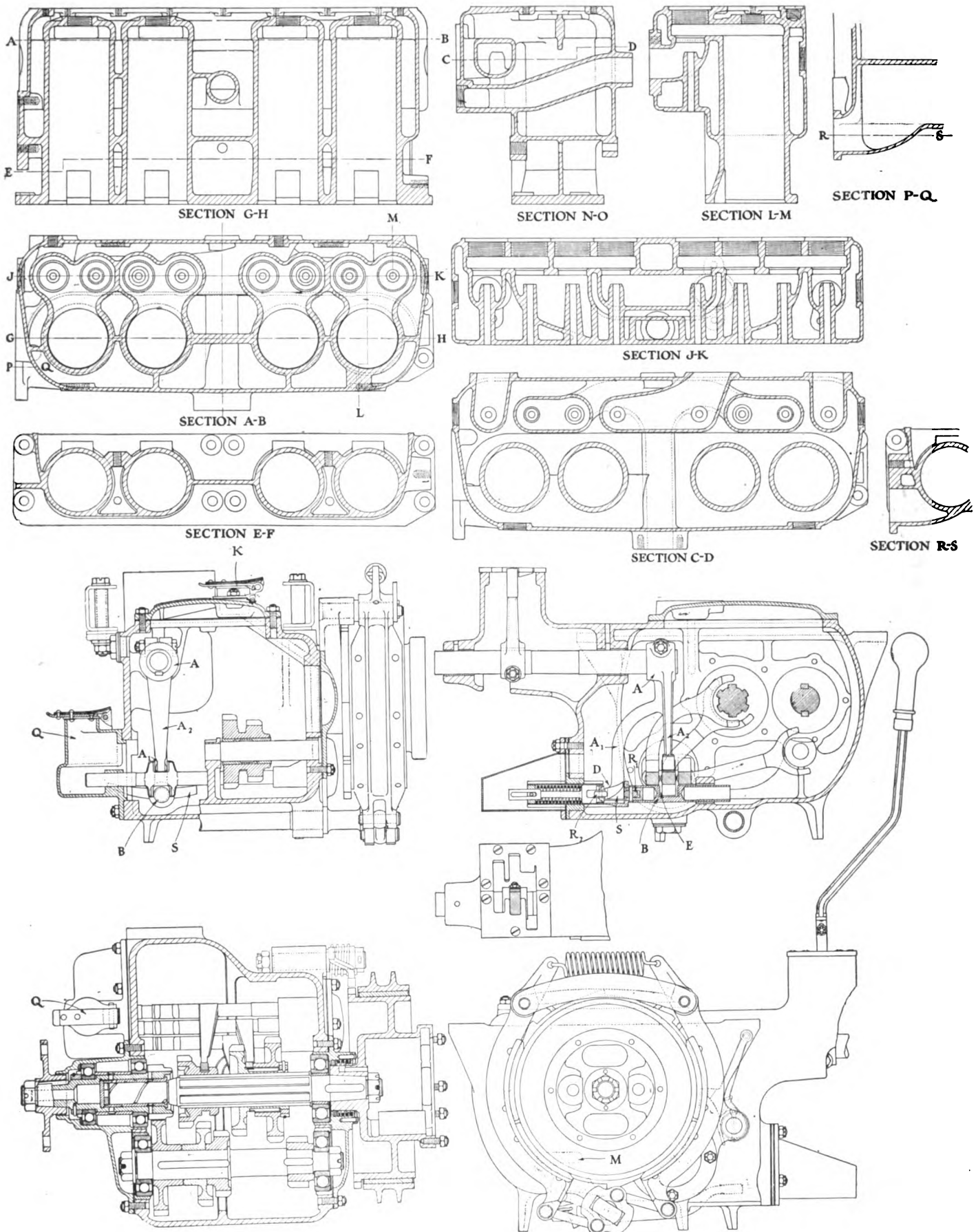
The rear-axle is semi-floating. The steel wheels are fitted to a conical hub and can easily be removed with a special spanner. The rear brakes are expanding brakes and can be adjusted by means of a fluted disk.

There are no control hand levers on the steering wheel, for the magneto has automatic spark advance and the throttle lever is replaced by a rotatable sleeve below the steering wheel. This arrangement is preferred by the Protos designers, because the throttle lever interferes somewhat with the steering and is rarely used if an accelerator pedal is provided. The very simple connection of the accelerator pedal with the throttle lever tube, by a cam, is clearly visible from the drawing. Steering is by a steel worm and sector with large surfaces, and adjusting



Pedal assembly and sectional views of rear axle and forward end of propeller shaft





Above: Sectional views and details of cylinder block. Below: Views of the gearbox, control and service brake

means are considered superfluous. The sector forms one piece with the steering arm, thus increasing the security.

The front axle is of the Mercedes type. The ball heads of the steering knuckle arms are below the tie rod, so the latter could not drop to the road if it should become detached. The ends of the tie rod tube are rolled into the annular grooves of the fittings. This is claimed to result

in a very dependable joint, avoiding the danger of burning the metal in brazing. Within the wheel hub there is a small ball bearing at the outer end and a large double row ball bearing at the inner end. The steering knuckle pivot has plain bronze bushings, with a large steel ball taking the axial thrust. Front and rear steel wheels can be exchanged.

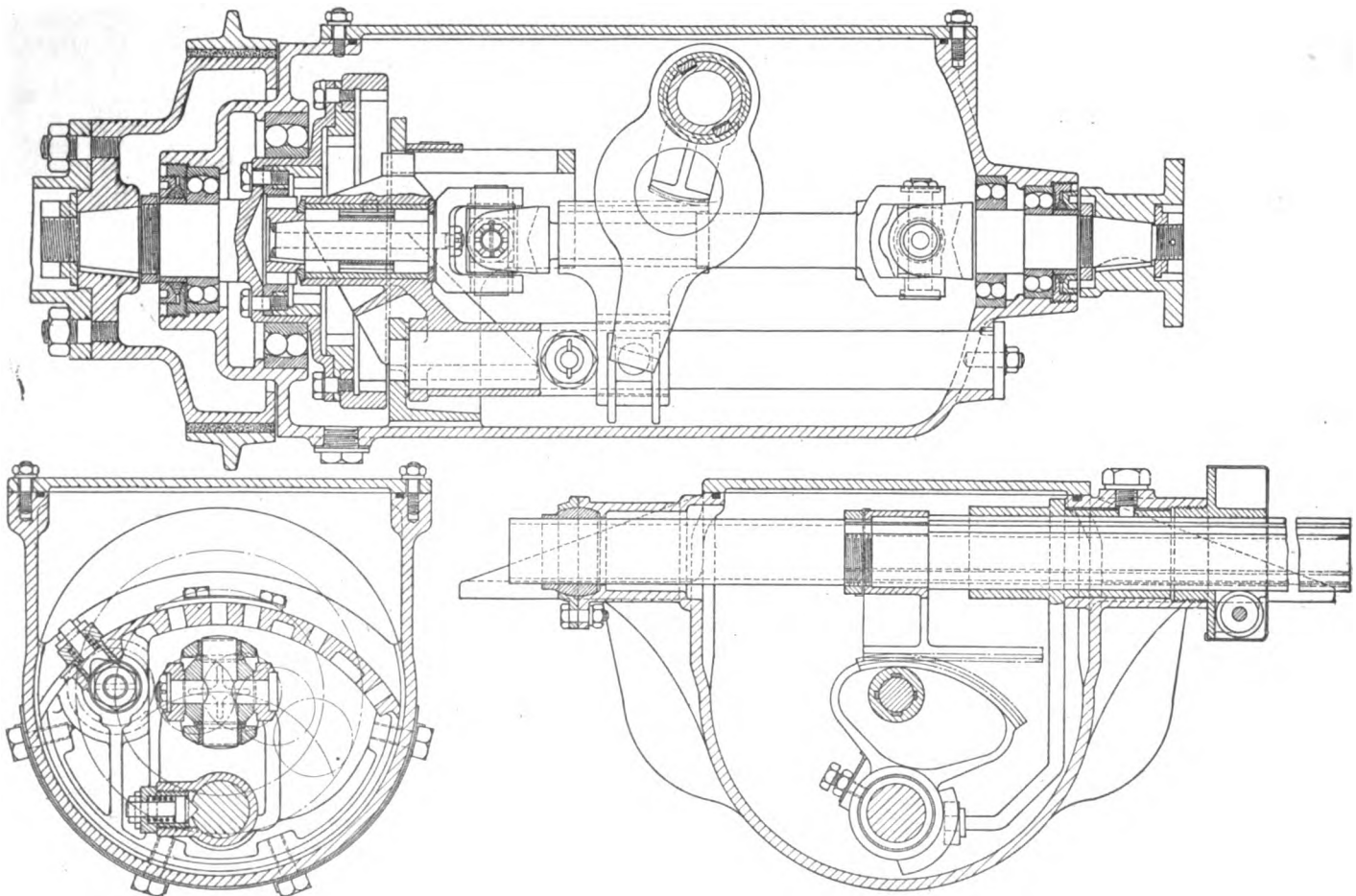
## A New Gear Box of Swedish Origin

**A** MOTOR car change gear has been invented by L. A. Pettersson, a Swedish engineer, a representative of whom is now in this country. The chief feature of the new gear is that for all forward speeds the power passes through the gearbox in a straight line, from the first motion shaft to the tailshaft arranged co-axially therewith, so that the usual secondary or countershaft is eliminated. The transmission shown herewith is designed to afford four forward speeds and one reverse, including a direct drive. The gearing itself is exceedingly compact, and that the complete gearbox is of about the same size as the conventional box is due to the fact that it also encloses an intermediate shaft with two universal joints, which permits of giving the single driving pinion, when changing from one speed to another, a radial as well as an axial motion. The gear is known as the Centrali.

As will be seen from the illustrations, the primary shaft consists of three parts. The first part is mounted in the outboard bearing at the clutch end and connects to the clutch shaft or sleeve. The second or intermediate part connects the two universal joints and incorporates a sliding joint. The third part, which carries the single driv-

ing pinion, is mounted in a bracket swiveled around a pivot in the lower part of the case. By moving the bracket axis different distances from the outboard bearing axis the pinion and its shaft can be slid into mesh with one or the other of four concentric internal gears all secured to the driven shaft. Operation of the gear is effected by a single lever at the side of the case which has both a sliding and a rocking motion. The sliding bearing supporting the driven pinion is first rocked into the position corresponding to any particular gear and is then shifted into mesh lengthwise. When in mesh the bearing bracket is held against lateral strains by a locking key which enters a slot in a sector plate, and it is held against longitudinal strains by the usual spring-pressed plunger. The reversing pinion rotates only while actually in use, and when not in use disappears in a recess.

A number of advantages are claimed for this change gear, the principal one being silent operation. All bearings are of the anti-friction type. As compared with the conventional type the gears are fewer in number but larger in size, since the total reduction is made in one step instead of two.



Primary shaft showing three parts

# Unconventional Sporting Airplane a New French Product

Unusual four-cylinder engine in airplane of original design. Duralumin combined with ordinary wood and fabric in construction of frame. Manufacturer also produces larger planes for passenger carrying.

By John Jay Ide

THE aviation firm of Henry Potez came into existence during the war, when it constructed a considerable number of airplanes to the designs of other makers. After the war Henry Potez undertook the production of airplanes of his own design, the most unconventional of which is known as Type VIII. This machine is of the so-called sporting type and is fitted with a most unusual 4-cylinder engine, also designed by Henry Potez and described below.

In the Type VIII Henry Potez biplane duralumin is employed for the channel section wing spars, wing ribs and the framework of the fixed and movable portions of the tail. The longerons and struts of the fuselage are also of duralumin, while the fuselage covering is of plywood. It remains to be seen whether this compromise between all-metal and the ordinary wood and fabric construction has pronounced advantages.

The landing carriage has four wheels and, due to the low position of the fuselage, the struts connecting the axles with the fuselage are commendably short. A sprag brake, pivoted to the center of the rear axle and operated from the pilot's seat, reduces rolling after a landing has been accomplished. The machine can be landed at only 25 miles per hour, owing to the low wing loading—4.5 lb. per square foot.

The pilot is placed in the rear seat, and, as the passenger is placed at the center of gravity, the machine can be flown in his absence without compensating ballast. Double control is provided.

The specifications of the Type VIII Henry Potez are:

Span (upper plane) .....	26.2 ft.
Span (lower plane) .....	22.3 ft.
Total length .....	18.4 ft.
Length of fuselage .....	15.4 ft.
Total height .....	8.0 ft.
Wing area .....	205 sq. ft.
Wing chord .....	4.6 ft.
Wing gap .....	4.8 ft.
Aileron area .....	19.9 sq. ft.

Stabilizer area .....	15.6 sq. ft.
Stabilizer span .....	7.9 ft.
Elevator area .....	10.2 sq. ft.
Rudder area .....	4.8 sq. ft.
Fin area .....	7.0 sq. ft.
Weight empty .....	485 lb.
Live load .....	353 lb.
Fuel and oil for three hours .....	88 lb.
Total weight .....	926 lb.
Weight per sq. ft. ....	4.5 lb.
Weight per hp. ....	18.5 lb.
Factor of safety .....	7
Speed at ground level .....	75 m.p.h.
Climb to 6560 ft. ....	18 minutes



Type VIII Henry Potez biplane

## Novel Engine Has Vertical Crankshaft

The Type VIII model is equipped with a Henry Potez Type A-4, 50-hp. engine. There are four air-cooled cylinders in line with a vertical crankshaft. The heads face forward in order to insure adequate cooling. The propeller is driven through a bevel gear at the top of the crankshaft. This bevel gear also acts as a 2-to-1 reduction gear. Pressure lubrication is employed.

The special feature of this engine is that light weight has been sacrificed in order to obtain the strength of an automobile type of engine. The weight complete is 4.4 lb. per horsepower, a figure about double that of a number of aviation engines.

### Specifications:

No. of cylinders .....	4
Bore .....	3.93 in.
Stroke .....	4.72 in.
R.p.m. of crankshaft ...	2200
R.p.m. of propeller ....	1100
Hp. ....	50
Weight complete .....	220 lb.
Weight/hp. ....	4.4 lb.
Fuel consumption .....	4 gal. per hr.

For transport purposes Henry Potez supplies the Type S. E. A. VII. This machine is derived from the S. E. A.



The Henry Potez type S. E. A. VII passenger carrying biplane

IV C-2 military model, supplied in considerable numbers to the French army. The wing area, however, has been somewhat increased in order to improve the landing qualities. The design and construction are conventional. The pilot is placed aft of the 400-hp., 12-cylinder Lorraine-Dietrich engine and behind him is the nicely stream-lined cabin for two passengers.

This type of machine is being employed with success on the Paris-Prague and Paris-Warsaw commercial airplane lines.

The Type S. E. A. VII has the following specifications:

Wing area .....	474 sq. ft.
Span .....	45.9 ft.
Height .....	10.5 ft.
Length .....	30.2 ft.
Weight empty .....	2425 lb.
Personnel and luggage .....	661 lb.
Fuel and oil .....	551 lb.
Total weight .....	3637 lb.
Speed at ground level. ....	120 m.p.h.

## A Five-Speed Truck Transmission with Single Lever Control

**S**INCE pneumatic tires have come to be used extensively on trucks of moderate and larger capacities there has been need for transmissions with more than four speed changes. A number of such transmissions have been brought out. Most of these comprise a four-speed transmission with an extra two-speed gear connected in series therewith, so that any of the four forward speeds of the first gear can be combined with either the direct drive or the low speed of the second gear. While what is here described as two separate gears is generally enclosed in a single housing and forms a unit, two levers are required for operating the combination, which is something of an objection, even though one of the levers may not have to be operated very frequently.

A design of gear box for motor trucks giving five forward speeds and one reverse has been invented by A. G. Herreshoff and is illustrated by the accompanying drawings. It embodies many of the characteristics of the ordinary four-speed gear, and the third, fourth and fifth speeds are obtained in exactly the same way as the second, third and fourth speeds in a four-speed gear. One difference is that the constant mesh gears at the left hand end in the drawing are placed between two sets of ball bearings, the object being to limit the span between supports of the splined and secondary shafts.

Another difference is that the first and second speeds, instead of being obtained by double reductions, as usual, are obtained by triple reductions. It will be noticed that the pinions A and B on the secondary shaft are not fast upon that shaft like the rest of the pinions, but are free to revolve thereon on a roller bearing. These pinions are driven from the reverse gear shaft at a speed lower than that of the secondary shaft. The drive is from the reversing pinion C to the reversing gear D, from gear E to gear B and from gear B to gear F for the first speed or from gear A to gear G for the second speed.

The slider bars are arranged exactly as in a four-speed gear, there being three of these bars, each controlling a single gear on the splined shaft. In ordinary operation the truck would be started off on second gear and the first gear would be used only in emergencies. As the quadrant positions for the first gear forward and the reverse are opposite each other and this slot of the quadrant can be locked by means of a projection, operation of the gear is very simple. Moreover, manœuvering, which should be done on the first forward gear and the reverse, can be effected easily by simply moving the gear lever back and forth in the same

slot. Mr. Herreshoff maintains that the low gear reduction in the gear box should be about 9 to 1 in order that, on the one hand, the truck may be capable of running 15 m.p.h. at 1000 r.p.m. of the engine, and, on the other, there may be sufficient torque on low gear to slip the wheels. Such a high ratio of reduction is impractical with a double reduction in the gear box. Moreover, with only four steps in the gear box the individual steps would be so great as to make gear changing very difficult.

## Some Observations Regarding Aircraft Engines

**I**N an article on the New Aircraft Engines Commander Martinot-Lagarde of the French Army makes the following observations regarding various features of engine design:

In the case of cylinders with aluminum water jacket, a defect in the fit of the steel sleeve in the cylinder block entails the early scrapping of the whole assembly.

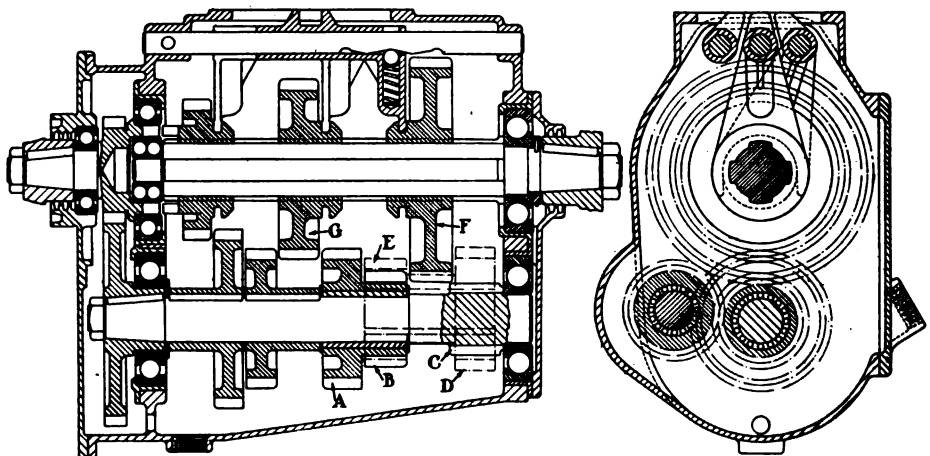
In engines on which the valves are completely enclosed the danger of coloring the valves by overheating is greater than in other engine types.

Valves with hollow, threaded stems are delicate. Where valves are operated by rocking levers the lubrication of the rollers presents a difficult problem.

Welding of the steel water jackets should be carried out with the greatest care, using very low carbon steel which does not air-harden.

Double valve springs are more dependable than single springs.

Water-tightness of the circulating pumps is more easily secured by means of gaskets than by means of conical joints.



Herreshoff gear box

# Directional Control of Tractors

Weak points explained in steering by retarding one side or the other of the tractor. Double engine offers possibility for betterment as does the brake and clutch method for heavy loads. A variable speed transmission with infinite number of speeds would solve the problem.

By Victor L. Darnell

**D**IRECTIONAL control for tractors of the track-laying type or the four-wheel drive type, where steering is accomplished by retarding one side or the other, offers many perplexing problems. There are two distinct conditions under which the tractor must be steered or directed; under a heavy load and under a light load. Directional control is easier under heavy loads than under light loads, as far as making even turns is concerned. Under light loads the tractor tends to produce a jerky or zig-zag action. However, it is under a light load that sensitive directional control is most needed in farming operations, such as cultivating, mowing, etc. It is the purpose of this article to show how sensitive steering might be accomplished.

Several of the different methods that have been used are described below and their weak points are explained.

## The Differential Method

The differential used with this method (Fig. 1) is exactly the same as that used in the automobile, but two brakes, C and D, are added. If the ground resistance is the same under both driving wheels, E and F, the tractor will continue in a straight line, but this is rarely the case and it is necessary for the operator to constantly tighten and loosen the brakes. Then, the use of brakes spells a waste of energy and as long as there is a slipping action under the brakes there is a loss of power; however, when the brake is locked and only one side turns, there is no loss except that in the differential gearing. The brake is applied on the side to which the tractor is to turn, and this involves one of the biggest draw-backs to this type of directional control. As one side slows up the speed of the other increases correspondingly until one side is locked and the other is go-

ing twice the original speed, which means that to keep the tractor going at a constant speed the engine must be slowed down to one-half its original speed and, roughly speaking, only one-half of the engine torque is carried to that wheel. This is one of the reasons that tractors of this type do not travel in a straight line, but follow a zig-zag course, especially under light loads.

Another bad feature is that the outside wheel should receive the maximum power in turning but is robbed of one-half that is coming to it. Then if one side gets in a mud hole the total turning effort is limited until a brake is applied on that side, and when this is done directional control is lost and the tractor must go whichever way it can until dry ground is reached, which may put the tractor in a still worse place. This could be partially remedied by locking the differential and driving straight ahead, but, of course, directional control would be sacrificed for the time being.

It would naturally come to one's mind that if the one side speeds up with a retarding of the other, why not put in a mechanism that would gradually neutralize this speeding up or, in other words, keep the engine speed constant or nearly so. In this manner conditions in turning would be bettered, but the other defects mentioned in the plain differential method would still be existent.

## Fixed Ratio and Clutch Method

There is a clutch and change gear speed ratio for each side of the tractor, as shown, for this type of directional control.

By releasing a clutch the gear change could be accomplished. This could also be accomplished by replacing the gear change with another clutch of different speed

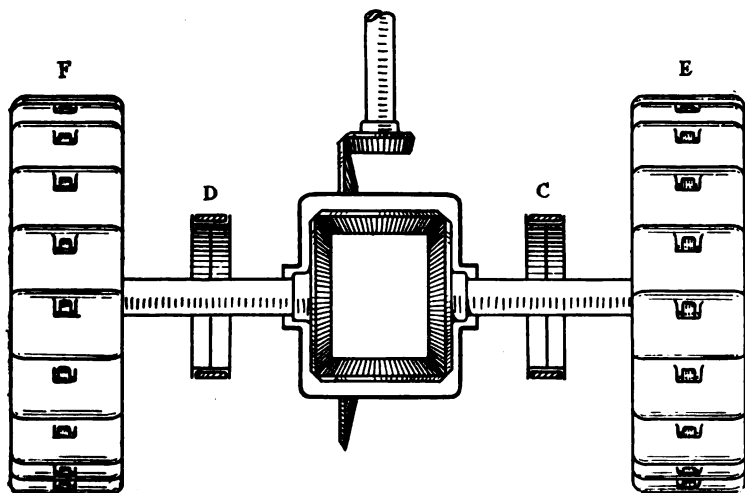


Fig. 1—The differential method

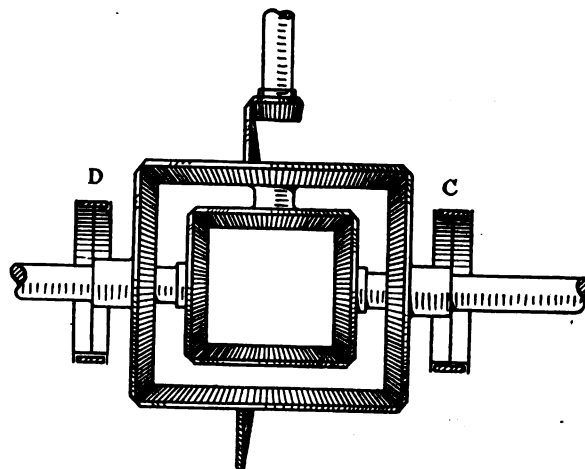


Fig. 2—Constant speed differential method



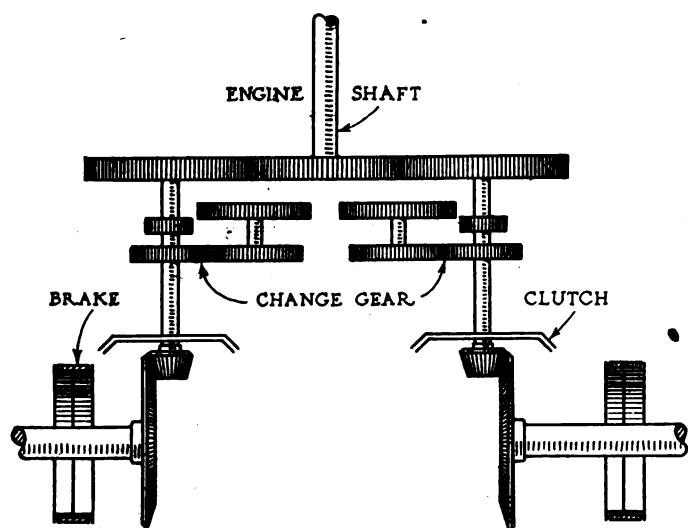


Fig. 3—Fixed ratio and clutch method

Fig. 5 (Right)—Indicating progressive action of brake and clutch

than the first one. If these clutches are capable of a slight degree of slippage then a curve would be turned with any desired radius and the power would be on the outside wheel in making the turns. If the steering is accomplished by the slipping clutch then the more evenly the clutch would slip under a heavy load, and hence the even the turn. The more speed changes or the more clutches we had the more definite radii we could turn. The application of a brake would help directional control under light loads, and it might be necessary to lock the side in neutral with the brake when making a sharp turn.

#### The Brake and Clutch Method

If the clutch is sensitive enough, turning a large radius under heavy loads could be accomplished by means of the clutch alone and the use of the brake could be reserved for sharp turns, by releasing the clutch and applying the brake. For light load steering the clutch and brake action would have to overlap to prevent a zig-zag action of the tractor.

This can be explained by assuming the total movement of the clutch from open to closed to be divided into 10 parts and the movement of the brake the same. If the clutch was 10 points closed the brake would be one point on, and so on, until the clutch was entirely on and the brake entirely off, or vice versa. The checked area would represent a frictional loss and would occur only as the clutch was acting, there being no loss when the clutch was wholly engaged or disengaged. It would seem that at point 5, where the brake movement equals the clutch movement, there would be no movement of the tractor

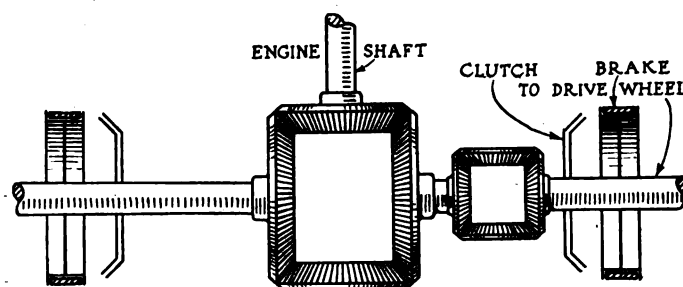
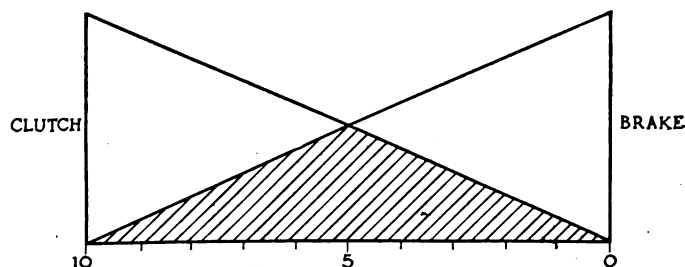


Fig. 4—Brake and clutch method



on that side, yet it would have a tendency to move forward. This can be explained by assuming one side of the tractor only connected to the motor. The tractor will then move in a straight line, provided there is no load on it due to its construction. There are then two alternatives, one being to apply a brake to the free running side and the other to add a load to the tractor to produce its easy turning.

There are several other methods of directional control which have possibilities.

#### The Friction Drive

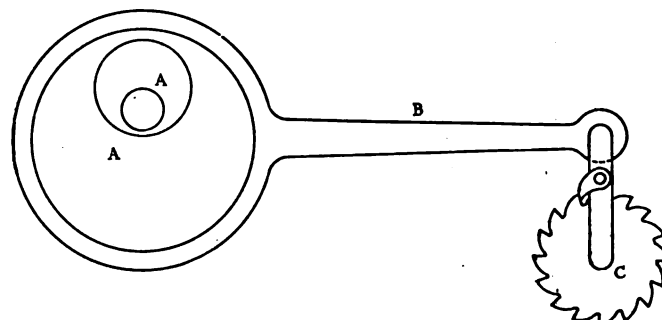
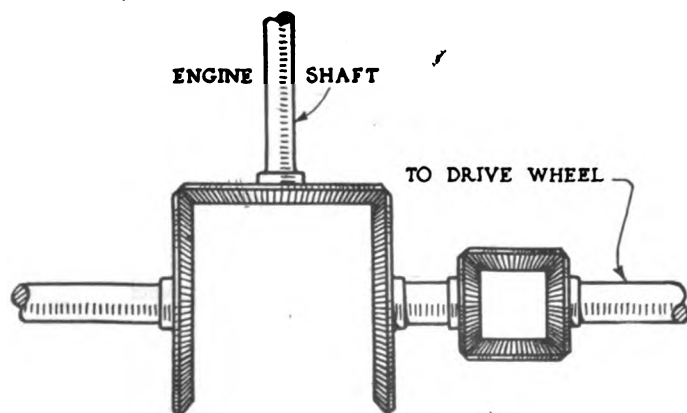
This friction drive could be made cheaply and sensitive enough for light work.

If a variable speed transmission could be devised with an infinite number of speeds and at the same time cheap to manufacture, durable and efficient, the problem would be practically solved. The magnetic transmission would accomplish the desired results, but would be too intricate and expensive. The hydraulic transmission would also answer the purpose, but its low efficiency, cost and number of parts required make it prohibitive.

The variable crank and ratchet looks very promising, but has never come to the front.

By simply moving the cam eccentric A around, the throw of the arm B is varied. By using three eccentrics the shaft C is given a fairly constant speed.

The steam tractor with an engine on each side would produce the best results that could be wished for. By simply operating a two-way valve the speed of either side could be controlled within the narrowest limits, and differentiation of power would be complete.

Fig. 7 (Above)—The variable crank and ratchet method  
Fig. 6 (Left)—The friction drive method

# Permanent Top Viewed with Favor in Many Quarters

Few manufacturers will displace collapsible top on their 1922 models but many believe the trend is in the direction of the permanent type. Heavy buying of enclosed cars indicates that the public no longer insists that the top be lowered. Considerable interest aroused by questionnaire.

**T**HE permanent top as standard equipment for passenger cars will not become general on 1922 models, but a growing tendency on the part of the buying public to favor a change from the collapsible top has caused a majority of manufacturers to give serious thought to the question. Certain models of a few makes of cars will appear with the permanent top this season and several manufacturers will be prepared to furnish such a top on special orders.

The type of permanent top that has been seen the most is what is known as the California top. This has been extremely popular in far western states. Everyday observation proves that in most other sections of the country the average car owner seldom lowers his collapsible top. The enormous increase in the sale of sedans and coupés indicates that many buyers no longer care whether a top can be lowered or not. It was these tendencies on the part of the public that caused AUTOMOTIVE INDUSTRIES to conduct a survey, which has recently been completed, asking manufacturers whether or not they planned to use the permanent top as a part of their equipment on the 1922 models and whether or not they felt that the tendency of other manufacturers was toward such a move.

Replies to a questionnaire from 49 manufacturers, who produce more than 75 per cent of all cars manufactured in the United States, showed that of this number there are 11 who expect to use the permanent top as a part of their standard equipment on one or more models. Five more said they would be prepared to furnish the top on special orders. The California top will be used on 6 of the 11 makes of cars that will have it as a part of their equipment, while the others will use those of their own design. But one of the 5 who will supply the tops on special orders will use their own model, the others planning to use the California top.

The survey showed that a genuine interest was being taken by manufacturers in the issue and 33 of the 49 said they felt that the tendency among other manufacturers was toward planning for such equipment. Only five said they thought there was no general movement along this line and 11 were non-committal.

The principal objection to a permanent top is the increased cost of manufacturing. Several companies reported that they felt that there is an increasing tendency on the part of the public to desire the change, but increased production costs would demand increased selling costs and in lieu of the period of industrial depression that has been upon the country, economy is the most desirable factor to maintain so long as it can be done without impairing efficiency and quality. The question of shipping also comes into the discussion, for many cars are being shipped from the factories in double decked loads. With a permanent top this, of course, would be

impossible unless some means could be devised whereby the top could be shipped in parts and assembled when it reaches the dealer.

Arguments in favor of this type of top, however, appeared. Some of the principal reasons why manufacturers feel that the tendency is favorable are:

1. Public satisfaction.
2. Cheaper cost as compared to the sedan or coupe.
3. Appearance.

In order to discover whether or not the public particularly desires a top that can be let down it is only logical to determine whether or not there has been a heavier demand for closed cars in the past few years than before. Figures for 1919 show that 161,000 closed cars were sold to the public. In 1920 a total of 320,000 were sold. The closed cars in 1919 amounted to 10 per cent of the entire number produced and in 1920 to 17 per cent. Figures for 1921, of course, are not available, but indications point to the fact that even a larger number will be sold. It is almost certain that the total production in 1921 will not reach the figure attained in 1920 when 1,883,000 cars were produced. This is due to industrial depression, but at the same time the demand for coupe and sedans is already ahead of production on several models.

Although expense of production was given as one of the reasons some manufacturers do not look with favor upon the permanent top, others pointed out that it is cheaper than the enclosed car. It has been shown that there is an increased demand for enclosed cars, and it is logical to assume that if the public is willing to buy coupe and sedan models of cheaper cars then a model combining the advantages of both the open and closed car would not prove a drug on the market. Figures have been compiled showing that the public does buy the cheaper models of enclosed cars. Ten companies, manufacturing these models at prices ranging from \$695 to \$2,885, had much larger sales than did companies manufacturing sedans and coupes of a more expensive nature. And a study of price lists will prove that there is a difference of from \$245 to \$500 between the prices of open and enclosed models of these ten makes of cars.

As far as appearance is concerned, that is largely a matter of personal opinion. There can be no doubt that many graceful lines have been brought out in the standard collapsible top. The general trend of opinion, however, indicates that the manufacturer as well as the public is convinced that there is more beauty and style in the permanent top.

A broad view of the situation does not indicate any immediate revolutionary movement toward standardizing this type of top, but there does appear a growing tendency to look with favor upon such action.

# The Testing of Motor Fuels

## Part I

A brief manual outlining the need for the testing of motor fuels, and showing how the results of tests are interpreted, especially in relation to their effect upon the engine and its performance.

**T**HERE is a wide variation in the quality of commercial gasolines and a wide and increasing distribution of blended fuels, particularly those containing benzol. This makes it essential that all gasoline used in engineering development or motor testing work be examined for its composition and properties. Accurate information on the quality and composition of gasoline used in such work is essential to the making of a proper decision as to whether the results obtained should be attributed to the engineering design or to the quality of the fuel used. Some of the factors which have a marked influence on the behavior of gasoline are:

- 1—Initial boiling point, because of its effect on starting.
- 2—Height of distillation curve and position of 85 per cent point, because of influence on such factors as distribution, knocking, carbonization and contamination of lubricating oil.
- 3—Content of alcohol and of aromatic hydrocarbons (benzol and similar materials), because of the smoothness and relative freedom from knock which characterizes the combustion of such materials.
- 4—Percentage of unsaturation, because of the gums which are formed from the unsaturated constituents, and which are then deposited in the induction system and on intake valves.

Fortunately, the commercial examination of gasoline is a comparatively simple matter and can be made by any technically trained man with a minimum of equipment.

If the gasoline is composed entirely of Eastern or Mid-continent petroleum oils, the determination of the following factors gives sufficient information on the characteristics of the material in practically any case to indicate whether it is suitable for use.

- 1—Specific gravity.
- 2—Distillation range.
- 3—Acidity.
- 4—Percentage of unsaturation.
- 5—Content of gummy materials.

In addition to methods for determining the above factors and for interpreting the results obtained, methods will also be given for obtaining the following data on a motor fuel:

- 6—Percentage content of aromatic hydrocarbons (benzol).
- 7—Purity of a fuel as to its content of paraffin hydrocarbons.

- 8—Content of alcohol.

### INTERPRETATION OF RESULTS

#### 1—Specific Gravity

The specific gravity of a gasoline is of importance only in that, when taken together with the distillation data, it serves to indicate the presence of any considerable percentage of materials other than those normally present in gasoline, such, for example, as benzol.

The normal specific gravity of commercial gasoline from Eastern or Mid-continent crude oils is around 0.740 to 0.745. Gasoline from California crude oil having approximately the same boiling range, has a specific gravity around 0.760.

The specific gravity of motor benzol is 0.877 to 0.879. The gravity of a gasoline-benzol blend is approximately the average of the specific gravities of the two ingredients, taken in the proportions in which they are present. (Because of a slight increase in volume which occurs when gasoline and benzol are mixed, the gravity of a blend is only

a close approximation to an average of the gravities of the two ingredients.) Hence, if the specific gravity of a gasoline from the eastern half of the United States is above 0.750, its distillation data should be examined for an indication of the presence of benzol.

#### 2—Distillation Range

The most important items of information on the properties and characteristics of a gasoline which may be obtained from its distillation data are,

- a—Starting qualities.
- b—Ease of vaporization and distribution.
- c—Tendency to contaminate the lubricating oil.
- d—Composition (to some extent), particularly presence of benzol.
- e—Knocking characteristics (if the source and composition of the fuel be known).
- f—Tendency to deposit carbon in engine cylinders.

The distillation data of a gasoline can usually best be interpreted by plotting temperature against per cent distilled, as illustrated in Figs. 1 to 3. The distillation data arranged in this way is interpreted as follows:

- a—Starting Qualities. A low initial, 5 per cent distilling below 55 deg. C. (131 deg. Fahr.), characterizes a fuel of good starting qualities. Similarly, a high initial indicates poor starting qualities. Thus, in Fig. 2 the fuel having distillation char-

**T**HIS manual, prepared in the form of a bulletin by the Fuel Section of the General Motors Research Corporation and edited by T. A. Boyd, contains much useful information which, so far as we are aware, has not heretofore been published in the concise and usable form in which it is here produced. Part II, which will appear in an early issue of *Automotive Industries*, gives in detail the methods followed in making tests of motor fuel and a description of the simple apparatus used in these tests.

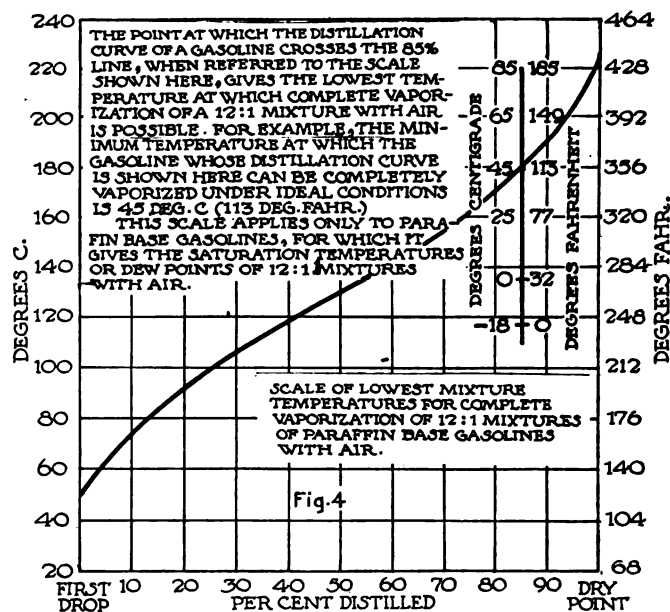
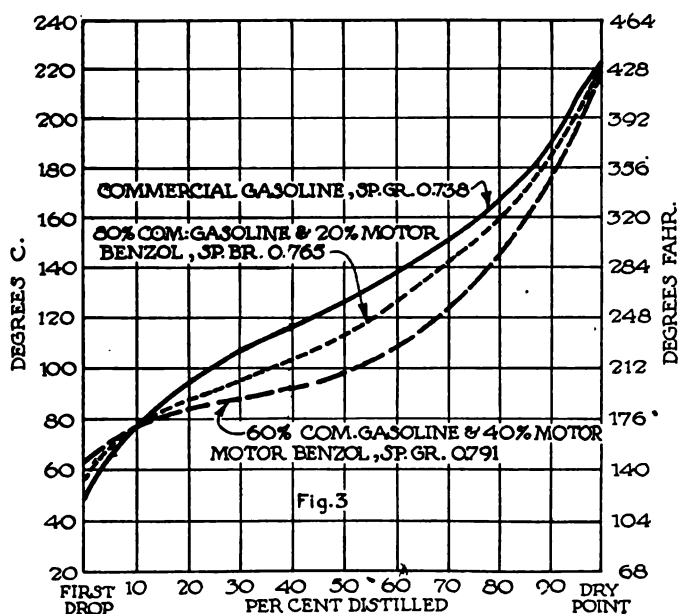
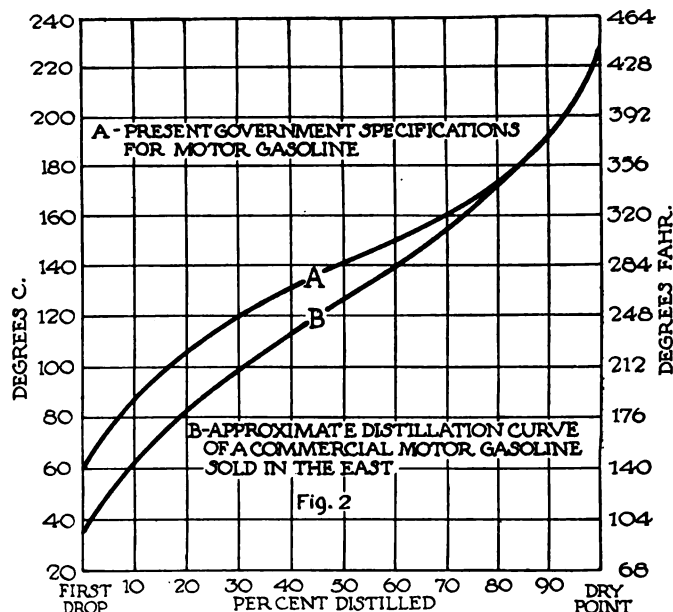
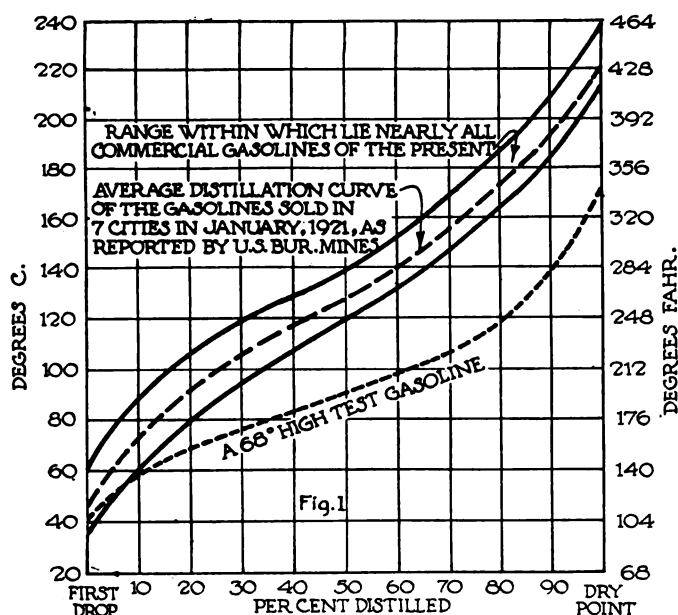


Fig. 1—Distillation curves of various grades of gasoline. Fig. 2—Distillation curves: A, for a gasoline corresponding to Government specifications, and B, for a commercial gasoline of lower average boiling point. Fig. 3—Distillation curves of commercial gasoline, and of gasoline-benzol blends. Note flattening of the curve in the 10 to 70 per cent range in the case of the blended fuels. Fig. 4—Curve showing the lowest temperature at which a gasoline with the distillation curve shown can be completely vaporized under ideal conditions

acteristics as shown in Curve B, has superior starting qualities to the fuel distilling as in Curve A.

- b—Ease of Vaporization and Distribution. The lower the distillation curve, the more easily a fuel may be vaporized. The distillation curves of nearly all commercial gasolines of the present lie within the range given in Fig. 1. The average volatility of commercial gasoline varies considerably from time to time. For this reason it is impossible to give a narrow range of values which will include the distillation curves of the gasolines that are sold for motor fuel commercially. For a like reason it is important that the distillation data of a gasoline, which is used in any experimental or testing work be known.

Especially is this true if comparative tests are being made in which more than one gasoline is used.

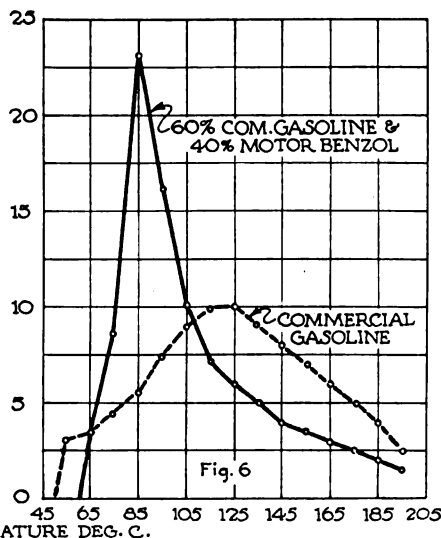
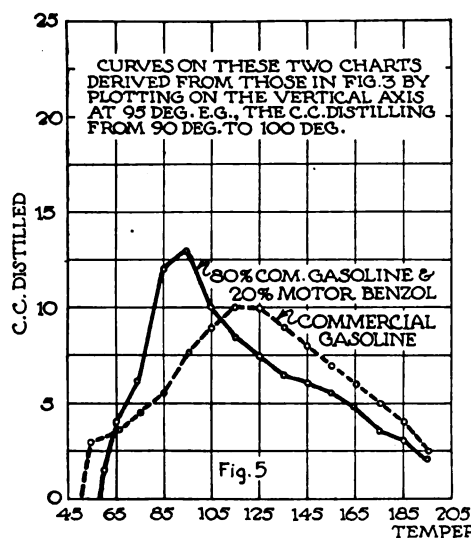
The results of recent work show that the temperature at which 85 per cent of a gasoline has distilled is of most importance in indicating its vaporization and distribution characteristics.\* An empirical rule for determining the lowest mixture temperature at which complete vaporization or a dry mixture is possible for a 12:1 mixture is as follows: (This rule applies only to paraffin base gasolines.)

Temperature of 85 per cent point in degrees Centigrade — 135 = minimum dry mixture temperature, in degrees centigrade.

Temperature of 85 per cent point in degrees Fahrenheit — 243 = minimum dry mixture temperature, in degrees Fahrenheit.

These are the saturation temperatures, or dew points of 12:1 mixtures of air and gasoline. It

\*Work done at the Research Laboratory of Massachusetts Institute of Technology under direction of R. E. Wilson. See *Journal Society of Automotive Engineers*, October, 1921, pp. 265-8, published complete in *Journal of Industrial and Engineering Chemistry*, Vol. 13, No. 10, October, 1921, pp. 906-12.



Figs. 5 and 6 show curves plotted from data (taken from Fig. 3) relating to the distillation curves of gasoline-benzol blends

is not possible commercially to obtain complete vaporization at these temperatures, but they may be used as an ideal upon which to base the performance of hotspots, etc. Fig. 4 illustrates the use of this rule in a graphical way.

c—Tendency to Contaminate the Lubricating Oil. Insofar as the nature of the fuel is a factor, the higher the 85 per cent point, the greater is the tendency toward dilution of the crankcase oil.

d—Composition, Particularly Presence of Benzol. A flattening of the distillation curve in the 10 to 70 per cent range (see lower curve in Fig. 3) usually indicates a blend. The gravity of the fuel should be noted in this connection. If it is high (above 0.750 for a fuel having an 85 per cent point not over 185 deg. C.), it indicates the probable presence of benzol. These same indications apply also to blends containing alcohol. Alcohol boils at about 78 deg. C. (173 deg. Fahr.) and has a specific gravity around 0.820. Alcohol alone is not soluble in gasoline unless practically no water is present; so that an alcohol-gasoline blend must contain a third material which serves as a binder, for which purpose benzol has mostly been used. If the distillation curve shows any peculiarity which might indicate a blend, it is of advantage to arrange the distillation data as shown in Figs. 5 and 6, plotting values taken from the ordinary type of curve referred to above.

The curves are plotted as in the following example: Assume that the initial of the gasoline is 50 deg. C. as in Fig. 3. A point is then located on the O vertical line at 50 deg. (Fig. 5). From the distillation curve (Fig. 3) the number of cubic centimeters coming over from 50 deg. to 60 deg. is noted, and this value is plotted as a point on the vertical axis at 55 deg. as in Fig. 5. In like manner the number of cc. distilling from 60 deg. to 70 deg. is plotted on the vertical axis at 65 deg. The same procedure is followed successively for the ranges 70 to 80, 80 to 90, etc. The area under the curve so obtained is proportional to the volume distilled, and any constituent which is present in considerable amounts produces a peak on the curve at about its boiling range.

Motor benzol boils at 80 to 170 deg. C. (176

to 338 deg. Fahr.) and considerably more than one-half of it comes over below 100 deg. C. (212 deg. Fahr.); so that its presence in a gasoline in any considerable percentage can readily be observed from the peak on the curve which shows the large amount of material coming over in its distillation range.

Because of the smoothness and freedom from knock with which the combustion of aromatic hydrocarbons (benzol and similar materials) is characterized, even at very high compressions, the presence of any considerable percentage of such materials in gasoline imparts combustion characteristics to the gasoline which do not belong to it alone and which it does not have commercially.

e—Knocking Characteristics. For fuels which are composed of paraffin hydrocarbons, the tendency to knock increases with distillation temperature. However, the knocking characteristics of a fuel are determined primarily by the nature of the materials of which it is composed, and secondarily by its distillation temperature. For example, a fuel which contains such materials as benzol or alcohol shows a decreased tendency to knock in proportion to the percentage of such material present. Most commercial gasolines as sold east of the Rocky Mountains are composed mainly of paraffin hydrocarbons, but the knocking characteristics of a fuel can be obtained from its distillation curve only when the composition of the fuel is known.

f—Tendency to Deposit Carbon in Engine. The amount of carbon which is formed in an engine from the fuel used increases with the distillation temperature of the fuel.

The height of the 85 per cent point gives a measure of this factor.

Because the amount of carbon deposited in an engine varies with a number of factors, no quantitative values can be given in this connection. Insofar as the fuel is a factor, however, the higher its distillation temperature the greater the amount of carbon deposited under any given set of conditions.

### 3—Acidity

Test should show no acidity. Acidity in gasoline indicates either (a) that the sulphuric acid used in refining was not completely removed from the gasoline, or (b) that either sulfonic acids or neutral esters of sulphuric acid were formed in the gasoline in the effort to produce a white product, and were not subsequently removed. The presence of any of these acid materials is harmful and unnecessary.

### 4—Percentage of Unsaturation

For development and testing work the unsaturation of a gasoline should not exceed 6 per cent, as determined by absorption in cold concentrated sulphuric acid.

The unsaturated or olefine hydrocarbons in gasoline are produced by cracking. They are characterized by the tendency of the molecules to polymerize or hook together with the consequent formation of larger molecules, some of which are gums or tars. While this action



goes on to some extent in gasolines containing only a small percentage of unsaturated materials and at ordinary temperatures, it increases with the percentage of unsaturation and it is very greatly accelerated by increase in temperature or the presence of acid materials. Trouble arising from the unsaturated constituents in gasoline is not common. If the percentage of unsaturation is high or the gasoline is old, tars are deposited in the induction system and especially on intake valves.

The percentage of unsaturation should be interpreted in connection with the content of gummy materials, as described immediately below. A gasoline which is low in unsaturation but which deposits a considerable amount of gums on evaporation is fully as unsatisfactory for use in testing work as is one which is high in percentage of unsaturation, but which gives little or no gums upon evaporation in the standard test.

#### 5—Content of Gummy Materials

If a weighable amount of gum (or an amount which is distinctly visible in the dish) is deposited, the gasoline contains either gums as such, or undesirable gum-forming constituents.

Acid residues will show as gum in this test.

If the gasoline contains any dissolved elemental sulphur, the bottom of the dish will be colored gray or black.

This test should be interpreted in connection with that for percentage of unsaturation, as described immediately above.

#### 6—Percentage Content of Aromatic Hydrocarbons (Benzol)

Benzol will stand compression pressures in excess of 200 lb. per sq. in. without knocking, and it imparts this characteristic to a gasoline or naphtha with which it is blended in proportion to the percentage of benzol present.

Fuels which contain benzol are therefore not comparable to commercial gasoline in the operation which they give in an engine.

Blends of benzol and petroleum oils containing from 20 to 60 per cent of benzol have been sold, and benzol has been blended with petroleum oils ranging from gasoline through the naphthas to kerosene. If desired the distillation range of the petroleum oil after it has been freed from benzol may be determined, but the character of the petroleum oil can be judged largely from its gravity after nitration and by the distillation curve of the original blend.

#### 7—Purity of a Fuel As To Its Content of Paraffin Hydrocarbons

The gasolines sold east of the Rocky Mountains are composed mainly of hydrocarbons of the paraffin or chain type of structure. To these materials is due the characteristic operation of the commercial gasolines produced from our eastern and mid-continent crude oils, particularly the knock which begins to be apparent at about 75 lb. per sq. in. compression pressure. Some gasolines, especially those produced from California crude oils, contain considerable percentages of naphthene hydrocarbons. The naphthenes have the saturated ring structure, and, when compared for a given distillation range are characterized by higher specific gravities and by the ability to withstand much higher compressions without knocking than the paraffin hydrocarbons. For this reason the gasoline which is used in any testing work in which knocking characteristics are an important factor, should be tested for its purity as to content of paraffin hydrocarbons. This is best done by determining the temperature of dissolution (T. D.) of a

50-50 solution aniline and the fuel, or more accurately, the temperature of critical dissolution (T.C.D.) of the fuel with aniline, as described later.

If the T. D. or the T. C. D. is found to be approximately 70, the fuel is composed entirely of paraffin hydrocarbons. If, after the fuel has been nitrated and washed until it is entirely free from aromatic and unsaturated olefine hydrocarbons, it gives a low T. C. D., 30 to 55, the material thus obtained is not a pure paraffin fuel; but contains a considerable percentage of naphthene hydrocarbons, and is, therefore, not representative of the majority of the commercial gasolines in use in the United States.

#### 8—Content of Alcohol

Alcohol, like benzol, can be used at compression pressures considerably above 200 lb. per sq. in. without knocking. It imparts this characteristic to a gasoline with which it is blended in proportion to the percentage of alcohol present, a smaller percentage of alcohol than benzol being required for a given suppression of the knock.

Fuels which contain alcohol are, therefore, not comparative to commercial gasoline in their operation in an engine.

Some alcohol-benzol-gasoline blends have been sold as motor fuel, but the amount of such material is small and its distribution is not wide. Commercial alcohol alone is not miscible with gasoline. An alcohol-gasoline or alcohol-naphtha blend must contain a third material which acts as a binder, for which purpose benzol has been most frequently used.

#### Heat Content of Motor Fuels

Alcohol has a much lower heating value than gasoline or benzol, about 80,000 B.t.u. per gallon for alcohol as compared to about 120,000 for gasoline and 130,000 for benzol.

(To be continued)

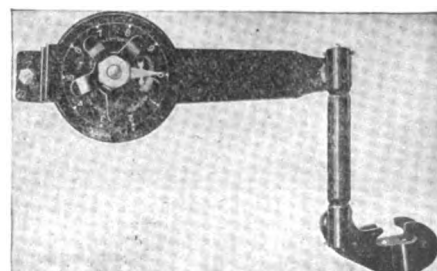
### A "Trade" Motor Car

**S**PECIALLY designed motor cars carrying samples of textile and drapery goods will soon begin a tour of the European continent under direction of members of the British drapery and clothing associations.

This scheme is in line with the trade ship idea that is to be promulgated—ships carrying the goods of various manufacturers to different ports of the world where buyers may inspect them. Spain will be the first country visited by the motor car exhibits, and naturally the plan has advantages over the maritime exhibits in that inland cities and towns can be visited.

### A New Model Shock Absorber

**A** NEW model shock absorber, shown in the accompanying cut, is being manufactured by Edward V. Hartford, Inc. The new model operates on the same principle used in the former Hartford absorber, but a tubular link now connects the arm of the shock absorber with the axle. Ball sockets at each end allow free side play.



New Hartford  
shock absorber

# Illinois Highway Department Makes Road Tests

New devices used in research work to determine comparative strength of various types of road pavement. Uniformity of subgrade under each of sections of road discovered by observations for moisture content and bearing power of soil under static and impact loads.

By Clifford Older and H. F. Clemmer\*

**C**ONCURRENTLY with the experiments carried on by the Federal Bureau of Public Roads at Arlington, Va., the Division of Highways, Illinois Department of Public Roads, is conducting research work in road building near Springfield, on what is known as the Bates Road, which parallels the Wabash Railroad for a distance of  $2\frac{1}{2}$  miles. This road is on a relocation, and the fact that the old road will accommodate traffic for any reasonable length of time makes it possible to close the test road to all but carefully controlled test traffic. There are no curves in the road, and the grades do not exceed 0.4 per cent. The subgrade soil is a brown silt loam, except for two small stretches where it more nearly approaches gumbo. The road is surfaced with seven general types of pavement, as follows:

1. Portland cement concrete.
2. Three- and 4-in. lug brick constructed monolithic with a Portland cement concrete base.

\*Chief engineer and engineer of tests of the Illinois Highway Department.

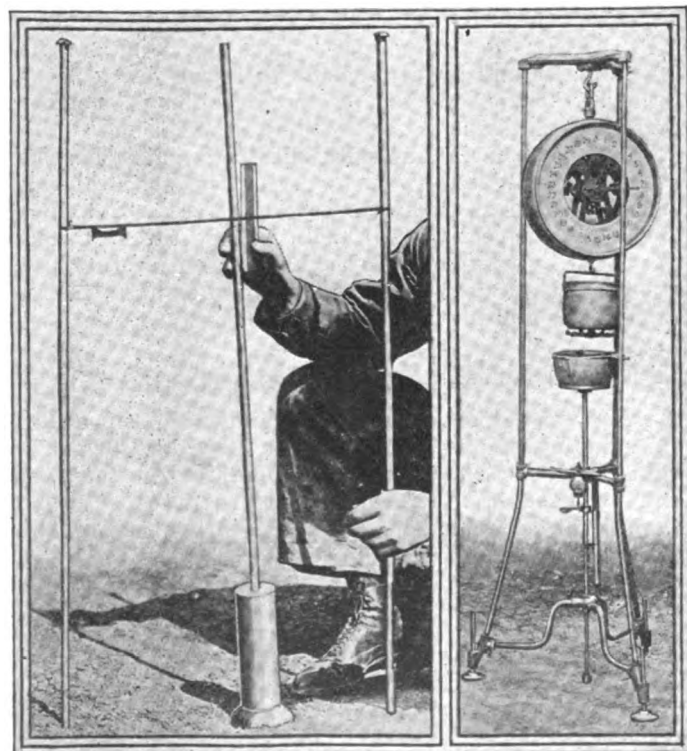


Fig. 1 (Left)—Goldbeck apparatus for determining subsoil impact bearing power. Fig. 2 (Right)—Apparatus for determining bearing power of subsoils under static loads

3. Three- and 4-in. lug brick constructed semi-monolithic with a Portland cement concrete base.

4. Three- and 4-in. bituminous-filled lug and lugless brick on Portland cement concrete base.

5. Three- and 4-in. bituminous-filled lug and lugless brick on macadam base.

6. Asphaltic concrete with and without binder course on Portland cement concrete base.

7. Asphaltic concrete with and without binder course on macadam base.

The series of test sections for each type or design cover all reasonable variations in strength that might be expected to give any degree of satisfaction under heavy traffic. Each series begins with a section roughly estimated to be equivalent in strength to 4 in. of concrete and increases to the approximate equivalent of 9 in. of concrete. In comparing the strength of concrete pavements with other types the following assumptions were made:

1. That a brick pavement constructed monolithic or semi-monolithic with concrete base has a strength equal to that of a concrete pavement of the same thickness and of the same quality of concrete as that used in the monolithic brick base.

2. That bituminous-filled brick on a concrete base has a strength equal to that of a concrete slab having a thickness equal to that of the base plus one-half of the thickness of the brick surface.

3. That bituminous concrete surfaces of 2-in. wearing course or  $1\frac{1}{2}$ -in. wearing course with  $1\frac{1}{2}$ -in. binder course have strength equal to 1 in. of concrete.

## Moisture Content and Bearing Power

For the purpose of determining the uniformity of the subgrade under each of the 63 sections comprising the road, observations were made for moisture content and bearing power of soil under both static and impact loads at points 25 ft. apart along the center of the roadway. These observations were made immediately before pouring of the concrete. In addition, samples of the subgrade, secured from different points along the road, were sent to the United States Bureau of Public Roads for soil analysis and laboratory determinations of bearing power.

All materials used in the construction were carefully sampled and tested to determine their physical characteristics, and, in addition, test specimens of the concrete and other pavement types were made up from the materials entering into the pavement.

On each 200-ft. section of concrete pavement or base the following test specimens were prepared: Three

slabs for determination of transverse strength, nine cylinders for compression strength test, and three slump test specimens. In order to duplicate as nearly as possible the actual conditions of construction, concrete for these specimens was taken from batches during the run of the day's work.

It is planned to leave the concrete slabs buried in the road shoulders until the section represented is tested by artificial traffic. The slab will at that time be removed to the laboratory and broken on a Riehle testing machine to determine the maximum transverse strength. The slabs are, for the most part, of Portland cement concrete, varying only in mix and aggregates with the sections they accompany. In special sections test pieces were made so as to incorporate the features of the pavement, as monolithic brick, concrete with mesh reinforcing, concrete with an addition of calcium chloride, or concrete with asphaltic concrete surface.

One of the three cylinders buried with each slab is broken in the laboratory for maximum compression strength when four months old, the second after a period of eight months, and the third will be broken with the transverse slab at the time of testing the road.

### Bearing Power of Subgrade

In the study of bearing power of the subgrade an attempt was made to compare the bearing power of the soils under impact as well as static loads. Comparison of the bearing power just before the pavement was laid and at various times after pouring the concrete was also attempted. The points at which the bearing power determinations were made were located 20 ft. apart along the center line of the road on the completed subgrade, and after the pavements were laid the determinations were made through the testing cylinders, which will be described later.

The impact determinations were made with the Goldbeck apparatus, shown in Fig. 1. The apparatus consists of a steel footing, 7 sq. in. in base area, into which is fitted a  $\frac{1}{2}$ -in. steel rod about  $3\frac{1}{2}$  ft. long. On the rod, fitted loosely so that it can be dropped from any height, is a steel cylinder of 10 lb. weight. The impact can be varied by dropping this weight from different heights. The depth of penetration is measured from a string stretched tightly between two steel rods driven firmly into the ground and set 2 ft. apart. On this string, which just clears the side of the rod, is suspended a small level. After any number of drops of the weight the distances are measured from the string to a given point on the rod with a 6-in. engineer's scale, and are recorded to one one-hundredth of an inch.

### Static Load Determinations

A special apparatus for making the static load determinations has been designed by the Illinois Highway Division. As shown in Fig. 2, this apparatus consists of a three-legged iron pipe frame from which is suspended a Toledo automatic hanging scale supporting a pail which contains about 30 lb. of shot. The load is applied to the subgrade by means of a  $\frac{1}{2}$ -in. steel rod terminating in a shoe  $\frac{1}{2}$  in. in diameter on the bottom tapered back to  $\frac{3}{8}$  in.  $\frac{1}{8}$  in. above the bottom. On the top of this rod is a pan which receives the shot from the pail which hangs on the scale, described above. An Ames dial, connected to the frame, with its plunger resting on the support attached to the  $\frac{1}{2}$ -in. rod, measures the depth of penetration as well as any upward movement of the rod due to elasticity of the soil. A thumb screw set in the frame enables the operator to stop the rod at will. At the 20-ft. distances on the center

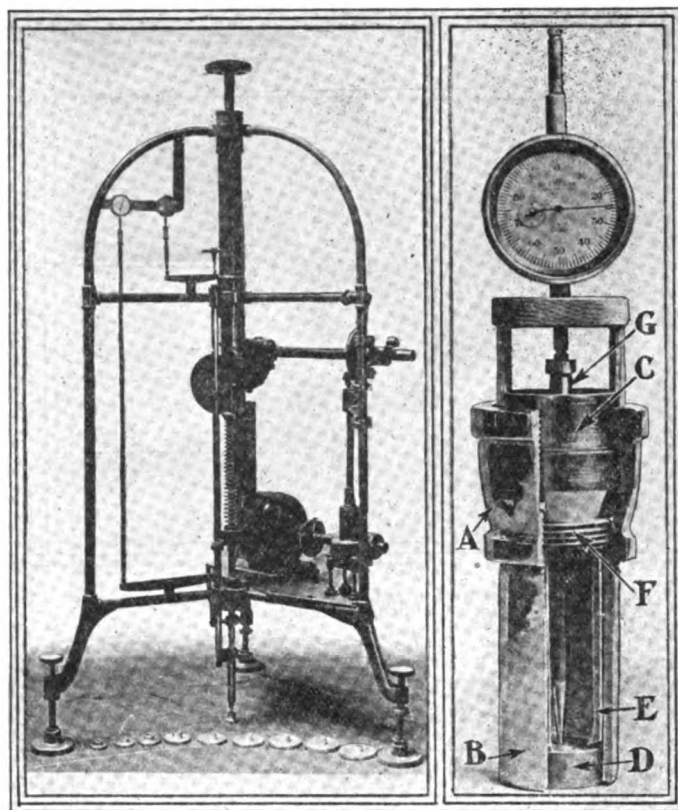


Fig. 3 (Left)—Repeated load testing machine. Fig. 4 (Right)—Subgrade testing cylinder

line of the road an initial reading was taken with the footing resting on the subgrade without any load, after which the shot was released and readings were taken for total loads of 10, 20 and 30 lb. Additional readings were taken for two minutes at intervals of thirty seconds under the 30-lb. load. The load was then removed and the upward movement of the rod, due to the elasticity of the soil, was measured. The 30-lb. load delivered a weight of 150 lb. per square inch to the subgrade. To determine the bearing power after the pavement had been laid, measurements of the penetration under static load were taken through the testing cylinders set in the pavement as well as at points 50 ft. apart along the edge of the pavement.

### Behavior of Soils Under Repeated Loads

In addition to the observations made for determining the bearing power of the subgrade when subjected to static and impact loads, it is desired to know the effect produced by a load application which more nearly approximates the actual conditions brought to the subgrade when a truck wheel passes over a rigid surface.

From observations made November, 1920, on 7-in. surfaces it was indicated that the influence of an 8000-lb. wheel load was felt through a distance of 17 ft. on each side of the wheel. This would mean that the pressure produced at any point by a truck running at a moderate rate of speed would increase from zero to the maximum pressure in about one second, and decrease from the maximum to zero in the next second. The repeating load machine, which is shown in Fig. 3, was designed to approximate the above condition. The apparatus consists of a pipe frame in which are mounted a cam and spring for producing pressure and a plunger through which this pressure is delivered to the soil. The cam is driven by a  $1/16$ -hp. electric motor.

By means of a scale along which a pointer on the spring moves, any desired pressure is registered. The

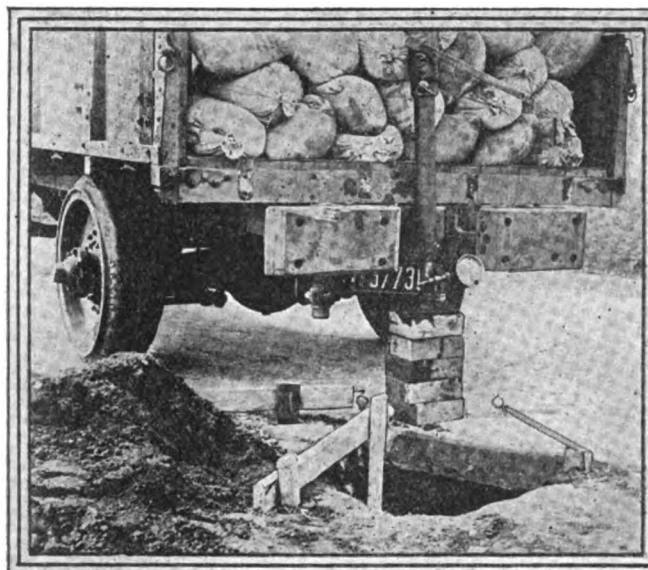


Fig. 5—Determining deflection of concrete slab with subsoil excavated

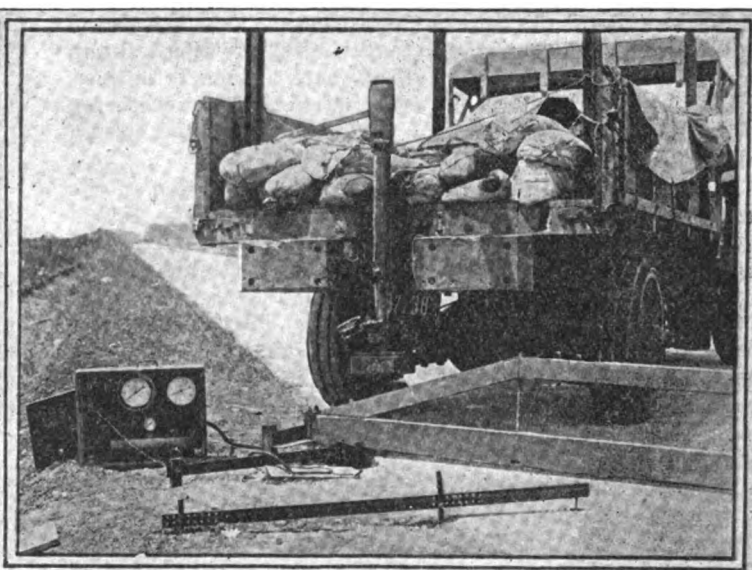


Fig. 6—Apparatus for determining deflection of road slabs due to temperature and load changes

cam revolves at a rate which will produce ten applications per minute. The movement of the plunger, which is identical with the movement of the soil under the pressure, is shown by an Ames dial. A second Ames dial is used to regulate the machine so as to keep the pressure constant. The different footings, as shown in the illustration, range in area from 1 to 10 sq. in. The effect produced upon a soil by these repeated loadings is assumed to be very much like that produced upon a subgrade when a number of trucks travel over a rigid surface. It is supposed, therefore, that the behavior of the soil under the plunger will be very much like that of the subgrade under a load. By means of this apparatus the data can be secured on the action of the soils of different densities and moisture contents when subject to repeated loads. To obtain some light on the effect of applying loads on areas of different sizes the different footings are used. These footings are loaded from 10 to 50 lb. per square inch, the loads being varied by means of an adjusting screw at the top of the frame.

#### Subgrade Testing Cylinder

The special subgrade testing cylinder, shown in Fig. 4, has been designed for study of the relative movements of the slab and subgrade. When the last of the cylinders have been set there will be approximately 800 of them in use. They consist of a  $1\frac{1}{2} \times 1\frac{1}{4}$ -in. black iron reducer, A; a short length of  $1\frac{1}{4}$ -in. black iron pipe, B; a  $\frac{1}{2} \times 1\frac{1}{4}$ -in. brass disk, D; a short sleeve of 1-in. black iron pipe, E, and a special  $\frac{1}{4} \times 1\frac{1}{4}$ -in. brass bearing plug, F. Reducer, A, is flush with the top of the pavement and disk, D, rests freely on the subgrade. The length of the pipe, B, and sleeve, E, vary with the thickness of the pavement in which the cylinders are used.

In the concrete sections these cylinders were installed when the pavement was constructed. In the bituminous concrete and brick pavements they were installed after construction of the pavement by boring holes with a Calyx core drill and grouting around them with care so as to assure satisfactory contact with the adjacent pavement.

The brass bearing disk, D, follows the downward movement of the pavement and the upward movement of the subgrade, so that any separation between the subgrade and the bottom of the pavement, due either to rutting caused by traffic or occasioned by moisture or

frost conditions, can be learned by measurements taken from this plug.

The device for reading the change in position of the bearing plug in relation to the pavement is shown very clearly in the illustration. It consists of an Ames dial fastened in a support, C, which rests on the stationary brass disk, F, and a rod, G, which fits into a small circular depression in the center of the bearing plug, D.

The difference between initial readings taken as soon as possible after the testing cylinders are placed and readings taken at subsequent time show any change in position between the subgrade and the pavement.

These bearing plugs can also be used to obtain data on bearing power of subgrade by loading them with the plunger of the static bearing power determinator.

By removing the brass bearing plug and iron sleeve these cylinders afford an excellent means of obtaining subgrade samples for moisture content determination. Also the brass bearing plugs in the cylinders give excellent points for taking precise levels so that the amount of heaving or settling can be determined.

The testing cylinders are set in rows of three and five across the pavement, the rows being 25 ft. apart. When five cylinders are set in a row they are placed in the center, at the quarter points, and 18 in. from the edges, and when three are used, the ones at the quarter points are omitted.

#### Slab Deflection Tests

For obtaining data on deflection of the various sections when subjected to different temperatures, as well as to repeated loads, eight Ames dials are set on any slab. Two dials are independently supported, while five are set in a beam which rests on two supports, one placed on the shoulder and the other placed in the subgrade through a hole in the center of the slab. Two thermometers are used, one for recording the air temperature and the other for obtaining the temperature of the concrete. Four sets of observations are made on each slab. In the first set of observations, which is made for determining the effects of change of temperature only, readings are taken on the thermometers and dials every half hour for 12 hr. In the second set of observations, taken for the purpose of determining the deflection caused by loads applied to the corners of the slabs, readings are taken for 24 hr. at half-hour intervals. From 4000 to 6000 lb. is applied at the corner

every hour. A reading is taken and the load is immediately released. One-half hour later a reading is taken without the load. The results obtained already show that the measurement of the load deflection would be futile without the determinations of temperature changes, because the warping of the surface, due to temperature variations, greatly exceeds the deflection under the loads applied.

#### Effect of Subgrade on Slab Deflection

For the purpose of securing some idea of the effect of the supporting power of the subgrade on the deflection of the slab after the 24-hr. run the subgrade is excavated under the corner (shown in Fig. 5) and several observations are made to determine the difference in the deflection of the slab when supported and when not supported by the subgrade. During the loading tests a strain gage is set along the diagonal for the purpose of securing some idea of the deflection of the upper surface. For the first 12 hr. of the loading run the dials are set along the diagonal 0—1 and for the second 12 hr. along the diagonal 0—2. This work is carried on by a corps of engineers divided into three shifts, each working 8 hr.,

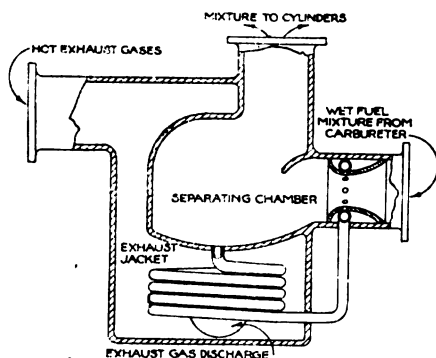
so that continuous readings are made day and night.

For determining the distribution of loads across joints and through pavement slabs of different thicknesses and types, soil pressure cells are placed under corners and centers of the slabs, and two Ames dials are set—one on each side of the joint about 2 in. from the edge of the pavement. The apparatus is shown in Fig. 6. A thermometer is supplied for registering air temperature. After the apparatus has been set up a loaded truck is brought slowly toward the point with its outer wheel about 6 in. from the edge of the pavement. The truck is stopped as soon as the dials give the first indication of the deflection of the pavement. Readings on the dials and the pressure cells are then taken, stopping the truck every 2 ft. to the joint and every 2 ft. beyond the joint until the dials again indicate that the truck is so far away as to cause no deflection. Because of the warping action of the slab and the temperature change, these readings are made at night as well as day, the daylight readings being taken between 9 a. m. and 4 p. m., and the second set the same day between 9 p. m. and 4 a. m. Especial attention is given to securing definite time intervals for each loading.

## Some New Automotive Equipment

### A New Fuel Vaporizer

A FUEL vaporizer designed to separate from the air stream liquid particles of fuel passing from carburetor to engine, convert these into a gas and again introduce them to the air stream, is shown in the accompanying diagrammatic sketch. Wet fuel mixture from the carburetor enters the central separating chamber through the Venturi tube at the right. The lower ve-



Diagrammatic view of Mitchel vaporizer

locity in the separating chamber and the change in direction of the air stream results in deposition of liquid fuel particles on the exhaust heated walls of this chamber. Portions of the fuel not vaporized by the wall contact are drained by gravity into the pipe coil which passes through the exhaust jacket and terminates in an annular space around the throat of the Venturi, whence the fuel vaporized in the heating coil again issues into the air stream and passes to the engine through the top outlet of the separating chamber.

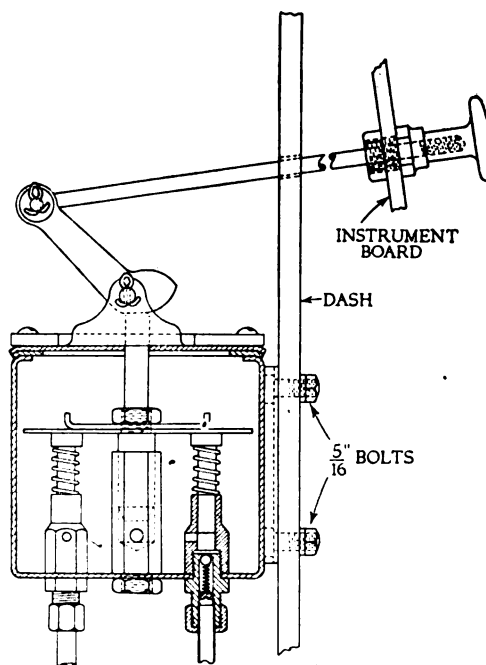
The device has been developed by G. I. Mitchel.

### Chassis Lubricator

A MULTIPLE oiler for lubricating chassis parts is manufactured by the Manzel Brothers Company. It comprises a number of pumping units equal to the number of places to be oiled, which are assembled in the

oil reservoir and from which leads run to the bearings to be lubricated. The pumping units are operated by means of a pullrod extending through the dash and instrument board, the oil reservoir being mounted under the hood. From the reservoir connections are made to all the points on the chassis requiring lubrication. The system enables the driver to lubricate every bearing while sitting at the wheel, either while driving or while standing in the garage. The system can be supplied for any chassis and with any number of leads.

PISTON rings with packing material have proved very satisfactory in different kinds of machinery, and the German automobile engineer, Hanfland, proposes for use in automotive engines piston rings that have an annular groove on the outside which is filled with an oil-absorbing, heat-proof material, say a graphite composition.



Manzel chassis lubricator



# British Air Ministry to Analyze Engine Development

Information regarding prevalent causes of failures will be particularly sought for. Number of researches will be carried out at universities. Future development to proceed with a multi-cylinder high compression engine. Aeronautical Research Committee reports on past experiences.

**I**N the annual report of the Aeronautical Research Committee for the year 1920-21, recently published, the work of the Engine Subcommittee is reviewed. Research work under the supervision of this committee was carried on at the Royal Aircraft Establishment, the National Physical Laboratory and the Air Ministry Laboratory at South Kensington. At the R. A. E. particular attention was paid to general problems affecting routine testing, as well as to some special problems, such as those connected with work on high flash point fuels, direct injection and ignition. At the N. P. L. a lengthy research on detonation was begun on lines laid down by Sir Dugald Clerk. Certain questions that came up were referred by the Director of Research to the Air Ministry Laboratory, such as a research concerning the present status of the internal combustion turbine and experiments on engines and air flow meters.

In developing a program of research the Engine Subcommittee kept in mind the urgent need for greater reliability in engines and power plants of aircraft. In this connection an analysis is being made of a large number of engine failures. For future development it has been decided to proceed with a multi-cylinder, high-compression engine, to discuss the design of an engine developing high power at altitude, to consider the possibilities of a high-speed aircraft engine and to investigate the use of high boiling liquids and water under pressure as cooling media.

## Analysis of Engine Failures

It is proposed in the report that the Air Ministry analyze and issue in collected form, for the information of engine constructors, their experience as users of engines as regards points affecting reliability, and to arrange for continuing to do so in the future. Information regarding epidemic causes of failure which have occurred in the past should be collected in particular. The Air Ministry was asked to carry out reliability trials with various types of engines, which, in case no British engines of the type were available, would be of German manufacture. In accordance with this request, tests are now being carried out on four German engines of two types supplied by the R. A. F., the tests being those specified by the Air Ministry for new British designs.

A series of experiments on the effect of pressure and temperature on the occurrence of detonation are also in contemplation. Detonation has been experienced in the small tube between the explosion chamber and the recording diaphragm, but this has been overcome by placing the latter in the surface of the experimental vessel. This experience raises the interesting question whether detonation in a restricted volume, such as a small pocket at the spark plug, is a cause of detonation in the vessel, and this matter will be investigated. The

effect of turbulence on detonation will be investigated by the N. P. L., a small fan being placed inside the cylinder; also the effect of adding oxygen to the air of the mixture until a point is reached where detonation occurs. Mr. Ricardo, in a paper submitted to the committee, drew attention to the small amount of inert gas which is required to check detonation; he believes that 5 per cent of such gas is sufficient to enable a compression ratio of 5:1 to be increased to 6:1, while at the same time increasing the thermal efficiency from 31 to 33 per cent. Mr. Ricardo also expressed the opinion that prolonged detonation is liable to cause crystallization in engine cylinders, a matter which he plans to investigate further.

## Accurate Air-Flow Meter

A report has been made to the committee on the Calender air-flow meter, which has been developed at the Air Ministry Laboratory at South Kensington. By means of an electrical method the instrument records the mean air flow through a tube, and it could readily be adapted to record the flow through an engine inlet pipe. Its chief advantage would reside in the possibility of its use for estimating the performance of engines at high altitudes. According to a further report on this flow meter, it was found to give an accurate measurement in all cases except when the flow reversed.

In connection with high-compression, supercharge engines, the question of variable valve timing is of interest. A delay in the closing of the inlet valve gives a lighter charge with a lesser chance of detonation. The use of the device for ground level control gives an estimated increase of 15 per cent in the available power and an increase of 7 per cent in fuel economy at half load at ground level. So far all experiments along this line have been made on a single-cylinder engine, but for the future experiments with a modified form of some existing aircraft engine, such as the Semi-Sikh, are contemplated.

## Factors Causing Vibration

In response to matters suggested by the Director of Research, it is stated that it is at present very difficult to formulate rules for avoiding synchronous vibration in engines, but that it is possible to calculate from the completed design whether synchronism will occur or not. It is uncertain whether engines can be always installed in planes so as to avoid serious vibration. In connection with these problems a comparison of torque reactions in different types of engines has been drawn up.

Considerable attention has been given to the subject of the magneto, with special reference to the problem of eliminating trouble due to sparking across the safety gap at high altitudes and to the question of the compara-

tive qualities of British and German magnetos. The former arises through the safety gap sparking voltage, decreasing more rapidly than the spark plug voltage with reduced pressure. A contributing cause probably is the cooling of the cylinder, due to shutting off at high altitudes. The most serious case of sparking at the safety gap occurs in engines with super-compression, in which the compression pressure is maintained regardless of the altitude. Various solutions of this problem have been suggested, but nothing definite has yet been arrived at.

#### Tests with Induction Type Magneto

In an investigation previously reported it was shown that the optimum results from an inductor type of magneto with a shunted resistance were obtained by reducing the number of secondary turns from the standard 10,000 to 7000, the sparking performance with a shunted resistance being increased from 45 to 60 per cent by

this means. The observations have now been extended to a rotating armature magneto (Bosch DU-4), and the results show that the optimum number of secondary turns is 7200, as against the standard, 8400; the average increase in performance was 11 per cent, while the shape of the low-speed characteristic was practically unaltered. The shunted secondary capacity characteristics showed an increase in performance of 12 per cent.

During the coming year a certain number of researches are to be carried out at universities, and in this connection consideration has been given to various designs of test bed. The Ricardo unit proved the most useful and was recommended by the committee. For other work the R. A. E. is developing a design of universal test bed suitable for the fitting of different types and sizes of cylinder.

A new altitude test chamber is to be constructed, as the existing plant at the R. A. E. is inadequate to test present-day engines with satisfactory results.

## New Fiat Racer in Italian Grand Prix

IN the Italian Grand Prix race, briefly reported in our Sept. 8 issue, a new design of racing car due to the Fiat company of Turin made its initial public appearance. These cars are fitted with eight-cylinder-in-line engines of 65 by 112 mm. (2.56 x 4.41 in.) bore and stroke. A sheet steel water jacket surrounds each group of four cylinders. There are two valves inclined in the head, the spark plug is in the center and two separate camshafts are used, the drive being at the rear by means of a vertical shaft. By means of bevel gearing this shaft also drives two four-cylinder magnetos.

One of the features of this engine is the extensive use of roller bearings, the crankshaft being carried in ten bearings of this type. Roller bearings are also used for the connecting rod ends and for the valve operating gear. Lubrication is under pressure with a dry sump. The engine is mounted directly in the frame by four points and has the gearbox housing bolted up to its rear. Water is circulated by means of a pump, and a draught of cold air is directed through the crankcase. Maximum power is developed at about 4300 r.p.m., when it is believed that the engine gives off about 112 hp. No authentic information has been given out on this point, but it is known that the engine will run up under load to 4600 r.p.m.

Both drive and torque are taken through the springs, which are underslung semi-elliptics. The gear ratio used in the race was 14-52, compared with 14-45 for the Ballots, both with 33 x 5-in. tires. Brakes are applied simultaneously on all four wheels, the drums in front being rather smaller than those on the rear. Fabric lining is used in front and cast iron at the rear.

All cars in the race used the new Pirelli straight-side cord tire of 33 x 5 in. Ralph De Palma started out without a spare, but the others carried one wheel at the rear. The big straight sides making the cars rather heavy to steer, Goux decided to use Pirelli clincher-bead, 32 x 4-in. tires on the front, these being of fabric construction. Wagner tried this combination in practice, but after he had lost a tire off the rim at more than 100 miles an hour, he considered it unsafe. The service given by Pirellis on the Ballot cars was excellent, the two leading cars finishing with their tires in condition to run, doubtless, another couple of hundred miles. The Fiat drivers, particularly Wagner, had many tire stops, and it was claimed that the reason the Pirellis did not stand up so well on the Fiats was their higher center

of gravity. This is denied by the Fiat engineers, who claim that the difference in this respect is not more than an inch. The Ballot frames are 14¼ in. from the ground and the Fiats 15 7/16 in.

The winning Ballot cars are the machines which ran in the French Grand Prix at Le Mans. De Palma had the car with which he ran at Indianapolis.

## African Automobile Trade

A WRITER in the London *Times* Trade Supplement cites Nigeria and the Gold Coast as places where local conditions impose big difficulties on British automobile truck makers to fit in with their special local requirements. As regards Nigeria he says: "At present vehicles using the more heavily metalled Nigerian roads must be fitted with rubber tires of a width of not less than the number of inches equal to the number of half tons of registered axle weight. No axle weight may exceed 4 tons, and the total axle weights of a vehicle must not exceed 5½ British tons (12,320 lb.). If the vehicle is used at all on light-metalled or clay surfaced roads, it must be fitted with air tires on all wheels."

Moreover, a change in the law as from the beginning of 1923 provides that only air tires may be used on any of the roads and that no vehicle may be fitted with double tires. This regulation he thinks will compel the use of giant air tires on all but the lightest vehicles.

As to the Gold Coast situation, there the gross weight of a vehicle, including driver and passengers, must not exceed 2½ British tons (5600 lb.), though exceptions may be allowed by district commissioners.

Consequently local buyers are justified in placing orders for automobiles with makers who act in response to, and even in anticipation of these restrictions, and who design their automobiles accordingly to meet the largest needs of the greatest number of export markets. It is precisely because American automobiles embody these features that they now hold markets, as well as making others, to which on national grounds they have no such prescriptive title as the Britisher.

THE President of Peru has submitted a law to the Chamber of Deputies providing for the nationalization of all petroleum deposits found in the country. Recent investigations have produced results showing the presence of extensive deposits of oil.

# Precision Machine Work in the Production of Aluminum Pistons

Methods employed in manufacturing pistons for the Essex engine. Special care exercised in machining the piston pin hole square with piston axis, and in aligning piston with cylinder bore.

By J. Edward Schipper

**A** NEW piston has recently been adopted for the Essex automobile which is not only interesting from a design standpoint, but presents some special manufacturing considerations which are unique. The entire layout for manufacturing this piston has been arranged in the belief that piston wear, oil pumping and failure of the piston rings to properly engage the cylinder bore are due in a large measure to misalignment. This misalignment causes tilting, or what is known in shop parlance as cocking of the piston in the cylinder, and results in one side of the piston acting as an oil scraper, thus giving unequal lubrication around the cylinder walls. The rings also tend to rotate and make it difficult or impossible to secure a good seal.

The pistons are manufactured from Lynite aluminum alloy. They are permanent mold castings and weigh 20 oz. before machining. The finished piston averages 13.5 oz. in weight, hence 6.5 oz. of metal is cut from each piston. The manufacturing schedule is based on the production of 550 pistons per day, so that the piston department machines off slightly more than 223 lb. of aluminum per day.

In following through the chain of operations necessary to complete an Essex piston the point which should be borne in mind is that in every operation where the consideration enters as a factor at all, parallel alignment of the piston pin hole with the head of the piston is very carefully maintained, as well as squareness of the piston pin hole with the vertical axis of the piston.

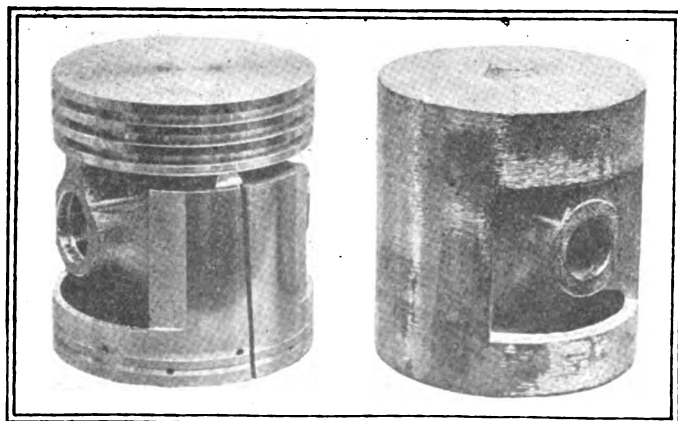
The first operation is to bore the open end of the piston. An unusual method of centering is employed in this operation. The centering tool comes in from the back of the No. 2 Warner & Swasey screw machine through the chuck and cuts a center in the projection

which is left on the center of the piston head for the purpose. The location is so arranged that the center mark must align itself exactly with the center of the open end of the piston. The latter piston is centered on a cone guide, which is exactly concentric with the centering tool. After centering, the open end is bored.

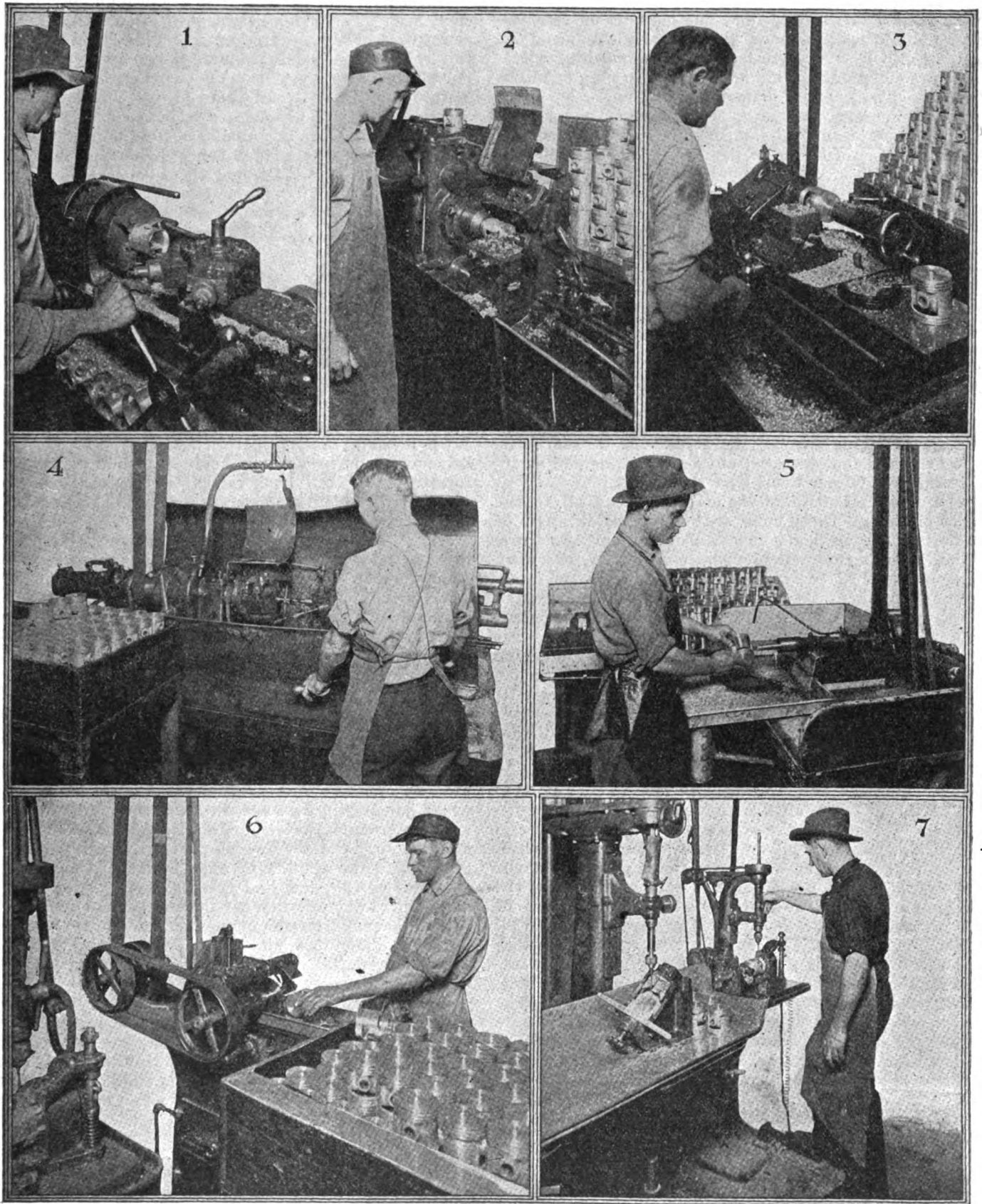
A Fay automatic lathe is used for turning the outside diameter and facing the end of the piston. This same machine also rough cuts and finish cuts the ring grooves. The finish is a sort of sizing or burnish which gives a mirror finish. For this work the piston is located from the open end, which was bored on the first operation, and from the center, which was cut on the piston head. This machine is the fundamental factor in timing the operations all through the department, as its capacity is 60 per hour, which is less than any other of the operations performed. The finished ring grooves on this machine are held to a tolerance limit of  $\pm .0005$  in., — 0.

The piston head is faced and the fourth piston ring land is undercut in the next operation. The fourth piston pin land is undercut to allow the ring to project .0125 in. on each side, or, in other words, the total diameter of the fourth piston pin land is .025 in. less than the diameter of the other land. This allows the lower ring to act as an oil scraper. The work is done on a Porter cable lathe, and the location is from the open end of the piston and from the center. The work revolves in this operation and is driven by a pin on the cone seat which bears against the piston pin boss.

One of the most interesting operations in the manufacture of the piston is the cross-boring, which is done with great care in a pot-chuck on a No. 4 Warner & Swasey turret lathe or screw machine. The pot-chuck is so arranged that the location is from the flat of the piston head to give the proper distance from this flat surface to the center line of the piston pin hole. The alignment in reference to the bosses is made sure by first inserting a lining bar which enters the cored hole. The next tool which comes into operation is a boring drill and the third a piloted, single-cutter boring tool, which takes a truing cut and gives an accurate alignment of the hole. The next tool on the turret is a floating reamer which accurately sizes the holes, after which another tool cuts two pin-retaining grooves in the piston pin bosses. On this machine the work revolves and the tools are piloted on both sides, this being accomplished by a pilot in the jig on the far end and pilot bushing on the near end which enters the hole and acts as a pilot bearing for the tool. For lubrication on making this cut, and a great majority of the cuts throughout the manufacture of this piston, a mixture of kerosene and so-called mineral "lard" oil is employed. This has



Finished Essex piston and blank from which it is made. The finished piston weighs 13.5 oz. and the blank casting 20 oz.



1—Boring open end of piston and establishing center. 2—Turning overall diameter and facing end of piston on a Fay automatic lathe. This same machine also rough and finish cuts the ring groove. 3—Facing the piston head and under-cutting the lower piston ring land. 4—Cross-boring the piston in a pot-chuck with special provisions for accuracy in boring by piloting the tools. 5—Hand reaming the piston pin hole after cross-boring operation has been completed. 6—Sawing a  $\frac{1}{4}$  in. slot under the bottom piston ring. Note simple locating method in V-block. 7—Drilling twelve oil holes in the piston skirt on an indexing fixture which takes care of spacing as well as stagger



been found to assist in giving a very clean surface. The work is held to as close limits as possible on this machine, but in order to meet the tolerances required the piston pin hole is hand-reamed after the machine operations are completed. This hole is held to plus or minus .0003 in. The nominal diameter is .875 in.

A 3/16-in. slot is sawed under the bottom piston ring. For this operation the piston drops over a dowel pin, which passes through the piston pin hole and into a V locating block. No clamp is necessary to hold the piston in this jig, as the action of the saw, which is downward, tends to force the piston directly into the V block. The saw has a capacity of 200 pistons per hour.

There are twelve oil holes in the piston skirt, each 3/32 in. in diameter. The holes are equally spaced circumferentially about the piston, but are staggered in an axial direction. This work is accomplished on a Leland Gifford drill, to which is fitted an indexing fixture which rotates the piston in the jig and spaces the holes properly. To take care of the stagger in the holes the fixture brings the work back and forth by means of a cam. The pistons are held in position on a spring clamp, which allows the cam to move the work back and forth, taking care of the staggering of the holes. The fixture is foot-operated and one machine can easily take care of 200 per hour.

There are also two oil holes which lead oil to the wrist pin boss. These holes are inclined at an angle of 50 deg. to the vertical and require an indexing fixture, which permits the drill to operate vertically, the work being inclined at the proper angle.

The location of the work in the fixture is from the piston pin hole by means of a locating pin which passes through the holes. These are 1/8-in. holes, and the machine has a capacity of 100 per hour. The machine used is a Sipp drill. Another Sipp drill is used for chamfering the wrist pin hole to break the corner at this point and to prevent a burr in assembly.

### Grinding Operations

For grinding the piston pin boss relief a Landis grinder is employed. The work is located by the open end of the piston against a cone seat with a driver fitting closely between the piston pin bosses. A special cam brings the work in contact with the grinding wheel at the four points at which the relief grind is taken; that is, one point on each side of each extremity of the piston pin boss. The machine readily takes care of 150 pistons per hour.

The same type of Landis grinder is used for rough grinding the outside diameter. This is a 6 x 18-in. machine, which takes off a roughing cut of .012 in. per side, leaving for a finish grind .0015 in. on each side. The rough grinding operation is taken care of at the rate of 100 per hour.

Particular care is taken in the finish grinding to hold the temperature of the cooling system for the machine within the desired range. It was found, in checking up the piston diameter, that a considerable temperature variation in the cooling system, such as might be experienced in cold weather, caused a variation in the diameters of the pistons turned out in the morning and later in the day, when the temperature was higher. In order to overcome this the temperature of the cooling medium is held at between 65 to 70 deg. Fahr. in order that more metal is not ground off on a warm day than is taken off on a cold day. The wheel used for finish grinding is a 36-L crystolon, this being a Norton wheel, and is the same wheel used for the rough grind. The relief grinding is done with a No. 24 CL Alundum wheel.

The range of variation in the cylinder bore is .002 in.

by steps of .0005 in., which is the machining limit on each size. The piston sizes, which are arranged for selective assembly, are seven in number and fit within this range. The nominal outside diameter of the piston is 3.372 in., with a variation of +.0015 in. and -.0005 in. Within this .002-in. limit there are seven selections for assembly, and the pistons are gaged and marked in accord with this. The machine used for gaging the pistons is the ordinary type of amplifying gage, which is checked up with a master plug, and the symbol for size is a letter stamped on the piston after gaging. The operator on the finish grinding machine is also provided with an amplifying gage for checking outside diameter for size and roundness before the piston goes to the inspection department.

### The Final Cuts

Following the finish grinding and inspection, the center is faced off on a Sipp drill. A final cut is then taken on the piston pin hole and the diameter checked with a go and no-go gage. The limits of the piston pin are shown by the diameters of the gage, which are .8747 on the go side and .8753 on the no-go side. This final cut is a hand-reaming operation, the ream being power-driven and the work hand-held. This differs from the former hand-reaming operation only in that the ream is driven at 60 r.p.m., whereas the first hand-ream had a reamer speed of 80 r.p.m.

At this point a line is drawn through the piston center line on the piston head. This line is drawn by means of an eccentric and a plug through the piston pin hole. The eccentric brings the piston down against the face plate, and the center line is then drawn on the top of the piston parallel with the axis of the piston pin hole. The purpose of this is for lining up in assembly with the connecting rod.

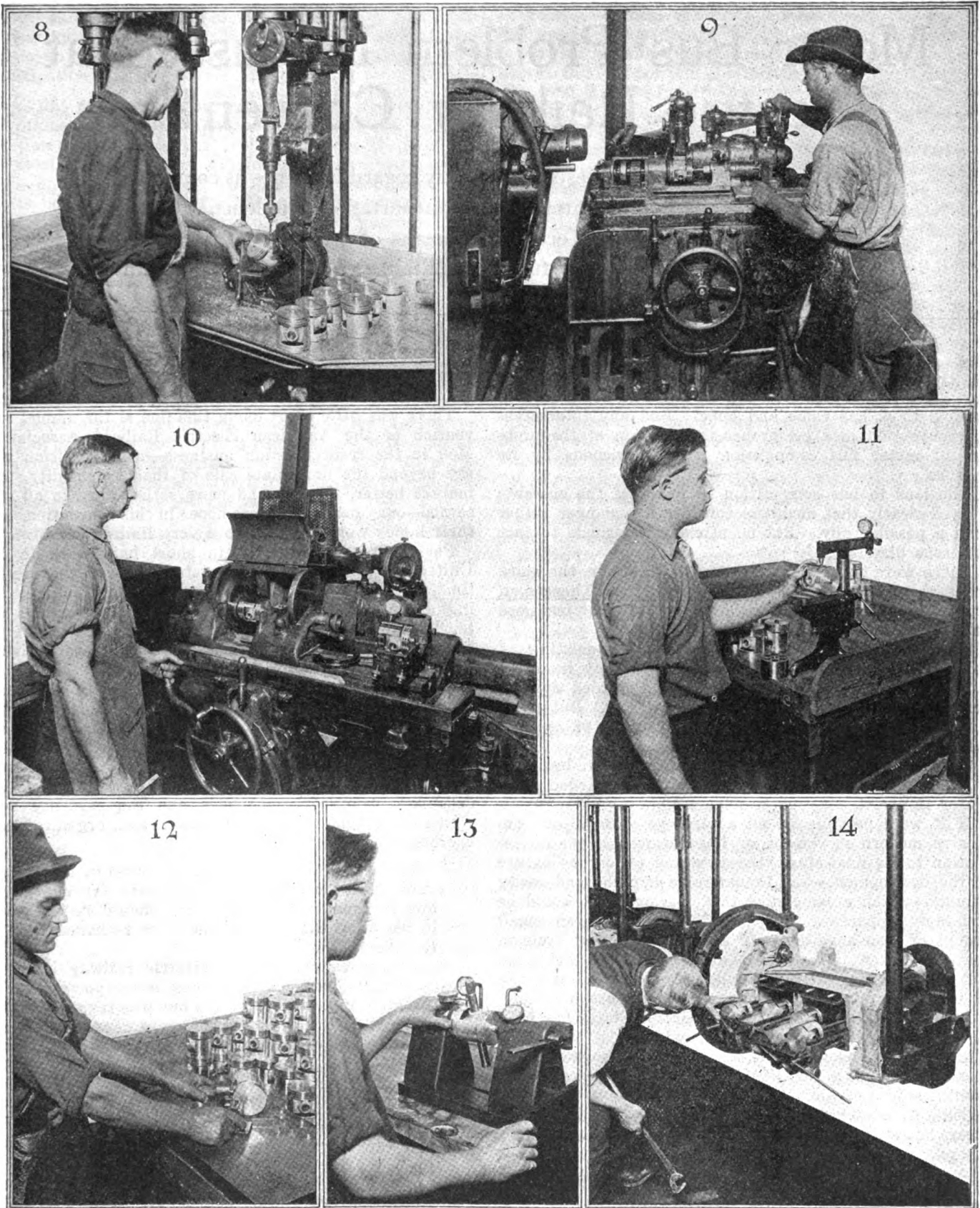
The skirt of the piston is split by means of a 1/16-in. saw-cut. The slot cut in the skirt is on an angle so that the slot does not work vertically up and down in the cylinder, but has a sliding action.

For checking the piston head and the accuracy of the cross-bore, a special inspection gage is employed which has amplifying gages in which the indicator points are run around the circumference of the piston head and also on a mandrel which passes through the piston pin holes. The amplifying gage is checked against the mandrel on one side, and the piston turns around 180 deg. and the amplifying gage then checks on the other side of the mandrel, which gives accurately any misalignments in the piston pin hole. Each of the pistons is stamped with the weight, which is necessary in the selective assembly.

An interesting phase in the assembly of the pistons, which is really a check on the piston itself, is the piston aligning fixture, which is bolted to the crankcase on the crankcase assembly line. It is in this aligning fixture that the line on the top of the piston is used. The fixture is so arranged that it has a gage with two high points, both of which must touch the piston head. If one touches and the other does not, the connecting rod is brought up to perfect alignment, so that both of the high spots on the aligning fixture will touch. The center line drawn on top of the piston must then also be parallel with the line on the aligning fixture.

Inasmuch as this fixture goes directly on the crankcase itself and is a part of the assembly operation of the engine, it gives a final check-up on the alignment of the piston and makes it certain that the piston will be operating on a true axis. This is the final step and illustrates the care given to avoid tilting of the piston in the bore.





8—Drilling two oil holes for the wrist pin. These holes are inclined at an angle of 50 deg. to the vertical. 9—Grinding the piston pin boss relief on a Landis grinder. 10—Grinding outside diameter of piston. 11—Amplifying gage and master plug used for checking same employed in piston inspection. 12—Drawing center line on piston head in a special jig. 13—Inspection gage for checking squareness of head and piston bore. 14—Aligning jig which is fastened to the crankcase to check up on squareness of piston. The center line is checked against a straight edge on the jig as illustrated, to make piston float freely

# Motor Bus Problem Discussed at Electric Railway Convention

Conservative traction interests apparently regard bus lines as competitors rather than as possible aids in solving transportation problems. It is evident, however, that the most economic means of transportation will survive in any given case. Mutually profitable cooperation is possible.

By Sinclair Gluck\*

**T**HE fortieth annual convention of the American Electric Railway Association at Atlantic City, October 3 to 6, has come and gone. And any interest at the convention in a comprehensive solution of the problem of motor bus competition was conspicuous by its absence.

Allusions to bus competition in many of the speeches showed clearly that members consider it a danger rather than a possible ally. But no attempt was made to face the issue directly.

There were two elements present. One side, the more conservative, was greatly in the majority. These men seemed to regard the bus as a menace to their business and nothing more.

The other and more progressive side, consisting of only a few men, some of whom have already installed buses to co-operate with their trolleys, regarded the bus not only as a possible but as an actual ally. But these men made no headway against the weight of opinion ranked against them.

Taking the convention as a whole, the motor bus may be said to have been almost entirely disregarded as a factor in street car line transportation.

If it were possible to get a birdseye view of any extensive modern movement or improvement, from its inception to its final stage, the slow and ponderous nature of the development—the innumerable bypaths and costly blunders which accompanied this development—would be strikingly apparent. Single individuals or even small groups of men have dreamed a dream and seen a vision that has taken them almost directly to the final goal. But give the movement a broader scope and the wastage of time and misdirected effort often becomes appalling.

Passenger transportation in the United States has been no exception, principally because, aside from the steam railroad, the development of passenger transportation has been in the hands of many individuals, working locally, and with little idea of what the other fellow is doing or why he is doing it. Few have been able to profit by the blunders of others and still fewer to take advantage of the successes of others.

## Little Effort to Solve Problem

There are organized and influential groups of men in the passenger transportation business, aside from the steam railroads. There are the electric railway interests and there are the manufacturers of buses and of truck chassis convertible into buses. But it is necessary for both of these important groups to work in a fundamentally con-

structive way to solve the short haul passenger transportation problem.

There was little effort along this line at the annual convention of the American Electric Railway Association. Men in the transportation business—men of vision who say beyond the immediate sale of their commodity, to a market better, broader and more satisfactory to all concerned—may have held great hopes in this convention. But their hopes were justified to a very limited extent.

Passenger transportation in short haul work in the United States is in a chaotic state of flux at the present time. Here and there, in cities such as New York, Washington and Toledo, well organized, efficiently operated motor bus lines are working in conjunction with street car lines to a greater profit of both and the general satisfaction of the public. Here and there in other cities more or less well organized bus lines are competing with street cars at a profit to themselves and a heavy loss to the electric lines. Here and there jitneys operated on a shoe string are cutting down the number of street car patrons at little profit to themselves. Elsewhere buses have tried to compete and have failed. The difference in the outcome has depended upon local conditions and the efficiency with which each type of transportation was organized and operated.

There can be no doubt in the mind of the intelligent observer that there is a field for short-haul bus transportation. And there should be no doubt in his mind that the bus is to be reckoned with in that field.

At the convention the electric railway interests apparently regarded the bus as a powerful and threatening factor. And the bus was regarded so far as most of the set speeches were concerned, as an opponent only—not a possible ally.

On the whole, the attitude of the speakers somewhat resembled the King Canute point of view. The more conservative electric traction interests do not want the tide of bus competition to rise any higher. So it seemed to be generally conceded that the best thing to do was to order it back, by means of legislation and of a great publicity campaign, extolling the benefits of street car lines to municipalities and the general public, and decrying buses as undependable, incapable of handling the traffic and unwilling or unable to stand their share of municipal duties and municipal taxation.

One speaker stated that there was only one successful bus line in the United States, the Fifth Avenue Coach Co.

Another stated that no bus line stood its share of municipal expenses.

\*Managing Editor *The Commercial Vehicle*.

There are many successful bus lines in California and elsewhere. Bus lines pay taxes and in some cases have franchises. And the work of the Fifth Avenue Coach Co. in clearing the snow during the last two winters from the streets on which it operates was an excellent example to municipalities far and wide.

**But far more important than any inaccuracy of statement was the mistaken attitude of the convention toward the entire problem. After all, it is the most economical form of transportation which should—and will—survive. The question, fundamentally, is not one of profit for traction companies now in business and in no hurry to go out of business, but one of solving the problem of the most economical and efficient form of transportation in each locality and under each set of conditions.**

Either the street car lines are of real and permanent value to the communities in which they operate, or they are not. If they are of permanent value they will survive and they have little to fear, except possibly financial mismanagement and inefficient operation. If they are not of real and permanent value in their particular communities, the directors and stockholders should read the writing on the wall and either get out of a bad business altogether or adopt the type of transportation which will solve the problem in their communities—for if they are not of real and permanent value, *they will not survive.*

#### Committee Report Not Ready

Some of the electric railway interests have realized the importance of a clear understanding of bus transportation. A committee of fourteen had been previously appointed, under the chairmanship of H. B. Flowers, vice-president of the United Railways & Electric Co. of Baltimore, to inquire into the question of trackless transportation. Unfortunately, the committee had not sufficient time to prepare a comprehensive report.

At the general meeting on Wednesday, October 5, in the morning, Mr. Flowers, the committee chairman, announced that he had only a progress report to make. He asked that the committee be reappointed further to consider the question of trackless transportation. He stated as his view that the trackless trolley and the motor bus must be conceded a place in the sun and that more time should be granted the committee to inquire further into this important subject.

It has been stated that of the fourteen reports of sub-committees which should have been turned into the committee, only two were available in time for the convention. One of these, the report of the sub-committee representing motor bus manufacturers, was turned in to the committee. No notice was taken of this report on the floor of the convention.

The two members of the committee, F. W. Fenn of the National Automobile Chamber of Commerce, and D. C. Fenner of the International Motor Co., who represented this sub-committee, were present at this session with a recommendation which they had prepared dealing with the manufacturer's angle on trackless transportation.

The report of the committee on publicity called attention to the failure of buses to handle the traffic in Des Moines when street car lines were discontinued. There were numerous leaflets available dealing with the Des Moines situation and attacking the bus generally.

#### Competition Felt

F. E. Frothingham, of Coffin & Burr, Boston, Mass., stated that the street car lines have been subjected to severe competition in the jitney and in bus lines. This was badly met. The street car lines ridiculed it instead of in-

sisting on fair competition and trying to absorb this competition. This attitude resulted in hostility from the public. He stated that the Fifth Avenue Coach Co. was the only successful bus line in the United States, and went on to say that possibly trackless trolleys might solve the problem of this competition for the street car line. But, he said, that if there must be competition, buses and jitneys must bear their share of street maintenance in clearing snow just as the street car lines do.

J. K. Newman, Isadore Newman & Sons, New Orleans, La., also spoke on the subject of street car line finance, municipal ownership, etc. He referred in passing to jitneys and buses. The gist of his remarks was as follows: Jitneys and buses take money from the street car lines. When this happens the street car lines have to raise their fares to meet expenses and the public suffers accordingly. If the street car lines are discontinued, he said, up will go the fares on the buses and down will go the service. It is not clear from the above why the public which takes the bus should suffer because the street car line raises its fare. And the question of increased fare and decreased service on the bus lines, once the street car lines are discontinued, is problematical to say the least.

Finally, he said, that as street car lines are discontinued the city will lose the franchise and the paving done by the street car lines. Jitneys and bus lines, he stated, should not be permitted in competition with trolley lines any more than two fire departments should be permitted. City franchises should guarantee no jitney or bus competition with street car lines.

Edwin Gruhl, vice-president and general manager of the North American Co., New York, in the course of his speech also touched on the subject of motor bus competition. He states that "While the motor bus has the advantage of low investment and small overhead expense, and greater speed and flexibility of operation, the operating cost of a motor bus per seat mile is practically twice that of an electric car. It is not likely, therefore, to seriously menace the industry except during periods of unemployment." According to a prominent bus operator these figures are based on the 16-passenger bus and do not apply to buses of larger capacity.

These remarks are characteristic of most of the speeches in which jitneys and motor buses were mentioned. But it must not be understood that all members of the American Railway Association are inclined to disregard the real value and importance of motor bus transportation. H. B. Flowers, general manager of the United Railways & Electric Co. of Baltimore, and chairman of the committee on trackless transportation, is very much in favor of the use of buses by street car lines. His company was one of the first to use buses, operating first twelve and then fifteen. The company is now going in for larger buses and may possibly experiment with double deckers.

In the debate on Tuesday J. P. Barnes, president of the Louisville Railway, led the progressive element. He said that the electric railway should regard itself as the transportation purveyor of the community, and as such should use every means available to improve transportation. He stated that the automotive industry was composed of real live men who knew the facts. In this connection he referred to the address last year in which Mr. Graham, coming from the automotive industry, held out open arms to the electric railways and offered to help them in any way possible. Mr. Barnes went on to say, "We took our heads out of the sand then, but we've stuck them back in again now."

**Unorganized jitney buses have done much in many communities to damage the prestige and decrease the profits of street car lines. If this is the case properly organized and efficiently operated bus lines**

will surely do more damage. And these bus lines are coming. Therefore, where bus lines are practicable it would seem obvious that there are only two courses of procedure open for the street car line in certain cases, either to organize and operate the inevitable bus lines themselves or go out of business.

From the views held by the representatives of manufacturers present at the convention it would seem that there is a strong inclination on their part to recommend the use of present standard equipment for buses.

#### Chassis Offers Problem

The attitude of the manufacturers is perfectly comprehensible. The exact specifications of the vehicle most suitable for city bus work have not yet been determined. It is not known what type of chassis will be demanded of them by the street railways which buy and operate buses nor is the extent of that demand known. To construct a chassis which will be ideal for city bus work will mean much research and designing effort and possibly the installation of additional machinery to manufacture the

final design. It is natural that the manufacturers are reluctant to undertake this work without any knowledge of the extent of the market on which they can depend for the sale of the ideal vehicle when it is completed.

On the other hand there are some who hold that the truck chassis is not suitable for the best type of city bus transportation. They hold that the high center of gravity increases the danger of overturn, also that the height of the body on the truck chassis makes it inconvenient for the passengers to board and alight from the vehicle. And there are other doubtful features. As an example of this it is reported that a truck chassis of a prominent and reliable make was recently tested out in city bus work by a large bus company. The bus had already made a trans-continental trip, but was in perfect condition and was driven by a representative of the manufacturers. At the end of a week the clutch, the brakes and other parts of the vehicle are reported to have failed under the constant strain of stopping and starting in traffic and the vehicle was practically useless.

But the bus is coming. The ideal type of bus chassis is coming also and will survive.

## S. A. E. Standards Work in Progress

**T**HE Society of Automotive Engineers has been requested to formulate a standard for wing nuts in order that designers may refer to a standard list and select sizes which may meet their requirements.

As it is recognized that the formation of such a standard should be based on the best present practice the S. A. E. is obtaining data on current practice for the different types of wing or thumb nuts and those standards which are in general use by small industrial groups such as bolt and nut manufacturers.

The adoption of a standard series of wing nuts will do much to decrease the cost of certain wing-nut sizes through greater production and will ultimately result in discontinuing many special sizes.

#### Makers May Standardize Clutch Facings

A. C. Bryan, vice-chairman of the Transmission Division, has submitted a preliminary recommendation for S. A. E. clutch facing standards based on present practice. This recommendation will be thoroughly discussed and, if possible, finally acted upon at the fall meeting of the Transmission Division.

It is believed advisable to divide the facing sizes into two divisions—one for single plate and the other for multiple plate clutches. The majority of single-plate clutches seem to be made in three sizes, 8, 10 and 12 in., and in view of the fact that they are quite similar in design and are housed by flywheels bored 8, 10 and 12 in. respectively, it would appear that a standard inside and outside diameter can be agreed upon without running into much opposition from the clutch makers, as these sizes will fit into their present clutches without any change in the design of the clutch parts.

A great number of multiple-disk clutches on the market are so varied in design that it makes the question of standard facing sizes for this type somewhat more difficult than in the single-plate clutch, but it is believed that the many sizes of facings now used can be reduced to a comparatively few if the matter is studied by the S. A. E.

It is generally recognized that one of the most effective ways of identifying stolen automobiles and minimizing the danger of their being stolen in the first place would be

the general adoption of a method of numbering engines which would make it impossible to change the numbers without leaving indications that a change had been made.

Replies to a letter from the S. A. E. Standards Department soliciting advice from automobile manufacturers on this problem indicated that the stamping of plain characters on several parts of the engine and other units of the chassis is the most satisfactory way of guarding against having the numbers changed by automobile thieves. It is realized, however, that if a simple means of numbering cast-iron or aluminum castings can be discovered which will make it difficult for the numbers to be changed, it would be a real solution to this problem. The suggestion has been made to the S. A. E. that a solution might be found by the casting of a special alloy block in the surface of that part of the engine casting which is to be numbered, the composition of the alloy being such that it would be impossible to change the numbers by any simple means. The selection of such a material would depend, of course, upon its physical characteristics. Members of the Iron and Steel Division have been asked to study the possibilities of this solution.

Any suggestions in this connection which might be developed into a satisfactory means for numbering engines should be referred to the Society.

## Tractors and Trucks in Morocco

**A**CCORDING to the French trade organ, *Exportateur Français*, there is a good scope at Morocco for tractors and trucks, a reason assigned being the absence of coal, and therefore lack of railroads.

The British Consul General at Beirut, Syria, pays a tribute to the enterprise of American auto firms in that territory. American cars, he says, greatly predominate because of being cheap, light and powerful to climb the stiff grades, whereas the cheaper British cars fail as hill-climbers, and dearer ones are either too expensive or too heavy. Trucks and vans, he says, have a good scope about Damascus and Beirut, where the merchants find it cheaper to use the roads in preference to the railway, the latter having inadequate carrying capacity.

## Exports of Automobiles and Tires for August, 1921

COUNTRIES	COMMERCIAL		PASSENGER		Parts	TIRES			All other Tires				
	Complete Cars	Chassis	Complete Cars	Chassis		For Automobiles							
						Casings	Inner Tubes	Solid Tires					
EUROPE													
Austria.....				10	\$5,360								
Belgium.....				31	23,431	25	\$9,381	\$4,961	\$3,143				
Denmark.....	1	\$2,164		6	5,882		112,581	31,812	6,682	\$352			
Estonia.....				1	2,106								
Finland.....							928	36,000					
France.....				9	20,713		9,806	21,105	1,336	\$99			
Germany.....						1	1,820	164	28				
Gibraltar.....				1	800		3,767						
Greece.....							949	2,028	87	217			
Iceland and Faroe Islands.....							362						
Italy.....				1	5,000		1,455	101	14				
Malta, etc., Islands.....							483	243					
Netherlands.....	25	12,567	2	\$866	48	34,799	8,752	4,985	70	148			
Norway.....			9	8,387	2	880	11,985	13,270	1,017	3,418			
Yugoslavia, etc.....				14	11,277		550	4,000		1,037			
Poland and Danzig.....				4	1,500		3,359	1,336		6,000			
Portugal.....							2,250	987	38				
Romania.....				1	1,250		2,099	26,388	5,007	1,833			
Spain.....				7	7,348		9,767	9,111	10	308			
Sweden.....				56	54,514	1	1,456	9,206	30,501	472			
Switzerland.....				14	16,804		5,943	1,759	197	2,055			
Turkey in Europe.....	4	16,000		1	1,800		4,943	749	484				
England.....	37	66,289	12	15,480	11	11,728	25	28,711	154,656	358,002			
Scotland.....				1	1,500			1,525	698	36,190			
Ireland.....								35		15,236			
North and South America													
Bermuda.....										76			
British Honduras.....								45	64	7			
Canada.....	50	70,158	39	70,641	693	809,583	12	20,875	832,940	73,646			
Costa Rica.....	2	4,062			5	5,752			500	227			
Guatemala.....					9	14,338			2,526	362			
Honduras.....			1	556	4	4,950			2,857	388			
Nicaragua.....									485	284			
Panama.....					22	21,255			4,230	9,281			
Salvador.....									1,058	2,791			
Mexico.....	98	75,831	33	17,820	564	497,279	30	8,538	119,884	84,100			
Newfoundland and Labrador.....					2	7,392			1,865	840			
Barbados.....									2,301	1,443			
Jamaica.....	2	956			5	3,685			8,938	10,858			
Trinidad and Tobago.....	6	3,587			8	4,168			8,064	7,076			
Other British West Indies.....	2	3,250			6	4,156			852	181			
Cuba.....	2	1,836			81	73,336	4	2,912	53,455	37,310			
Virgin Islands of U. S.....					6	5,000			2,432	1,877			
Dutch West Indies.....									900	2,383			
French West Indies.....									665	38			
Haiti.....									2,062	3,275			
Dominican Republic.....					4	1,670			4,762	8,958			
Argentina.....									47,535	34,988			
Bolivia.....										7,474			
Brazil.....					7	16,900			1,683	117			
Chile.....	8	3,824	1	1,072	3	4,460			3,665	5,739			
Colombia.....	1	1,817	1	480	4	2,640			3,722	367			
Ecuador.....									10,014	5,112			
British Guiana.....									205	3,016			
Dutch Guiana.....									1,777	121			
Peru.....					2	4,805			141	11,720			
Uruguay.....					1	4,500			7,163	199			
Venezuela.....					21	23,071			9,883	5,818			
Asia													
Aden.....									9,786	5,977			
China.....									68	854			
Chosen.....				22	35,585				9,856	7,944			
British India.....				2	1,200								
Straits Settlements.....				23	12,736				19,317	160			
Other British East Indies.....									6,615	2,344			
Dutch East Indies.....				117	120,903				36,895	19,842			
Greece in Asia.....										466			
French Indo China.....									425				
Hejaz, Arabia, etc.....				9	6,431				116	648			
Hongkong.....				3	5,500				2,351	1,164			
Japan.....	2	4,350	13	17,412	28	31,122			18,594	6,012			
Palestina, Syria.....				16	16,190				9,972	3,860			
Russia in Asia.....									11				
Siam.....				6	3,600				567				
Turkey in Asia.....									137				
Australia.....			1	2,335	37	49,603	125	104,682	53,226	5,411			
New Zealand.....	1	2,000	2	5,200	15	22,975			41,685	32,684			
Other British Oceania.....				3	2,424				365	208			
French Oceania.....				2	2,066				875	906			
Other Oceania.....				2	1,390				351				
Philippine Islands.....				2	3,520				10,193	12,380			
Africa													
Belgian Congo.....			10	4,784	5	2,165			1,019				
British East Africa.....			9	13,365					9,393	6,759			
British South Africa.....					28	32,855	1	2,575	33,642	11,588			
British East Africa.....			1	3,000	4	6,936			7,832	4,681			
Canary Islands.....			1	1,592					505				
French Africa.....									233	225			
Morocco.....			5	2,391	20	9,815	4	1,732	8,647				
Portuguese Africa.....									830				
Egypt.....									8,470				
Total.....	241	\$268,691	140	\$165,361	2,009	\$2,082,646	228	\$182,682	\$1,786,886	\$992,123	\$114,074	\$113,184	\$22,338



# Bright Future Predicted for U. S. International Trade

Speakers at American Manufacturers Export Association believe exchange situation will be remedied slowly but surely. Danger of German competition is overrated. Many expressions against the proposed tariff were in evidence at convention. European imports needed to start trading.

**T**HE chief interest to the automotive industry in the annual convention of the American Manufacturers Export Association, held in New York City during the first week in October, was the universally expressed conviction that foreign trade, although it totals no more than 10 to 20 per cent of our total business, is essential to the return of prosperity to the United States. With this belief was coupled a general feeling that our overseas business has passed its lowest point and that a trade revival may be confidently expected in the coming months. The recovery, of course, will not be sudden and it will not come as a boom, but, nevertheless, better conditions in this part of our business are on the way.

The association is a general one and numbers among its thousand members manufacturers of all classes of goods suitable for the export trade. Among these are automobiles, trucks, equipment and other products of the automotive industry, many firms of which are members of the association. Consequently, the gathering brought together a number of export representatives from the industry, although, unfortunately, no part of the program specifically considered the automobile and its place in our foreign trade. However, the association recognized the growing foreign position of the industry by electing J. Walter Drake of the Hupp company, chairman of the Foreign Trade Committee of the N. A. C. C., as a director.

Delegates and speakers at the convention were chiefly concerned with three things. These were international credits and financing, which included the exchange situation; the proposed American tariff changes, and the better tone prevailing and predicted for our overseas trade. As to the first, it was generally agreed that events would have to take their course and that the correction or stabilization of exchange depended upon many factors. Par value for many foreign currencies cannot be expected for many years, and, in the words of more than one speaker, the present monetary units of some may fall by the wayside to be replaced by other standards. Stabilization, through mutual and co-operative efforts by the great banks of issue of the United States, England, France, Italy, Holland and Spain, was given as a possibility by Secretary Hoover, who addressed the annual dinner, and it was hoped by him that some method might be worked out which would do away with the recent violent week by week fluctuations that have been so characteristic of certain divisions of the exchange market.

The proposed tariff was not popular with the members of the association. No more so was the American valuation plan. Only one speaker favored the changes

that Congress has proposed and he was greatly outnumbered by others throughout the meeting. The position was made clear by James M. Anderson, Jr., of the Chase National Bank of New York, in considering the possibility of the dumping of low-priced goods from Europe or other sections. He said:

"Many American manufacturers are apprehensive of European competition, notably from Germany, and they are urging that high tariff barriers be erected to prevent the influx of foreign goods. During the first eight months of 1921 Germany sent us \$52,000,000 worth of goods and took from us \$263,000,000. There is nothing in these figures to suggest a very imminent danger. But the most welcome thing that could come about, the thing that would promise for a real revival, would be a real and vigorous increase in imports to the United States of European manufactures. It would start the circle of trade going again."

This position was recognized even by Senator Walter E. Edge, the New Jersey representative in the Senate, who is best known for the bill bearing his name that authorized the formation of foreign trade financing banks. Senator Edge stated that he favored protection, but that Europe must send goods to the United States in order to restore her financial and industrial status. He proposed that the tariff act give broad discretionary powers to the President to control various schedules. The President, with the possible assistance of the Secretary of the Treasury and the Secretary of Commerce, would be authorized to regulate the rates to protect any American industry threatened by low-priced, foreign-made goods.

## Hoover Predicts Price Stabilization

Secretary Hoover declared that European competition of low-priced products could not be continued long. The same economic factors were at work throughout the world, he said in substance, and that would bring about a condition of more stabilized prices. He was distinctly against any belief that Germany has achieved a solid foundation in her present show of feverish prosperity and believed that the continued inflation of the mark will ultimately cause a sharp turn in the minds of those who fear German competition.

This competition was also a subject that engrossed the delegates, many of whom were at a loss to know just how strong a position Germany had obtained in her former foreign markets. Unfortunately, few direct references to this were made by the speakers. The attendants, however, were unusually frank in declaring that German competition had been greatly overrated in the general markets and that American manufacturers

could compete on price to-day in a majority of the world markets.

George Weston, general manager for South America of the American Express Company, made this an important point in his talk at the luncheon on the opening day. With specific reference to textiles, he related an experience during August with three textile salesmen from the United States in his office at Buenos Aires. These men, he said, were confident that they could compete on price, service and delivery with their lines, provided Argentine exchange went no lower than it was at that time. Weston then showed that the Argentine currency had appreciated materially since the conversation referred to and, consequently, orders for textiles, hardware and other lines were again being booked.

### The South American Market

Weston was one of the few speakers whose talks carried an intimate and recent knowledge of particular foreign markets. He has just completed a ten months' visit to Brazil, Uruguay, Argentina and Chile, and has unbounding confidence in their fundamental strength. In Brazil, he said, the shelves of interior stores are almost bare of all goods, and, as a result, inquiries are coming to the larger centers that will result shortly in new business and further liquidation of whatever stocks are held in the customs houses. Brazilian merchants have been hard pressed, although an improved condition is already apparent, and he counseled that all credit risks to that country should be carefully scanned.

Argentina and Uruguay were looked upon by the speaker as offering more immediate business. With general betterment expected by their bankers and business men, Weston said that he would not be surprised to see our trade improve rapidly with those two countries. The last year crops in Argentina have now been sold and anxiety as to the wheat production for 1921 has been allayed by recent rains. Chile was pointed out as presenting a condition similar to Brazil. The demand for nitrate had dropped almost to nothing, but there now are "evidences that this nitrate stagnation cannot con-

tinue much longer and Chile will again come into her own."

Another important subject covered by Weston was that of credit allowances.

"The day of cash against documents at New York has passed," he said. "Fortunately the Germans have not reverted to their old methods of extending credits for periods of six months, a year or two years, but all of the Europeans are quoting 60-, 90- and 120-day terms. We must meet these allowances if we are to do business.

"On prices we are to-day doing business in many lines and new orders are being placed. The quality of goods from Europe is generally lower than from this country and this is being recognized. The only things I have to deplore in regard to our foreign trade are the lack of perseverance and the lack of knowledge as to South American needs of many of our manufacturers."

The picture of Europe, as given by several speakers, was both bright and dark. The latter was almost entirely one of finance, whereas it was conclusively shown that great strides had been made since the armistice in restoring the economic and social structure of a majority of the continental countries. Secretary Hoover was one who has been greatly impressed by the forward movement of Europe in this regard. Another was John S. Lawrence of Lawrence & Co., Boston, who summed up the European situation by saying that the continent had made a steady improvement in industry and agriculture but had steadily declined on the financial situation.

This brought up the reparation payments by Germany, which was a recurring subject for discussion. Several speakers recognized that the United States should have some part in the reparations deliberations. W. F. H. Koelsch of the New Netherland Bank of New York, whose paper was read, expressed the possibility that the allied leaders in Europe might propose some change in the payment system instead of having such a request come from Germany.

Myron W. Robinson of the Crex Carpet Co., New York, was elected president of the association to succeed William C. Redfield, former Secretary of Commerce.

## New Theory of the Slotted Wing

IN a paper recently read before the Society for Aeronautical Science at Munich, Dr. Betz dealt with a certain development in sustaining planes or aircraft wings due to Lachmann in Germany and Handley Page in England. The object is to increase the lift by providing slots in the wing parallel to the leading edge. If these are to be effective they must extend without interruption across the entire width of the wing. This arrangement may also be regarded as an extra plane of small depth placed in front of the main wing at its leading edge so that there is only a very small space left between the two. The maximum lift of the plane is thereby increased by 80 per cent or more. There are different explanations of this phenomenon. One is that the small plane located in front of the main plane is located in an air stream whose conditions of flow are determined by the main wing. It follows that at the leading edge of the main wing the air speed materially exceeds the speed of flying. The reactions of the air on the small wing in front therefore are considerably greater than if it passed through space at the flying speed.

The new explanation of Dr. Betz is based on the fact that for a given speed the lift of a plane increases with the angle of incidence until the air stream on the upper

surface can no longer follow that surface. If the angle of incidence becomes too big, a new condition of flow develops, the air stream separating from the plane, creating a field of eddies which grows with the angle of incidence. Such eddies have a tendency to form even in the case of small angles of incidence, but the air, passing over the plane, immediately washes them away, and thus maintains a smooth, lift-creating stream. In the case of large angles of incidence this becomes impossible. But if the air stream on top of the plane is reinforced by air passing through the slot in the wing from the under to the upper side, the lift-creating flow conditions can be maintained even with larger angles of incidence. New energy is being supplied to the air stream on top of the plane by the air flowing through the slot, which enables it to continue to wash away the eddies. This energy has to be paid for, however, the phenomenon being accompanied by increased drift of the slotted plane as compared with a plane without slot.

This new explanation is valuable for the reason that it furnishes a basis for judging the value of new plane combinations of the kind referred to, and facilitates the arrangement of systematic test series in a field where the number of possible combinations is almost without limit.

# The Purpose of the Labor Articles in AUTOMOTIVE INDUSTRIES

Mr. Tipper, in this article, points out the necessity for studying the human side of production activities with a view to preventing trouble rather than waiting for difficulties to arise and then attempting to find a remedy. Production cost depends largely upon human organization.

By Harry Tipper

SOME of the subscribers of AUTOMOTIVE INDUSTRIES who favor me with their constructive criticism of these articles, have asked me of late why the continuing of the labor articles, now that the labor problem has passed. This is a reply to those questions, mainly for the purpose of clarifying the problem which faces industry and showing the imperative necessity for studying the human side of the case, at least as carefully as we are studying the mechanics.

The labor disturbances which were so violent in 1919 and the early part of 1920 have subsided to a very large extent. Strikes are no longer occurring with the same frequency. Grievances are being adjusted where there was no basis of adjustment previously. These things are true sufficiently to remove the problem of human efficiency from among the visible problems before the manufacturer. The manufacturer is now more concerned with the production costs because of the declining prices he is obliged to face.

It is important that the significance of this situation be thoroughly understood. Prices have declined materially from last year and these new prices have been arranged largely for the purpose of meeting market conditions and are not particularly related to the costs of production. The authoritative economists are almost a unit in declaring that for a number of years there will be a general tendency for prices to decline over the surface of industry, although this will not apply to all industry to the same degree, nor will it be true without intervals of increasing prices from time to time.

## Necessity for Lower Costs

However, the best information on the economic situation indicates a necessity for lower costs. These lower costs must come out of the production of the product, or the commercial branches and marketing necessities of the same product. It is probable that the increased efficiency will have to be secured from all departments of the business, that production methods must be improved, and production costs reduced per unit of goods, and also marketing methods be improved and marketing costs be reduced per unit of sale. The mechanical fabric of industry is too great and too complete in its character and subdivision to be improved very rapidly in itself.

It is worthy of note that in all reports of the Waste Committee of the American Engineering Council, the large percentage of the waste is due to human inefficiency, the costs of human neglect and the results of human failure.

In every industry in the country these costs represent a larger total than the lack of balance in the mechanical fabric and the possibilities of immediate improvement in the character of the mechanical equipment.

Events have shown that it is not possible to figure on a certain efficiency of labor on the average, as the efficiency fluctuates with the conditions of employment and the character of industrial development. The problem, therefore, is one of harnessing a larger part of the potential capacity of the individual human being to active and continuous service in the production of commodities.

William James pointed out a good many years ago that only from 40 to 60 per cent of the intellectual capacity of the average individual was put to work. The only failure of that estimate is that it is too high. The potential capacity of the average intellect for judgment, accuracy and order is very much greater than the expressed skill of the same intellect and the expressed skill is the only part that can be applied to the job.

This problem of harnessing a larger part of the average capacity of the man to the job is not a theoretical one. It does not bear any relation to those academic researches which are concerned with the general development over periods of generations and do not appeal to the business man, who is immersed in the development of product for the immediate future and for his own generation only.

## Individual Efficiency Helps

The organization which is able to increase the individual efficiency to a fair degree is in a better position to withstand the stress of competition than that organization which has neglected the human side of the question. The severity of competition is increasing, because the manufacturing capacity is larger than the absolute requirements and this competitive intensity will demand an analysis of cost very much keener and more accurate than our previous analyses. It will require a much closer study of the factors that enter into the costs, and how these factors can be influenced. Labor disturbances may have ceased to operate as a visible problem for the time being, but the problem of putting the human potential capacity to work is so far from solution and so necessary a matter of study, that it must be considered with the same care now given to the mechanics of production and the elements of salesmanship.

These articles have missed their purpose and shot very wide of the mark if they have failed to indicate that the question of strikes or group disturbances is only

one symptom of the problem and not the reason for considering it.

No engineer worthy of the name would defer his study of mechanics of production until the machinery of the factory broke down, and then begin a hurried attempt to find some way to make it work again. Every item of this mechanical production is analyzed sufficiently to enable the manufacturer to depend upon keeping his plant going with fair regularity, with little lost motion and with a fair dependability of result.

The same manufacturer does not consider the human problem until the system breaks down and the men refuse to work. In fact, many manufacturers are inclined to wonder why the problem should be discussed so long as the machinery of human group organization does not entirely break down and leave them stranded.

Behind the present engineering skill and expressed efficiency there are a hundred years of development in the practice of mechanical equipment and the study and improvement of machinery.

The bibliography of works on production from the mechanical side runs into thousands of books and presents a wealth of detailed consideration from which the student can learn the past experience in all kinds of manufacture.

No such background is to be found in the case of the human being in industry. Books on organization have not dealt with human organization, but with systems of controlling human organization. Books upon management have dealt very rarely with the development of men, but very frequently have enlarged upon the systems of centralized instruction and control by which men can be made to do as they are told.

All through this history of production there is an absence of consideration for the human factors in production, which is as illuminating as it is disturbing.

With so little background for study, it is difficult for the average man to conduct researches into the subject. Most men in their study have been accustomed to have their subject separated from the rest of the fabric of industry, carefully analyzed, and dished up, so that they would not have to search through innumerable volumes to find it out.

It is not possible to do this in connection with human matters. Books which would suggest factors of importance in human growth are classed under many subjects in the libraries and called by many names by the publishers. It is necessary to read a number of books in order to get one clear suggestion. Consequently, the average man, who is busy with the operations of the plant, finds it impossible to carry his studies of this subject very far. He cannot spend the time in reading books which are so far away from his practical operations in order to find a suggestion that he may use. His mind is occupied by his practical responsibilities, so that the suggestions would pass unnoticed most of the time, because they have not been applied to his particular case.

It is important, therefore, that the student who has been able to conduct such analysis and research should present his conclusions, refer to his authorities, consider the practical experiments, and draw the principles and fundamentals from his wide consideration and experience with the needs of the busy man in mind. This service should be performed continually, because only by that means can the subject be opened up and applied to the manufacturing necessities.

The big problem before the manufacturer to-day is how to reduce costs. The production costs must be reduced along with the other costs. How to reduce these costs and to retain the efficiency or to increase it, are the important elements of the problem. The problem cannot be solved by merely reducing the activities. It may be solved by increasing the activities through the reduction in the cost of the individual unit, and this means an increase in the efficiency of work upon each unit.

Because so much of the waste is the waste of human capacity, the problem of production costs is very largely a problem of human organization, and this is developed from an understanding of human necessities.

This is not a job to be done by a half hour's discussion or a little ginger talk. It must be studied and experimented with carefully and continually. Hence, these articles and their continuance when there is no visible labor disturbance and there appears to be no particular difficulty on the horizon in connection with the skilled or unskilled labor portions of the human organization within the factory.

## Unemployment in Great Britain

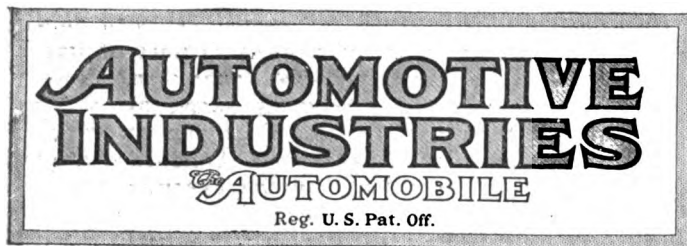
**T**HOUGH there is much dispute—and with fair reason—concerning the English Government's periodically issued figures as to the cost of living in Great Britain, there is no challenge to the data concerning wage revision and number of unemployed. In August, 3,160,000 persons had a revision of wages; of which 3,070,000 suffered a reduction and nearly 90,000 received an increase. The gross reduction on full time wages was about \$3,500,000, made up of rates ranging from 2 cents per hour (47-hour week) for most trades, up to 72 cents per week for day-rate metal trades workers and 7½ per cent for metal trade piece workers.

Unemployment among the trade unions fell from 16.7 per cent at the end of July to 16.5 per cent in August, the total of unemployed registered at the labor exchanges on August 26 being approximately 1,573,000 persons, of whom 1,190,000 were men. A bad feature about the unemployment figures is that a vast number of persons have exhausted the period during which they were entitled to

State aid. They have now to qualify for a further period by being out of work a number of weeks. Meanwhile they have to be supported and, at present high cost of living, obviously the task is unusually difficult. Terms offered by the Government for municipal aid in road making and improvements have been rejected by local authorities as demanding too high a rate of interest.

It may be noted that in the automobile works labor of the skilled sort (fitters and turners) in Britain is averaging 45 cents per hour for 47-hour week, but Ford workers receive a uniform rate of 52 cents per hour besides a yearly bonus plan.

**A** BOOK containing petroleum laws governing leases, concessions and explorations in all the countries of North, South and Central America has been compiled by the Bureau of Mines in Washington. Included in the collection is the leasing act enacted by Congress and the petroleum laws of the various states in this country.



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## Headlamp Lenses with Key Slots

THE majority of the special lenses used on headlights with the object of reducing the glare act on the principle of the prism, the rays of light being turned downward by refraction in passing through the lens. In order that such lenses may perform their function efficiently they must be held in the lamp shell in a definite position; if they should turn around their axis to any appreciable extent they may fail to accomplish their purpose and even be a positive detriment.

So far the friction between the lens and the lamp shell has been depended on to keep the lens in the position in which it is placed when fitted. It has been proved by experience, however, that this method of holding is not reliable, especially in the case of lamps on the cheaper grades of car, which lamps are generally made of very light stock. In the course of operation the lens will shake loose and is then very apt to turn around. As this is a matter which does not materially affect the operation of the car, and as the driver feels that he is complying with

the law if he has his lamps fitted with one of the types of approved headlamp devices, it is likely to be neglected, and hence the intent of the law with respect to glare elimination is defeated.

The remedy for this difficulty is obvious. All that is necessary is to provide the lens with one or more keys or key slots and the lamp shell with corresponding members. The matter has been taken up by the Standards Committee of the S. A. E. Once the locking means has been standardized, the lens makers can go ahead and change their molds with the assurance that lenses from these molds will fit any lamp of the corresponding size, and this particular difficulty will be eliminated.

## Building Foreign Confidence

DESPITE scientific theories as regards salesmanship, personal contact plays an important part in modern business. Advertising has a definite function in the selling scheme, but it must be backed up by personal visits by salesmen. These personal contacts do more than get business; they make possible the establishment of close business friendships and make it easier to build up mutual confidence between buyer and seller. Such confidence means an actual reduction in selling costs.

In merchandising automotive products to foreign countries, however, this personal contact is usually difficult and often impossible to get. Consequently, the building up of confidence is a more difficult matter than in domestic business. Sharp practices in domestic business will finally ruin any confidence that may be built up, but the personal contact that is possible will usually prevent misunderstandings.

In the case of foreign business, however, even the appearance of evil is especially to be avoided. It takes letters a long time to reach their destination, and it takes a long time to overcome an unfavorable impression that may arise through misunderstanding. Putting aside national pride for the moment, it is undoubtedly true that the handling of our foreign automotive business in the past has not always been such as to tend toward building up confidence in American methods.

An instance is related in which a representative of an American car manufacturer in China told a Chinese merchant that in order to be sure of getting 10 cars a month he should contract for 100 a month. The transaction took place during peak production times, and the salesman told the Chinese merchant that his American factory was so hard pushed to supply cars that it supplied only about 10 per cent of every order which they got. The Chinese merchant took the word of the salesman concerning this practice and ordered accordingly. He received no cars at all for some eight months. Then the slump in the American market came. The Chinese merchant then received a shipload of 600 cars in one lot. Naturally he was unable to pay for them and could not sell them. As a result these cars are probably on some Chinese dock at the present time.

While such practices are not, of course, common among automotive exporters, the example cited is a



striking, though exaggerated, illustration of how the confidence of foreign buyers may be broken down. This one experience probably created a prejudice against American methods among all the Chinese merchants with whom this particular merchant has since come in contact. For, just as we are likely to judge the practice of an entire country by the actions of the individuals with whom we have dealt, so the foreigner is likely to judge American standards of practice in the same way. The justice of such judgment may be questioned, but the fact remains.

In handling foreign business extreme care is necessary, even in small matters, to make certain that there is no opportunity for misinterpretation or misunderstanding. Practices understood at home may not be understood abroad.

## Motor Buses in America

ANY intelligent analysis of the transportation system in this country must recognize the importance of the motor bus as an important potential factor in solving the problems presented. The development of both city and interurban bus lines in England strikingly illustrates the scope of the motor bus in an economically sound solution of transportation problems.

There are even greater possibilities for a similar development in this country, so that the motor bus field is a potential market worth the attention of truck manufacturers. In considering this market, however, many variable factors confuse the situation at present. On the commercial side, it is not yet clear what agencies will be the most important in developing bus transportation and consequently in buying buses.

The existing transportation interests may realize possibilities of the bus as an ally. They may install and operate bus lines in connection with their present services, strengthening and substituting as the transportation economics of the individual situation dictate. It was largely along these lines that the English development took place, and there is some evidence of similar action in this country. On the other hand, the spirit of opposition to buses may prevail among existing transportation agencies, in which case bus development may be through municipalities or independent bus line operators.

Sufficient progress has not yet been made to determine what lines the major development will take in the United States. The potential market for buses is undoubtedly present; the concrete market must be studied very carefully.

But motor bus development will depend largely upon engineering as well as commercial developments. Many engineers who have studied the problem carefully are of the opinion that the standard truck chassis is not suitable for motor bus work. The ability of the engineers to modify or redesign the truck chassis for bus service and the willingness of the truck manufacturers to make this special design are large factors in the future of bus development.

Every truck chassis which fails to perform effi-

ciently and economically when used as a bus adds just so much resistance to the rapid development of a potentially profitable market. Every chassis which enables the operator to make a profit and the passenger to ride in comfort at a reasonable price hastens the development.

While it is not always possible to adjust immediate efforts exactly in line with permanent development, the various factors mentioned should be seriously considered in marketing efforts of this kind.

## Tractor Dynamometer Trials

FOR some years the question has been discussed in tractor circles whether scientific tests in connection with tractor demonstrations would not prove of help to the industry. It was realized some time ago that the mere demonstration had practically played out as an attraction to the farming community, and if the tractor industry was to be further promoted by field demonstrations, accurate measurements of drawbar pull, drawbar horsepower and fuel consumption must be made, so that data could be put into the records which would bear weight with prospective purchasers.

During the past year excellent data concerning American tractors have been furnished by the official tests of the University of Nebraska. As it is impossible for a tractor manufacturer to sell his machines in Nebraska without first submitting them to these tests, practically all tractors now manufactured in this country have been tested at Lincoln, and as the results are available to the general public the need for such tests at tractor demonstrations has been eliminated. It is more than likely, however, that if dependable tests had been carried out at the national demonstrations some years ago the Nebraska tractor law would never have been adopted.

In England the need for serious scientific tests in connection with public trials has also been felt, and at the trials recently held at Shrawardine every tractor was given a six-hour test with a traction dynamometer. An endeavor was made to obtain data bearing on the relation between the maximum obtainable drawbar pull and the weight on the drivers. This is a very important factor in tractor design, because the drawbar pull is one of the factors which measure the working capacity of the tractor and if a given drawbar pull can be obtained with less weight, the over all efficiency of the tractor can be increased. It is readily realized, however, that the ratio referred to depends not only upon the nature but also upon the condition of the soil. Its value is naturally smaller when the soil is wet than when it is dry. It so happened that during the Shrawardine trials the soil was quite dry, yet the drawbar pull of thirty-six out of thirty-eight machines was limited by the adherence of their drivers and that of two only by the engine power. It might have been expected that if any type of tractor would stall its engine under excessive loads, it would be the chain-track type, because of the admitted better adherence of this type, but as a matter of fact the two tractors that stalled their engines were of the wheeled type.

# N. A. C. C. Discusses Dealer Problems

## Car Makers Urged to Give More Help

### Used Cars, Financing and Contracts, Subjects Considered at Their Annual Meeting

NEW YORK, Oct. 10—One of the greatest problems confronting the automotive industry is found in the relation between manufacturers and dealers. This fact was recognized at the annual members' meeting of the National Automobile Chamber of Commerce here last week when practically the entire session was devoted to consideration of various phases of the subject.

#### Difficulties Not Minimized

The convention was attended by more than 100 factory executives who made no attempt to minimize the difficulties involved in finding a market for used cars, financing dealers and meeting dealer requests for contract changes.

The great volume of used cars on the market was held to present the most difficult obstacle to continued sales of new cars in large volume. The most concrete proposal in this connection was that manufacturers should study not only the market for new cars but for used cars and govern their production accordingly. It was apparent, however, that no concerted action can be expected along this line and that it will be up to each individual company. Some of them seemed to feel that there was plenty of demand for their output, but that some of the other fellows should limit theirs.

#### Some Companies Assisting

In fact, as the discussion continued, it became clear that no uniformity of action in relation to any of the big problems of the industry is likely at this juncture. Each manufacturer will study his own resources and his own needs and act accordingly for the benefit of his dealers. Those who can help them to help themselves probably will do so, but it was the view of the majority that the manufacturers have troubles of their own and that they should not be expected to assume the burdens of their dealers. They held that in the dealer end of the industry there should be a survival of the fittest and that those who are not good business men or who have scant financial resources of their own should be eliminated as rapidly as possible.

It was brought out that several companies have been assisting their dealers by helping distributors carry stocks or handle dealer paper. This disclosed what

appears to be a steadily increasing sentiment in favor of eliminating distributors if they are not strong enough to finance themselves in favor of a system where all dealers will work under the direction of factory branches or regional factory warehouses.

There was a feeling that companies which are in a strong enough position to do so should assist dealers in paying the carrying charges of some reputable financing company to handle vehicles actually on their floors.

The manufacturers were willing to assist in every way in their power in selling bankers throughout the country on the essentiality of the motor car and thereby inducing them to assume a more liberal attitude in regard to dealer paper. It was felt that the recognition given the industry by the big bankers of New York and other large cities would have a beneficial effect.

Financing of dealers was considered even more intensively by the truck manufacturers than by those in the passenger car field. They listened to addresses on this subject by J. H. Shale, vice-president of the Bankers Commercial Security Corp., and John J. Schumann, Jr., vice-president of the General Motors Acceptance Corp. Both spoke along the same general lines.

(Continued on page 747)

## Carter Motors Formed with \$2,000,000 Capital

WASHINGTON, Oct. 10—Incorporation of the Carter Motor Car Co. with a capitalization of \$2,000,000 has been announced here. The company was incorporated under the laws of South Dakota by L. L. Stephens, Frank L. Carter and A. Gary Carter. Buildings formerly occupied by the Washington Motor Car Co., at Hyattsville, Md., a suburb of Washington, have been taken over for a factory.

The advance notices issued by the incorporators state that a small car will be marketed at an attractive price. The company says the car will be equipped with easy-riding comfort springs, the patent for which is controlled by the incorporators.

#### DENIES KISSEL APPEAL

WASHINGTON, Oct. 10—The Supreme Court of the United States to-day denied the Kissel Motor Car Co.'s appeal for a hearing in a case which involves the construction of the Texas restraint of trade law. The Kissel company, whose plant is located at Hartford, Wis., gave an exclusive territorial agency contract to an agent who became indebted to the corporation. The lower court held that the company could not recover because its contract violated the Texas law.

## Willys Progresses in Reorganization

### Completion of Negotiations Calling for \$25,000,000 Loan Expected in Few Months

NEW YORK, Oct. 11—Satisfactory progress is being made in the plans for the reorganization of the Willys-Overland Co. They now have reached a point where it is expected negotiations will be completed in a few months. A letter soon will be sent to stockholders of the company asking for their proxies.

The plan has been worked out by a committee of bank creditors headed by Ralph Van Vechten, vice-president of the Continental & Commercial Bank of Chicago. It calls for a loan of \$25,000,000 in the form of a bond or note issue which will run 10 years or longer. It has been understood that Kuhn, Loeb & Co. would underwrite this issue.

Bank loans of \$10,000,000 will mature Nov. 1, and it is understood the company will ask for an extension of four months. The bank debt will be reduced 10 per cent by the payment of \$1,800,000 in cash on Nov. 1. Another reduction of 10 per cent was made by the payment of \$2,000,000 in cash on Aug. 1. The bank creditors are ready to agree to the extension and it is expected that the reorganization plans will have been matured and that the \$25,000,000 will be available before the expiration of the four months.

Willys-Overland has no bonded indebtedness and it can place no mortgages on any of its properties without the consent of two-thirds of its preferred stockholders.

## Electric Auto Lite Secures Durant Work

TOLEDO, Oct. 10—A contract for a supply of ignition, starting and lighting equipment for its new four and six cylinder motor cars was closed by Durant Motors, Inc., with the Electric Auto Lite Corp. here, it was announced to-day. T. W. Warner, vice-president of Durant Motors, Inc., and president and general manager of Durant Motors of Indiana, Muncie, negotiated the contract with C. O. Miniger, president of the Auto Lite Corp., on Saturday.

The contract will mean a rapid return to normal production at the Auto Lite plant here.

"Already business has taken a remarkable turn for the better with us," declared President Miniger. "We have increased our force by 200 employees in the last few days. Our program for October is 10 per cent larger than September and in November will increase."

# Seager Patents Are Upheld by Court

## Essentials Retained in Webb Jay System

### Infringement Charges Against Stewart-Warner Sustained in Far-Reaching Decision

CHICAGO, Oct. 10—In an opinion handed down in the Federal Court here, Judge George A. Carpenter holds that the Seager patents on vacuum-tank equipment are valid and have been infringed by the Stewart-Warner Speedometer Corp., which was made defendant in the action. The plaintiffs were James B. Seager, Arthur L. Payton and Cornelia F. Thomas.

#### Litigation Long Pending

The opinion is the outcome of patent litigation which has been pending for some years and which came to trial last June.

While Seager's patent relates to the application of the vacuum feed to stationary engines operating without a throttle valve, another patent issued to Harrington, also in suit, extends the system to throttle controlled engines, and the court regards the claims as sufficiently broad to cover the application of the vacuum principle to all types of engine.

In referring to the defendant's system, the court decides that while the Webb Jay invention is doubtless an improvement on anything either Seager or Harrington described, the essentials of the Seager combination are retained in it. In this connection the opinion says:

#### Applicable to Automobiles

"Webb Jay, the inventor of defendant's so-called infringing system, realized that in climbing a steep hill with an automobile the suction of the engine will be inadequate to develop in the reservoir sufficient suction to elevate fuel from the low level storage tank. Jay realized the desired results by enlarging and deepening the lower compartment of his reservoir.

"This made it possible for the level in that compartment to vary as much as six or seven inches. In order to make this reserve capacity available for supplying the carbureter, it was necessary to locate the entire reservoir at a level above that of the carbureter nozzle.

"It was undoubtedly an improvement on anything Seager or Harrington had done, for the defendant to enlarge the reserve capacity of the lower compartment of the reservoir, but this enlargement, and the inclusion of a float chamber and valve in the discharge conduit leading to the carbureter nozzle, does not organically change or avoid the construction, mode of operation and result of the Seager and Harrington inventions.

"The essentials of the Seager combination

are retained in defendant's equipment, notwithstanding that there have been added, first, the Harrington improvement of a two compartment reservoir with intervening valve, and, second, the automatic suction intermitting mechanism."

The court states that while the Seager invention has never been sold to the automobile trade, which was one of the contentions of the defendant, its adaptability for use on motor cars as well as on stationary engines has been demonstrated. Continuing its opinion, the court says:

"In the defendant's system it is the presence of the Harrington invention which permits the use of an obstruction (a throttle) in the airline to the engine at a point between the carbureter nozzle and the point at which the suction conduit is tapped in, so that the suction of the engine, however high it may go, may still be utilized to develop a correspondingly high suction in the upper compartment of the reservoir for elevating fuel into it, while the lower compartment, which is always under atmospheric pressure, will continue to feed fuel to the carbureter, no matter how relatively low the suction upon the nozzle may become; and this, notwithstanding that in the defendant's system there is added to Harrington the automatic suction intermitting mechanism, and notwithstanding that the substantial constancy of the level of the supply to the carbureter nozzle is effected by the float chamber and valve rather than by the overflow pipe of Harrington.

(Continued on page 750)

## Brush Charges Ansted Motor Is Infringement

DETROIT, Oct. 10—Alanson P. Brush of this city has brought through Williams, Bradbury, McCaleb & Pierce, attorneys who have recently been engaged in the Seager and Harrington patent suit against the Stewart-Warner company of Chicago, a patent infringement suit against the Chicago sales organization of the Lexington Motor Car Co.

Brush alleges that the Ansted engine used in Lexington cars infringes a number of his patents. He asks that the defendant be made to account for past use and sale, and be restrained from further use and sale of cars equipped with these engines. The Ansted engine has been used in the newer model Lexington cars and has recently been adopted by Durant for his six-cylinder car.

#### INSTITUTE CHANGES PLANS

NEW YORK, Oct. 11—After careful consideration the board of directors of the American Petroleum Institute has decided to hold the second annual meeting at the Congress Hotel in Chicago, Dec. 6, 7 and 8. Tentative plans to hold the meeting in Kansas City have been cancelled. The program will be announced in the near future.

## Tire Manufacturers Increasing Output

### All Akron Companies Report Improvement in Sales for Past Month

AKRON, Oct. 11—There has been no appreciable slowing up of the rubber tire industry this fall, despite the fact that the tire manufacturing business customarily enters a period of less activity either in September or October, and does not emerge from it until January or February of the succeeding year.

Instead of curtailing production, Akron rubber companies are increasing their output and expect to make further increases between now and the first of the year. History shows that a 15 to 20 per cent decline in September sales as compared to August sales can be expected in the tire industry each fall; but this year conditions are reversed. Practically all companies here reported increased sales for September and are planning further increases during October.

#### Goodrich Inventory Reduced

The B. F. Goodrich company, prepared for an anticipated normal sales decline in September over August, reports September sales far in excess of those of August. The company also has gone on a basis of 200,000 tires for October and plans to increase production steadily for the next three months. Goodrich has reduced its finished goods inventory by nearly a million tire units since the first of the year and is now down to an inventory of 300,000 tires. This is actually a smaller number of tires than the company heretofore has had to keep en-transit. The low inventory, Goodrich officials say, reflects the improvement of the past few months in transportation conditions. Goodrich now is at the point where an expansion of inventory is possible.

#### Firestone Leads

Firestone continues to lead in tire production, with a daily ticket calling for 22,000 tires. Firestone was the only major rubber company to climb back to its 1920 peak production, having returned to a production of 28,000 tires daily three months ago. Goodyear continues on a basis of 16,000 tires daily.

Firestone, Goodyear, Miller and the General Rubber Co. report that both in units and sales volume their 1921 business will exceed that of 1920. This is considered extraordinary in view of the peak business done by all rubber companies during the first six months of last year and the long duration of the tire industry slump.

## Urging Surrender of Army Equipment

### Highway Officials Appeal to Harding for Transfer to State Road Commissioners

WASHINGTON, Oct. 10—President Harding has received an appeal from the executive committee of the National Association of State Highway Officials to compel the War Department to surrender to the highway commissioners of the various States all available surplus motor equipment and other road building machinery. They are also trying to force quick action on the part of Congress in disposing of the highway legislation. The recommendations of the unemployment conference for the extension of road-building have been seized upon by this committee in an effort to impress both the legislative and executive branches of the Government as to the needs of material and Federal funds.

#### Wreckers Wish Material

Negotiations are under way looking forward to an adjustment of differences between the War Department and the Bureau of Public Roads, regarding the disposition of motor vehicles and supplies now in the possession of the former. It is understood that the department is daily beset with demands from junk dealers and so-called wrecking corporations to be permitted to take over the motor vehicle surplus stocks, practically at prices dictated by the dealers themselves. These men have received no encouragement under the present administration of the department. One of these concerns is said to have very powerful political backing, and has been insistent in its demands, but whether the influences in its behalf are operating to prevent action on pending bills authorizing the transfer of road building machinery to the State highway commissions has not been disclosed.

One section of the pending bill not only authorizes but directs the Secretary of War to transfer to the Secretary of Agriculture, upon his request, "all war material, equipment and supplies now or hereafter declared surplus from stock now on hand and not needed for the purposes of the War Department, but suitable for use in the improvement of highways," the Secretary of Agriculture to distribute such equipment among the highway departments of the several States.

#### Will Relieve Unemployment

In the pending good roads bill, which is in conference, an appropriation of \$25,000,000 is provided, to be available immediately, and an additional \$50,000,000, six months after the passage of the act. As reported to the Senate, it carried \$100,000,000 for the present fiscal year and a like amount for the fiscal year 1923, but demands for economy and reduced public expenditures forced a

compromise at \$75,000,000, which if agreed to in conference, will make a grand total of \$369,000,000 provided within the last five years as Federal aid in the construction of good roads throughout the country.

The highway commissioners insist that the States could not buy sufficient machinery for manufacturers at this time to undertake an extensive road-building program. However, they contend that with the transfer from the War Department it would be possible to build hundreds of miles of road, thereby giving employment to thousands.

The House will soon take up the bill and it is said that commissioners are canvassing the various State delegations in order to bring pressure to bear at the right moment.

### Seek Approval of Plan for Closing Cotta Plant

ROCKFORD, ILL., Oct. 8—Although receivers of the Cotta Transmission Co. have operated the plant in the last few months to show a net profit of \$5,139.14, the referee in bankruptcy will be asked to approve the recommendation of the creditors that the plant be closed and bids asked for the remaining assets. The factory, under the court order, will operate until sanction is given the closing plan.

Receivers' statements show orders on hand Sept. 17 amounting to \$2,308.50, with liabilities of \$250 and cash balance of \$45,162.20.

Alternative proposals made at a recent conference of the receivers and the creditors were operation of the plant pending disposal upon bids for its remaining assets or continued operation without a definite future program. Court approval would have been required, however, as the receivers' orders were to continue operation of the plant until the court ordered otherwise.

### Allen Receivers Ask Permission to Sell

COLUMBUS, Oct. 8—Creditors having consented and urged its liquidation, George A. Archer and William C. Willard, receivers for the Allen Motor Co. of Columbus, have applied to the U. S. court for permission to sell the assets at public auction. The assets consist of the plant, machinery and stocks. Claims against the company are in the neighborhood of \$2,000,000 and assets are estimated at something less than that amount.

#### AMERICAN ROLLS-ROYCE OPENS

SPRINGFIELD, Mass., Oct. 8.—After a close down of a few weeks the American works of Rolls-Royce are operating on a limited basis. S. deB. Keim, general sales manager, has just returned from an extensive trip through the West in relation to sales distribution and as a result a number of representatives have been appointed. From present indications, the works should be back in normal production at an early date.

## Space Is Assigned for National Shows

### Ninety-four Cars Will Be Exhibited in New York—Eighty-two in Chicago

NEW YORK, Oct. 6—More than 100 factory executives attended the annual members' meeting of the National Automobile Chamber of Commerce here today to draw space for the New York and Chicago shows. Greater interest even than was displayed last year was shown in the coming expositions.

All the applicants for space will be taken care of at the New York show, which will be held in the Grand Central Palace from Jan. 7 to 13, but the situation in relation to the Chicago show, which will be held at the Coliseum two weeks later, is not so satisfactory.

The overflow from the Coliseum will be taken care of so far as possible in the Armory at Chicago, but even these two buildings will not be adequate to meet the demand for space, and several companies will be unable to make displays.

Ninety-four cars will be shown in New York as compared with 87 last year, and 82 will be shown in Chicago. Only two foreign cars will be shown at New York. They are the Itala and the Vauxhall. The American cars which will be shown in New York but to which space has not yet been assigned are Hatfield, Bournonville, Essex, Rickenbacker and Kelsey. The Rickenbacker probably will be displayed at Chicago also.

The result of the drawing follows:

Note: In Chicago letter X after space means Coliseum or Annex; letter Y means Armory. In New York Show the A spaces are on first floor, B spaces on second, C on third and D on fourth. "Not" means "not showing" or "space not available."

\*Means "non-member of N. A. C. C."

New York Space	Car Name	Chicago Space
A-19	Buick	C-5-X
A-11	Dodge	D-1-X
A-15	Studebaker	B-2-X
A-20	Cadillac	A-6-X
A-12	Willys-Overland	C-3-X
A-16	Chevrolet	A-4-X
A-30	Nash	C-1-X
A-14	Hudson	D-3-X
A-13	Olds	C-6-X
A-26	Franklin	B-6-X
A-17	Oakland	A-2-X
A-4	Paige	D-5-X
A-27	Chandler	B-4-X
A-31	Hupp	B-5-X
A-5	Packard	D-2-X
A-3	Reo	C-2-X
A-10	Dort	A-1-X
A-32	Cleveland	D-6-X
A-21	Marmon	F-4-X
A-22	Peerless	D-4-X
A-23	Pierce-Arrow	C-4-X
A-7	Haynes	F-3-X
A-25	Velle	K-1-X
A-8	Lincoln	A-3-X
A-18	Lexington	B-2-X
A-9	Maxwell	E-2-X
A-6	Jordan	F-5-X

(Continued on page 743)

## Employment Eases Used Car Situation

### Better Industrial Conditions in Indianapolis Promise Greater Business in New Sales

INDIANAPOLIS, Oct. 8.—The fact that unemployment here is on the decrease especially with the higher priced mechanics and salaried men is easing off the used car situation, according to dealers. Both lower and higher priced used cars are being sold now with greater ease than for some time. The situation is not what the dealers want yet by any means, but the present situation is indicative of what may be expected in case the industrial situation continues to improve.

For a time this summer the used car problem, especially in the high priced used cars, presented a real problem to dealers. Unless they were able to take in old cars it was virtually impossible to sell new cars to the prospects. The volume of new cars sold, while good, would have been much better had the dealers been able to move used cars. For a time much agitation was being stirred up to get a uniform system in taking in and disposing of used cars, especially with reference to the prices at which they were to be taken in. Most of the dealers in the city at one time had all the used cars they could handle and, because of the slowness of sales, they were unable to take in any more and thus make new sales. A relief in the sales of used cars will doubtless stimulate the sale of new cars, or at least the dealers here believe this will be the case, and it is on this supposition they are basing their assertions that October will be a good month.

The credit situation continues to improve. Local companies who finance buying of both old and new cars report that a noticeable improvement may be seen during the past thirty days and the dealers are finding money easier at the banks than for some time. There are many indications that interest rates will drop before the first of the year.

## 22,000 Studebakers Sold in Third Quarter

NEW YORK, Oct. 8.—Studebaker sales for the third quarter of the year approximated 22,000 cars, or nearly the number sold in the previous quarter. The output for the first nine months aggregated 55,000, which should bring the year's total to 70,000, a number in excess of the best previous year, 1916, when 65,885 cars were turned out. For weeks the company has been oversold on enclosed cars in spite of the fact that the Detroit factories are concentrating on these models.

Because of price reductions, profits of the second quarter, when nearly the full year's dividend of \$7 was returned for

the \$60,000,000 common, will probably not be maintained for the third quarter, the improvement, however, as compared with the third quarter of 1920 being at least 50 per cent.

October 1 Studebaker had more than \$9,000,000 cash in the banks, which is more than double its Jan. 1 balances, and since the first of the year has paid off, in addition, bank loans of \$3,500,000, preferred and common dividends for three quarters and has invested \$1,000,000 in securities.

## Durant Will Employ 4000 in Indiana Plant

INDIANAPOLIS, Oct. 8.—Thomas W. Warner, vice-president of Durant Motors of Indiana, which recently bought the Sheridan automobile factory of the General Motors Corp. at Muncie, has announced that eventually the Durant factory will employ 4000 persons in the manufacture of automobiles. The Durant company expects to have 800 men at work by Jan. 1. A large force of workmen is now employed in cleaning up the plant and setting machinery.

Plant No. 1 of the Muncie Products Co., a division of General Motors, has 75 more men employed than it had when it was running full time a year ago. Other plants of the Muncie Products Co. also are adding to their working forces weekly.

## Cork, Ireland, Votes Ford Freedom of City

CORK, IRELAND, Sept. 28 (*By Mail*)—Henry Ford has had the freedom of the city of Cork conferred upon him "as a token of the city's appreciation of his great interest in the industrial development of his native country," and the next time he visits Ireland he will be honored by a fitting reception headed by the Lord Mayor and the city officials. At the meeting of the city corporation when the honor was bestowed a letter was read from Henry Ford & Son pointing out that a lease of the park taken in 1918 bound them to lay out \$1,000,000 in buildings, and for a period of five years after the completion of the buildings to employ and keep employed at least 2000 men.

In spite of the most formidable difficulties they have erected buildings which covered over six acres of land at a cost of \$1,250,000, and have equipped them with the most modern machinery at an approximate cost of \$2,000,000. At the commencement of the work only about 10 per cent of the tractors was manufactured in Ireland; now 90 per cent is being made in this country, principally in Cork.

In addition they are manufacturing in the Cork factory complete engine and all cast-iron parts of the Ford car for the Manchester factory. There are 940 men employed and paid double the wages stipulated for in the lease. The expenditure on wages alone since the firm came to Cork has been \$2,125,000.

## Would Lessen Idle Through Road Work

### Association Offers Suggestions to Aid in Solving English Unemployment Problem

LONDON, Sept. 20 (*By Mail*)—In connection with the proposals for relieving unemployment by providing work for unemployed ex-service men in road construction, repairs and improvements, the Automobile Association has recommended to the Cabinet Committee on Unemployment that only such plans for highway work be adopted as will insure 90 per cent of the funds to be devoted to relief going in wages to the unskilled. In asserting that road making is primarily the work of an expert and the proportion of expenditure which can go into the pocket of the unskilled necessarily must be small, it urges that the money be spent on such work as can be done by manual rather than mechanical labor and that the employment must be found where the unemployed are at present situated; in other words, all over the country. It makes the following suggestions:

Appeals to be issued to land owners to give land adjacent to highways for the widening of bends and corners, the extension of visibility and the provision of footways.

The highway authorities acting with the Roads Department of the Ministry of Transport to schedule all offers, to set out the work and to decide the value of such work.

Assuming that one particular job is assessed at 100 days' work, that amount only would be paid and be divided among the number of men actually engaged. The rate per day would be variable according to the amount of work done.

The erection of wire fences and the planting of quick-set hedges or the re-erection of existing fences would be a matter of labor rather than material.

Such relief work would cover, in addition to the setting back of fences, felling and removal of trees, clearing of brushwood and removal of obscuring banks, better surface drainage, and eventually improved gradients and cross falls to the roads themselves when reconstructed or resurfaced.

Such work can be done remuneratively, it is held, in rural areas particularly. Waste can be avoided, the association says, when useful and necessary work only is undertaken on the basis that pay is by results rather than the actual time taken.

Relief of the unemployment situation along similar general lines has been suggested by automotive interests in the United States to the employment conference meeting in Washington.

## COURT HEARS HARDWOOD CASE

WASHINGTON, Oct. 10—Argument in the Memphis hardwood case involving the principle of the open price competition plan, which is of interest to the automotive trade, was heard by the Supreme Court this week.



## Safety Council Hears Automotive Speakers

Sessions Also Given Over to Discussions by Rubber Section of Organization

BOSTON, Oct. 10—The meetings of the automotive and rubber sections of the National Safety Council which were held in this city drew a larger attendance than many of the other sessions of the council. The tenth annual congress was held at the State House where all the big committee rooms were turned over to the organization. Three days were devoted to the sessions.

Chairman Robert A. Shaw, Ford Motor Co., Detroit, called the automotive meeting to order. Two papers were presented, J. A. Dickinson, Bureau of Standards, Washington, speaking on "Fundamental Principles of Safeguarding," in which he gave deductions from Government investigations, and E. W. Dodge, Abrasive Co., Philadelphia, talking on "Why Grinding Wheels Break."

### Kaems, Automotive Chairman

The next day there were four speakers, all of whom explained phases of conserving life and limb in big plants. The speakers and their topics were: W. J. Pfefferley, Detroit, Square D Co., "Electric Hazards and Proper Installation"; T. Alfred Fleming, New York fire insurance expert, "Fire Prevention"; David J. Price, Bureau of Chemistry, Washington, "Dust Explosions"; and A. L. Kaems, Simmons Co., Kenosha, Wis., "Punch Presses—Designs of Dies."

The closing session had the following program: "Industrial Surgery and First Aid" by Dr. T. A. McCann, Dayton Engineering Laboratories; "Safety Through Motion Pictures," David S. Beyer; and "Standardization of Statistics," George H. Hawes, Detroit.

The election of officers resulted as follows: Chairman, A. L. Kaems; vice-chairman, E. E. Blank, Buick Motor Co., Flint; secretary, M. K. Averill, Dodge Brothers, Detroit.

### Rubber Section Meets

Chairman E. H. Fitzgerald, Federal Rubber Co., Cudahy, Wis., called the rubber section to order. More than 30 rubber companies were represented. In the absence of Secretary Ray N. Watson, Goodyear, S. M. Schott, Morgan & Wright, Detroit, read the paper, "Standard Statistics on the Rubber Industry," prepared by Watson. It was followed by a talk by F. H. Hoxie on "Fire Hazards and Static Electricity in Rubber Plants." The second session had three speakers whose topics were "Safety—From a Chemist's Standpoint," by Dr. Lothar E. Webber, Boston India Rubber Laboratory; "Keeping a Rubber Factory Clean," by William S. Jameson, Fisk Rubber Co., Chicopee Falls; "Practical Plans for Medical Supervision in Rubber Plants," by Dr. R. S.

Quimby, Hood Rubber Co., Watertown.

The final session had as the principal speaker President C. D. Whittlesey, Hartford Rubber Works, who talked on "Safety—From a Factory Manager's Viewpoint." There was also a talk on "Reclaiming Plants and Their Efforts Toward Safe Operation," by John C. W. Baker, Rubber Regenerating Works, Naugatuck, Conn.

Committee reports were followed by an election of officers resulting as follows: Harold T. Martin, Fisk Rubber Co., chairman; C. F. Horan, Hood Rubber Co., vice-chairman, and E. W. Beck, United States Rubber Co., secretary.

## May Continue Cadillac Plant for Collins Car

NEW YORK, Oct. 10—Notwithstanding the fact that R. H. Collins has assumed the presidency of the Peerless Motor Car Co. of Cleveland and will take over the active management of the plant, it is possible the development of the new Collins car will be continued in the main building of the old Cadillac plant at Detroit which was purchased by Collins soon after he left the General Motors Corp. It can be stated upon authority that W. C. Durant personally retains his original interest in the development of the Collins car and would like to see it closely allied with his line. Two very fine six-cylinder cars developed by the Collins engineering staff are now running.

It is probable several changes will be made in the present Peerless organization, although it is understood that some of the present executives of the company will remain under the Collins regime. The present Peerless car will be redesigned, but it is understood few important mechanical changes will be made and that attention in this connection will be centered upon body design.

## Close Quality Plant Awaiting Inventory

INDIANAPOLIS, Oct. 10—N. M. McCullough, an Anderson banker who recently was appointed in the Federal Court at Indianapolis receiver for the Quality Tire & Rubber Co. of Anderson, has taken charge of the company's property and has closed the plant pending an inventory. McCullough qualified by filing a bond of \$10,000, which, it is understood, covers the personal property, and another bond will be required when the real estate is ordered sold.

### ALL A. E. A. SHOW SPACE TAKEN

CHICAGO, Oct. 10—When the exhibit of the Automotive Equipment Association opens at the Coliseum here Nov. 14, in connection with the annual convention of the association, all available space will have been subscribed and a splendid exhibition assured. This year attendance at the show for the afternoons of at least two days will be compulsory on the part of delegates to the convention. The show will continue to Nov. 19.

## Bull Bondholders Entitled to Proceeds

Supersede Claims of General Creditors to Share in Sale of Assets

INDIANAPOLIS, Oct. 8—Final disposition of the assets of the Bull Tractor-Madison Motors Corp. of Anderson, bankrupt, has been made by Harry C. Sheridan, referee in bankruptcy, in a ruling that Charles H. Jocknus of New York and John F. Green of St. Louis are entitled as bondholders to the proceeds from the sale of the property of the corporation. Hearing on the claims of the bondholders and of general creditors has been completed before the referee. The amount of the fund that has been held in the Union Trust Co. by Fred C. Dickson, trustee in bankruptcy, is \$120,000, practically all of which was claimed by Jocknus and Green.

The referee heard the claim of J. W. Sandsbury and the National Exchange Bank of Anderson that they were entitled to part of the fund through implied contracts, even though Jocknus and Green were conceded to be bona fide bondholders. Their claim was for about \$20,000. The Citizens Savings & Trust Co. and Wilbur M. Baldwin, trustees, of Cleveland, claimed \$6,400. The referee decided that the claims of the bondholders superseded the claims of those creditors whose claims, he ruled, were general creditors' claims.

Bankruptcy proceedings were filed against the Bull Tractor-Madison Motors Corp., with property in Anderson and Minneapolis, in July, 1920. The trustee in bankruptcy sold the assets of the corporation in November to Goldstein Brothers of Philadelphia. The plants of the corporation have not been operated during the time of the litigation. Settlement of the title to the funds held by the trustee in bankruptcy closes the case, except the formal orders to be made by the referee.

## Pennsylvania Meets to Form Association

HARRISBURG, PA., Oct. 10—At a conference here of forty delegates from all leading cities of the State, preliminary steps were taken toward organizing the Pennsylvania Automotive Association, the completion of which will be effected at a convention in the Representatives' Chamber at the State House on Nov. 9 and 10. Gov. William O. Sproul will be invited to attend and invitations will be extended to all branches of the industry in the State.

George G. MacFarland of Harrisburg was appointed temporary chairman at the conference and L. W. Schriener, a jobber of automotive merchandise, temporary secretary. The directorate will be unique inasmuch as each local association will have a representative on it.

## Branches Replacing Willys Distributors

### New Sales Policy Effective Nov. 1—Expect 7,000 Dealers in Few Months

TOLEDO, Oct. 10—Announcement of the details of the plan by which Willys-Overland Co. will completely reorganize its organization for distribution so as to give more profit to dealers and establish direct contact with factory was made here Saturday.

The plan will become effective Nov. 1.

Not more than twenty-five of the old distributors who have made remarkable records for efficiency in the selling of motor cars will be kept under contract by Willys-Overland, Inc., the great distributing corporation subsidiary to the factory company.

In the future all Willys-Overland dealers will deal directly with the factory through branches of Willys-Overland, Inc.

#### Better Service Planned

President John N. Willys has devised this new means of meeting the public's demand for cars at pre-war prices in the face of the increased cost of doing business on the part of the dealer. Through the elimination of the middleman's profit both buyer and dealer will benefit, he states.

The close connection with the factory, he says, assures the buyer the most economical and efficient service for his motor car.

"Excepting the securing of the Knight motor franchise, and the development of the Willys-Knight motor, which permits the sale of Willys-Knight cars at moderate prices, I consider this new sales plan the greatest achievement in the history of the Willys-Overland Co.," declared Willys.

"Fortunately, Willys-Overland, Inc., is well-equipped to put into effect the new sales plan at once.

"In 1916-17 a series of branch houses were built in the larger cities of the country at a cost of millions of dollars. In addition long term leases were secured on a number of excellent properties. Thus we are fortified with well organized branch houses to give rapid service, which is so essential today.

"We have anticipated the demand on the part of the public that the middleman be eliminated. It is a part of the movement back to normalcy.

#### For Better Sales Balance

"Moreover, the time has come when a truer balance of sales between various sections of the country should be maintained. We believe that sales reflect service and that by making possible to dealers in every city, town and hamlet the same factory-supervised service we can expect our products to be distributed in better proportion than in the past.

"All dealers in the United States sold slightly more than 1,800,000 automobiles last year, an average of little more than thirty cars to the dealer. In some states the sales per dealer were as low as eleven cars, in others the average sales were as high as sixty cars.

"Analysis shows that in many cases there

is a wide difference in sales per dealer in territories despite parallel conditions in crops, general financial power and living standards.

"Some states forged ahead and others fell behind. Sales of automobiles in Indiana last year increased 47 per cent compared with 22 per cent the preceding year, while Ohio sales increased only 22 per cent with 24 per cent the preceding year.

"Our investigations prove conclusively that sales are now measured largely by service rendered. We believe the new plan fills the need for our company."

The reorganized plans, calling for improvement of service and parts department sales for dealers, is looked to increase the Willys-Overland family of dealers to 7,000 in a few months.

The Willys-Overland, Inc., branch at Toledo will have under its direct jurisdiction more than 400 dealers where it formerly was limited to a field of a few counties. This will mean that the branch here will have to maintain highest efficiency to serve the dealers. The condition here is typical of the many other large branches of the distributing company.

President Willys says he looks forward  
(Continued on page 745)

## Fergusson, Engineer, Leaves Pierce-Arrow

BUFFALO, Oct. 8—David Fergusson, for many years chief engineer of the Pierce-Arrow Motor Car Co., has severed his connections with that organization and is reported to be planning an extended vacation. It is probable that the company will not appoint a successor. Delmar G. Roos, formerly assistant chief engineer of the Locomobile Co. of America, has been named passenger car engineer. E. R. Fried, formerly with the General Motors Co. and more recently chief engineer of the Murray Motor Car Co., becomes car chassis engineer.

## Ladd Metric System Bill Before Senate Committee

WASHINGTON, Oct. 11—Hearings on the Ladd Metric System bill are scheduled to begin to-day before a subcommittee of the Senate Committee on Manufactures, consisting of Senators McNary of Oregon, chairman; Weller of Maryland and Jones of New Mexico.

The first witnesses to appear will give testimony in support of the measure. Among them are Dr. Harvey W. Wiley, former chief of the Bureau of Chemistry; Dr. Charles L. Parsons, secretary of the American Chemical Society; Howard Richards, Jr., secretary of the American Metric Association; S. L. Hilton, president of the American Pharmaceutical Association; William J. Scheffelin, a drug manufacturer of New York, and Theodore H. Miller of the De Laval Separator Co.

The names of those to appear in opposition to the measure have not been announced. The bill provides for the compulsory adoption of the metric system throughout the country after ten years.

## Inventive Genius Is in Wide Demand

### Manufacturers Alert for Innovations Which Will Give Superiority to Their Product

DETROIT, Oct. 10—Inventors and students in the automotive field have never had a better opportunity to reach the ear of the manufacturer than at present. Scarcely without exception, each manufacturer has all faculties keenly observant for any improvement or innovation which promises to give his car a superiority over its fellows as to serviceability, driving qualities or general design.

Although there is a great deal of secretiveness attached to moves of this kind, many factories have their engineers testing out ideas, a number of which, it is certain, will be adopted. Nothing epochal is expected, but a very well defined line of improvements may be looked for in the cars exhibited at show time.

Simplification of the driving apparatus is one of the ideas under careful consideration, the factories knowing that any improvement making the car safer and easier to drive will increase its popularity immensely and add largely to the field of prospective buyers. It is realized that apparent complication of driving mechanism has kept many prospects from becoming actual owners.

The elimination of the human element in every possible way is being sought so far as it is possible to have mechanism replace it. Top, curtain, wheel and other incidental troubles of other years, though narrowed down to a fine minimum in cars of recent manufacture, will probably witness a still further drawing of the possible trouble line in the new cars.

Many of the medium and lower priced cars will be seen carrying improvements which up to the present have been confined largely to the higher priced automobile. No sales point that can be put into the car will be neglected.

## New Company Formed to Make Wilcox Truck

MINNEAPOLIS, Oct. 8—The Wilcox Trux, Inc., is the outcome of the reorganization of the H. E. Wilcox Motor Car Co., which on April 2 went into the hands of a receiver, F. E. Satterlee. The receiver has brought order out of chaos quickly, the creditors receiving 30 cents. The receivership shortly will be discharged. The liabilities approximated \$500,000 and the book assets \$600,000.

The new company will engage in general machine shop work as well as the construction of Wilcox trucks. The authorized capital is \$300,000. Officers are: President, H. E. Wilcox; vice-president, C. B. Will; secretary, M. H. Boutelle; treasurer, G. W. Lewis. R. D. Wilcox is an additional director.

## Automotive Bankers Form Association

### Country Wide Organization Will Serve as Clearing House for Information

CLEVELAND, Oct. 10—Representatives of approximately 100 financing companies attended the convention at which the National Association of Automotive Bankers was organized here last week. They represented an annual volume of business of more than \$500,000,000 in the United States and Canada. Members estimated that 65 per cent of the motor vehicles sold in the United States are purchased on the deferred payment plan.

Analysis of the business of the companies showed that the average purchaser is buying a car valued at approximately \$1,300; that he pays more than 50 per cent in cash; that his annual income is in excess of \$4,000; and that his net worth is in excess of \$6,000. More than 70 per cent of the purchasers have bank accounts and carry life insurance. The average purchaser is 33 years old and 75 per cent are married.

#### Headquarters in Cleveland

The headquarters of the association will be located in the Gotham National Bank building in this city and it will be incorporated in this State as a membership corporation. The organization will be carried into each state and the state branches ultimately will pay for the support of the association on the same basis as those affiliated with the National Credit Men's Association.

The main purpose of the organization is to prevent frauds by unscrupulous automobile dealers who frequently attempt to get two or three companies to finance the same motor vehicles. The association will serve as a clearing house for information valuable to the members and it will attempt, so far as possible, to put into effect uniform systems of accounting with standard financial statement blanks for dealers.

The directors elected were: Fred E. Barrett of Indiana, president of the Indianapolis association; F. A. Weber, Jr., of New York, former president of the New York association; John B. Perlee of Illinois, former president of the Chicago association; H. N. Ritter of Ohio, G. P. Hopkins of Maryland, G. A. Pivrotto of Pennsylvania, H. Abbenseth of New Jersey, H. B. Jackson, president of the New York association, and Walter E. Heller, president of the Chicago association.

#### Weber Chosen President

The directors elected Weber president, Barrett first vice-president, Perlee second vice-president, Jackson treasurer, and Ritter secretary.

Various activities, helpful not only to financing companies but to dealers, were explained by representatives of various

local associations. For example, it was stated that all the Ford dealers in Chicago have united in a plan to prevent car thefts. Each dealer places on every car a secret number and secret letters. When a car is stolen the police look for these secret identification marks and they are able through the dealers to trace the factory engine number even though it has been obliterated by the thief. In this way they are able to establish ownership. By means of this system the percentage of stolen cars recovered has been very large.

## Philippines Imported 3,835 Cars Last Year

WASHINGTON, Oct. 10—The annual report of the Insular Collector of Customs for the Philippine Islands shows that 3835 automobiles were imported during the year 1920, the cost of which was 9,038,156 Philippine dollars. The number imported in 1919 was 2557, valued at 5,947,075 Philippine dollars. Almost all of the automobiles imported came from the United States, the number being 3829, at an aggregate value of 9,017,298 Philippine dollars. One was imported from the United Kingdom, valued at 3403 Philippine dollars, and five were brought from France, at a total cost of 17,455 Philippine dollars.

Importations of automobile parts reached the value of 1,843,678 Philippine dollars. Most of these parts were bought from the United States, insignificant quantities having been purchased from Japan, the United Kingdom and France. The only countries from which automobile tires were brought were the United States and the United Kingdom.

## Three New Models by Commerce Motors

DETROIT, Oct. 8—The Commerce Motor Car Co. has three new models coming through, a bus body for the Model T chassis, a Model 18 chassis with longer loading space and 5000 lb. pay load capacity, and a "Store-At-Your-Home" truck, which is in fact a body carrying a small grocery store stock in bins. The bus body, capable of carrying 13 passengers, with equipment of 34 x 4½-in. cords, sells for \$2,300, including the Model T chassis. The new Model 18 sells for \$2,150 in chassis, and the "Store-At-Your-Home" for \$2,250. A refrigerator may be added for \$90 additional.

## Another Price Reduction Is Made on Nash Models

KENOSHA, WIS., Oct. 13—Another reduction in prices on all models of the Nash Four effective at once is made by the Nash Motors Co. The prices follow:

	Old Price	New Price
2 passenger roadster....	\$1,175	\$1,025
5 passenger touring....	1,195	1,045
Coupe .....	1,735	1,645
Sedan .....	1,935	1,835

Another reduction in prices on this line was made July 2.

## Crop Values Govern Truck Investments

### Well Developed Road Systems Im- portant Factor in Commercial Vehicle Registration

NEW YORK, Oct. 10—Investment in motor transport and high value products go hand in hand, according to comparison of Government figures on crops and motor vehicle registration on farms, as made by the National Automobile Chamber of Commerce. Iowa, Texas, Illinois, Missouri, Kansas and Ohio are among the first ten states leading in value of farm products and are also among the first ten leaders in farm motor vehicle registration.

Iowa is the banner state both agriculturally and in motor transport, being the first in value of farm products and farm-owned cars, third in average value of crops per farm and number of farm-owned motor trucks, and second in percentage of farms owning cars.

The registration of motor trucks on farms totaled 131,551 as of Jan. 1, 1920, with registration of commercial vehicles heaviest in Pennsylvania and New York where there are well developed road systems as well as a heavy truck gardening business. The corn belt states are leading purchasers of motor trucks, but their demand is small in proportion to the number of farms.

Many farms use more than one motor vehicle per farm. The Bureau of the Census count shows 2,146,512 passenger cars on 1,979,564 farms and 139,169 trucks on 131,551 farms. Cars are owned by 30.7 per cent of all farms, with 2 per cent owning motor trucks.

The Bureau of Public Roads reported a gain as of Jan. 1, 1920, of 22 per cent in the registration of all motor vehicles during the year 1920. If the farm registration increased in this ratio, the farm registration of motor cars to-day is 2,618,744 and of motor trucks 169,786. Sales reports of car manufacturers, however, indicate that the heaviest sales for 1920 were in rural regions so that the general ratio is probably too light for the farm sections, and the total of motor cars and trucks on farms may be as high as 3,000,000.

## Highway Council Head Is Now with Autocar

WASHINGTON, Oct. 10—S. M. Williams, chairman of the Federal Highway Council which is discontinuing its highway activities, has associated himself with the Autocar Co., Ardmore, Pa., as special representative. Williams began his highway work with the organization of the Highway Industries Board during the war. Following the disbanding of the board he formed the Federal Highway Council, which in the last few years has been active in developing store-door delivery, studying sub-soils of highways, and backing useful legislation.

## Tire Manufacture Continues Increase

### More Stocks on Hand for August —Volume of Shipments Greater

NEW YORK, Oct. 10—Statistics compiled by the Rubber Association of America on tire production, shipments and inventory for the Department of Commerce show a steadily increasing volume of manufacture and also an increase in stocks on hand for August as compared with July. The figures by months since November, 1920, which was taken as the base month, up to September follow:

PNEUMATIC CASINGS				
1920	Inventory	Production	Shipments	
Nov. ....	5,880,016	649,742	806,023	
Dec. ....	5,508,380	506,111	1,327,153	
1921				
Jan. ....	5,319,605	703,430	965,417	
Feb. ....	5,193,018	819,892	1,073,756	
Mar. ....	4,597,103	1,163,314	1,614,651	
Apr. ....	4,527,445	1,651,418	1,785,951	
May ....	4,451,668	2,100,917	2,085,882	
June ....	4,154,456	2,313,265	2,643,850	
July ....	3,892,037	2,570,524	2,757,581	
Aug. ....	3,934,583	3,043,187	2,894,442	

INNER TUBES				
1920	Inventory	Production	Shipments	
Nov. ....	6,131,935	742,815	920,938	
Dec. ....	5,786,929	508,446	1,481,285	
1921				
Jan. ....	5,586,163	740,824	1,042,617	
Feb. ....	5,415,464	916,627	1,129,881	
Mar. ....	5,044,861	1,346,483	1,643,690	
Apr. ....	4,916,772	1,762,122	1,983,571	
May ....	4,751,880	2,210,040	2,342,567	
June ....	3,835,098	2,359,928	3,232,673	
July ....	3,122,815	3,020,981	3,603,248	
Aug. ....	3,649,319	4,430,152	3,804,060	

SOLID TIRES				
1920	Inventory	Production	Shipments	
Nov. ....	298,875	21,355	34,217	
Dec. ....	303,473	16,297	40,828	
1921				
Jan. ....	303,753	21,220	29,116	
Feb. ....	304,374	23,365	29,599	
Mar. ....	283,800	28,710	43,926	
Apr. ....	269,985	28,859	42,080	
May ....	264,633	35,156	40,122	
June ....	240,336	38,395	49,867	
July ....	220,003	35,123	55,678	
Aug. ....	216,367	55,694	66,866	

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

## Employment Increases in Southern States

ATLANTA, Oct. 10—Concrete evidence that general business conditions in Atlanta and throughout the sixth Federal Reserve district, which comprises the Southeastern area, are at the highest mark since the first of this year is furnished in the monthly statement issued by the Federal Reserve Bank of Atlanta for September. All lines of wholesale and retail trade show material improvement.

The boom in cotton prices is given as the main reason for the general bet-

terment of business over the Southeast, and the bank predicts a further rise in cotton prices during October. Increases in employment are shown in the principal industrial centers of the section. Among Atlanta dealers and distributors of motor cars and trucks this betterment is being felt in increased demand, especially in the rural districts. As a whole, however, the improvement will not be felt by the automobile business in the section for at least two or three months. Especially is this true of the higher priced cars.

September bank clearings in Atlanta were almost \$30,000,000 larger than clearings during August.

## Space Is Assigned For National Shows

(Continued from page 738)

New York Space	Car Name	Chicago Space
A-24	Auburn	E-1-X
B-27	Stephens	F-1-X
B-26	Stearns	H-1-X
A-2	Chalmers	A-5-X
A-29	Gardner	B-1-X
B-28	Stutz	O-2-X
A-1	Cole	G-1-X
B-24	Locomobile	H-2-X
B-9	Moon	E-4-X
B-29	Liberty	G-2-X
B-25	Briscoe	O-1-X
B-23	Mitchell	P-1-X
B-30	Elgin	J-1-X
B-12	Grant	N-1-X
B-2	Mercer	M-1-X
B-8	Lafayette	E-3-X
B-4	Case	A-1-Y
B-16	National	F-2-X
B-10	H. C. S.	M-2-X
A-28	Apperson	Q-1-X
B-3	Barley (Roamer)	B-2-Y
B-18	Westcott	Q-2-X
B-17	Klassel	Q-3-X
B-31	Templar	A-4-Y
B-1	Columbia	B-1-Y
B-13	Holmes	B-3-Y
B-14	Elkhart	Q-4-X
B-6	Davis	A-3-Y
B-15	Premier	A-2-Y
B-22	Standard Steel	A-8-Y
B-7	Crow	A-7-Y
B-21	R & V	A-6-Y
B-20	McFarlan	B-7-Y
B-11	Saxon	E-2-Y
C-3	King	B-5-Y
B-19	Maibohm	E-1-Y
C-20	Anderson	C-1-Y
C-12	Jackson	A-5-Y
C-4	Dorris	B-8-Y
C-19	Dixie Flyer (Kentucky)	B-4-Y
C-14	Sayers	B-6-Y
B-5	Milburn	E-4-Y
C-6	Detroit Electric	E-6-Y
C-18	Paterson	C-3-Y
C-7	Pilot	E-3-Y
C-5	Stevens-Duryea	E-5-Y
C-2	Wm. Small (Monroe)	C-2-Y
C-15	Hanson	C-5-Y
C-21	DuPont	Not
C-8	Commonwealth	C-4-Y
C-11	Kline	Not
C-13	Rauch & Lang	C-6-Y
C-1	Durant	D-1-Y
C-9	Handley-Knight	L-1-X
C-16	Wills St. Claire	D-2-Y
C-10	Ambassador	Not
C-22	*Stanley	Not
C-17	*Noma	Not
D-1	*Leach	Not

## River Rouge Works on Four-Day Week

### Further Reduction in Time at Ford Foundries Scheduled for November

DETROIT, Oct. 10—Indications of a gradually decreased production by Ford Motor Co. and the allied Ford interests for the winter months are seen in the notice issued to workmen in the Ford foundries at River Rouge of a four-day week for the balance of October and a three-day week for November.

All of the Ford foundry work is now done at the River Rouge plant, the foundry at the Highland Park plant having been discontinued the past month and the transferral of equipment having been made to the Rouge. With a slowing down in business, activities are being cut down all along the line. The foundries, being the starting point of all construction, are the first affected.

### All Employees Retained

Although no formal announcement of the Ford retrenchments or of its winter manufacturing policy has been made, it is known that under its plans practically all employees will be kept on the rolls through its part time system. No complete cessation of work is expected, business conditions being far more satisfactory than a year ago.

In most of the other plants, aside from the makers of higher priced cars, much the same manufacturing policy will be carried out. Sales in higher priced cars are keeping the factories at close to 100 per cent production, and this activity promises to extend to the first of the year, and probably until spring.

Several of the medium priced cars and one low priced car are also well sold up into the future. Briscoe, soon to give way to the Earl, is said by the factory to be sold through 1922. Rickenbacker, with its promised 12,000 production in 1922, is also practically assured of a sell-out by business already received. Chevrolet is said to have enough business on its books to carry it through to August, 1922. Buick and Studebaker are also declared sold well into the future and Dodge Brothers is going steadily ahead on its 550 a day schedule.

### Equalizing Inventories

Those factories which have made curtailments in working schedules have done so to equalize inventories as work progressed and the employee organization is being kept in mobile order so that it can be quickly summoned to meet any sales requirement. No particularly dull period is expected during the winter months and everyone will be kept working, part time at least.

The care of the factories in holding together their employee organizations testifies to the general excellence of the men now working in the industry. There has been no time in recent years when the class of worker was of higher grade.

## Export Statistics Are Reclassified

### Chassis and Complete Vehicle Divisions Are Supplanted by Price Classes

WASHINGTON, Oct. 12—Export statistics of automotive products issued by the Bureau of Foreign and Domestic Commerce, have been reclassified and beginning with Jan. 1, 1922, will be listed in more detailed divisions than heretofore. The new classifications will be such as to render the statistics of considerably greater value to the industry in analyzing markets and planning sales campaigns in foreign countries.

Cars, trucks, tractors, airplanes and tires are among the chief automotive products to undergo reclassification. Heretofore exports of cars have been listed as to number and value, the divisions being chassis and complete vehicles. This classification has been of relatively small commercial value to the industry. The new divisions, however, will be one of price classes. Thus the monthly export figures of cars, beginning next January, will be listed under the three following classifications by number and value:

1. Under \$800.
2. Over \$800 and under \$2,000.
3. Over \$2,000.

#### Different Truck Listing

In accordance with this reclassification, there will be no distinction made between chassis and completed vehicles. Such distinction, however, is of practically no importance, according to prominent members of the industry who make extensive use of the figures.

Trucks will be listed according to rated capacity. The following classifications will be used, number and value being given in each case:

1. 1 ton and under.
2. 1½ tons to 2½ tons inclusive.
3. Over 2½ tons.

Under the new system there will be a separate classification of electric vehicles, while trailers will also be listed separately according to number and value.

Tires will be classified and listed in detail under the new procedure, the divisions being as follows:

1. Pneumatic casings for automobiles.
2. Other pneumatic casings.
3. Pneumatic tubes for automobiles.
4. Other pneumatic tubes.
5. Solid tires for automobiles and trucks.
6. Other solid tires.
7. Tire repair materials.

#### Aircraft Amplified

The aircraft export statistics will be amplified by the following groupings:

1. Airplanes and hydroplanes.
2. Other aircraft.

Under the present procedure all aircraft is bulked together under one general head.

The reclassification of these vital export statistics is being carried on under the direction of John Hohn, chief of the statistical division of the Bureau of Foreign and Domestic Commerce. The new and more detailed grouping of automotive products was determined upon at a conference of the statistical division and the new automotive section of the Bureau. The reorganized bureau is undertaking similar reclassification of export statistics in many lines and when completed plans for next year are announced there will be shown between 700 and 1300 new classifications of export statistics, each designed to aid directly and practically the American manufacturer in selling his foreign markets.

## BANK CREDITS

Following upon the recent announcement of increased prices for certain steel products, come further data supporting the belief that the iron and steel industry, as regards production at least, has reached the approximate bottom. The United States Steel Corporation's report of unfilled tonnage, as of Sept. 30, shows an increase for the first time since July, 1920. The unfilled orders on the books as of that date were 4,560,670 tons, an increase of 28,744 over the previous month, and is indicative of the increased rate of production as compared with shipments. The Steel Corporation's subsidiaries were working at 38 per cent of capacity at the close of the month, it is estimated, as against 30 per cent on Sept. 1. The country's pig iron production for the month of September showed an increase for the second consecutive month. The output for the month amounted to 985,529 tons, or at the rate of 32,850 tons per day as compared with an average daily output in August of 30,780 tons. There were 12 more furnaces in blast on Oct. 1 than there were a month previous.

Dun's and Bradstreet's latest index numbers again indicate a relative degree of stability in prices. For the fourth consecutive month, Bradstreet's index number increased. The increase during September was .92 per cent as against .41 per cent in the previous month; while Dun's index number showed a decline of only .48 per cent as against .66 in the previous month and an increase of 2.41 per cent two months ago.

There was little change in the Federal Reserve System's technical position last week. The reserve ratio duplicated the high for the year made the previous week, at 69 per cent. Gold reserves of the system increased \$6,633,000, while deposits declined \$21,073,000, and Federal Reserve notes in circulation increased for the first time in some months by \$25,117,000. The decline in interbank borrowing was indicative of a more uniform distribution of the improvement which has been characteristic of the system in recent months.

## G. M. Graham Resigns from Pierce-Arrow

### Becomes Chandler Vice-President in Charge of Sales, Service and Advertising

BUFFALO, Oct. 13—George M. Graham, one of the most prominent figures in the automotive industry, has resigned as vice-president of the Pierce-Arrow Motor Car Co. to become vice-president of the Chandler Motor Car Co. in charge of sales, service and advertising. He will assume his new duties Nov. 1. Graham, who formerly was a newspaper man, has been the spokesman of the industry on many occasions because of his ability as an orator. He also is an analyst and economist of note.

During the war Graham served as chairman of the Motor Truck Committee, making his headquarters in Washington. He appeared frequently before various divisions of the War Department, committees of Congress and the War Industries Board, obtaining recognition and concessions for the automotive industry.

#### Prominent in N. A. C. C.

Graham has addressed meetings of automobile dealers throughout the country, telling them of the achievements of their industry. Thousands of copies on his address on motor vehicle regulation before the National Highways Convention were distributed throughout the country. He has spoken before the Chamber of Commerce of the United States and numerous other national organizations.

Graham is a member of the highways, motor truck and taxation committees of the National Automobile Chamber of Commerce. He was one of the two spokesmen who discussed problems of the industry with President Harding last spring and he recently has appeared in Washington several times in connection with hearings on pending legislation.

After leaving the newspaper business, Graham was associated with publicity, advertising and promotion campaigns for such companies as White, Packard, Pierce-Arrow and Mitchell. When he decided to devote all of his time to the automotive industry he joined the Willys-Overland company and from there went to Pierce-Arrow five years ago. He explains that a desire to associate himself with a quantity production company producing popular priced and high grade cars prompted him to join the Chandler company.

#### TO ACCEPT STANWOOD OFFER

NEWARK, Oct. 13—Vice Chancellor Backes has authorized Receiver John P. Kirkpatrick of New Brunswick to accept the offer of \$60,000 for the assets of the Stanwood Rubber Co., made by a committee of the company's creditors, representing 85 per cent of the claims against it, and the company is to be reorganized for business.



## Engineers Witness Ordnance at Work

Almost Every Form of Equipment  
Demonstrated at Army Association Annual Meeting

ABERDEEN PROVING GROUNDS, ABERDEEN, MD., Oct. 10—Several hundred engineers representing the membership of the Society of Automotive Engineers and the American Society of Mechanical Engineers were guests of the Army Ordnance Association at its third annual convention at the proving grounds here and witnessed one of the most comprehensive demonstrations of ordnance apparatus ever staged. A program was carried out that continued from 9 o'clock in the morning until 8 in the evening and embraced a demonstration of almost every form of ordnance equipment from the 16-inch 50-calibre army gun that throws a shell weighing 2340 pounds 50,000 yards to the smallest machine gun.

### Proves Field Day

The demonstration of motorized ordnance proved a veritable mechanical circus, embracing every form of vehicle that pulls ordnance or transports ammunition. The tanks, motorized gun mounts and motor trucks had a field day over the rough proving grounds. The following is a list of motorized equipment participating in the event:

- 75 mm. gun and 105 mm. howitzer motor carriage.
- 155 mm. gun and 8-inch howitzer motor carriage.
- 75 mm. gun and 105 mm. howitzer motor carriage.
- Self-propelled caterpillar, Mark VII.
- Self-propelled caterpillar, Marks I, III, IV.
- 2½, 5 and 10-ton caterpillar tractors towing gun carriages.
- 2½-ton divisional tractor.
- 20-ton tractor.
- Peoria reconnaissance tractor.
- Syracuse reconnaissance tractor.
- Millitor truck with Chase track-laying attachment.
- Tanks in all sizes.
- Christie tank.
- White chassis with British belt track-laying attachment.
- Manly hydraulic transmission truck.
- 3-ton Christie trailer
- Cleveland 1½-ton trailer.

### Foreign Vehicles Inspected

A 75-mm. gun on caterpillar was driven through 5 ft. of water, the vehicle having a waterproofed engine and transmission. Practically all engineers present were given an opportunity of riding on the different types of vehicles. In fact, it was the wish of the army association that all guests make a trip on the apparatus.

Following the tractor circus was an inspection of German, French and Italian motor vehicles that are housed in a commodious building on the proving grounds. These consist of trucks, tanks, trailers, steam vehicles, everything, in

fact, considered worth while by the ordnance department.

The exhibition of guns and the firing demonstration were most elaborate. Everything in the ordnance category was demonstrated by firing, from the big gun to the smallest Browning machine gun. An opportunity was given the guests to look minutely into all of the gun mechanisms. There were exhibitions of firing small guns with tracer bullets, demonstrations at night with flashless powder in 75 mm. guns, and in short, a most complete demonstration of every type of gun.

Airplane demonstration was largely confined to examination of Martin bombers and Handley-Page machines. During the day the Handley-Page dropped a 2000-pound bomb on the proving grounds in plain view. Smaller bombs were also dropped. An opportunity to examine in detail the navy blimp C2 was afforded.

## Branches Replacing Willys Distributors

(Continued from page 741)

to 1922 as the greatest automobile year in history.

"A survey of the situation indicates the possible need of between 2,000,000 and 3,000,000 cars for replacement during the coming year," he declared.

"Up to January, 1921, figures show that 11,839,483 motor vehicles had been built in the United States since 1899. Of this number 613,695 had been exported. Registrations in 1920 amounted to 9,211,295. In other words, since records of automobile production were first tabulated 2,014,483 cars were worn out or discarded.

"In 1919 some 596,969 were discarded. This is very close to the actual number of cars built in 1914, the actual figure being 569,045.

"Now let us compare the discarded cars in 1920 with the production in the fifth year preceding. In 1920 some 517,556 cars were discarded as against 892,000 built in 1915. It is apparent that financial stringency and the holding back of the public on account of falling prices resulted in 374,444 cars being carried over.

"In 1916 the first huge volume production was accomplished. In that year 1,583,617 cars were built. It seems probable that the first six months of this year will see the replacement of about 1,000,000 cars, the other half million cars normally ready for replacement being carried over for the same reasons as those in 1920.

"Now in 1917 were built 1,868,947 cars.

"This figure added to the normal total of cars held over and not replaced in 1920 and 1921 gives a total of 3,000,000 cars which the records of past year show would normally come in for replacement under normal conditions in 1922.

"Even if sub-normal conditions continue we should have the greatest year for replacement in history."

Willys pointed to the manufacturing economies of his company and declared that the increasing efficiency of the last ten months was enabling Willys-Overland to give a better value than ever before.

G. B. McNary, formerly in charge of the branch at Sacramento, has been made head of the Willys-Overland, Inc., office in Dallas.

## Appeal to Harding on Sales Tax Plan

Representatives of Automotive  
Industry Endeavor to Obtain  
Support for Smoot Bill

WASHINGTON, Oct. 10—Speaking for the National Automobile Chamber of Commerce, C. C. Hanch, executive vice-president of the Lexington Motor Co. and chairman of the taxation committee of the N. A. C. C., has made a personal appeal to President Harding to use his influence in fulfilling the Administration's pledge of tax relief for American business. He directed the attention of the President to the fact that coteries in Congress were menacing economic recovery and characterized the tax plan as now proposed by Senate and House as "mere fly specks in the business situation."

### Hanch Sends Letter

The automotive industry in common with many other manufacturers sent its representatives to a White House conference in a final effort to obtain the support of the President to the proposed manufacturer's sales tax plan known as the Smoot bill. The opinion of American business men as represented in the manufacturers' national tax committee was made known by John E. Edgerton, president of the National Association of Manufacturers.

The industry was represented at the conference by Hanch, J. Walter Drake, president of the Hupp Motor Car Corp., and Pyke Johnson, Washington representative of the N. A. C. C. The visit was followed by a letter to the President signed by Hanch as chairman of the tax committee of the N. A. C. C. Mention was made of the fact that many legislators believe that a manufacturers' sales tax is inevitable.

### Seek Just Taxes

In his communication to the President, Hanch made clear the thought of the industry on tax revision. He said:

"At this moment your administration is plagued by cliques and blocs in Congress which are the direct outgrowth of existing class legislation. The continuance of repressive war measures during times of peace will inevitably create a riot of class rivalries, class hatreds and class laws.

"Aside from the proposed repeal of transportation taxes all of the other proposed repeals of discriminatory war taxes are but mere fly specks in the business situation. How much simpler and better it would be if the Congress would accept your constructive recommendation to 'abolish inequities' by the repeal of all special discriminatory stigma war taxes and the substitution thereof of an equitable manufacturer's tax. Many congressmen who fear an equitable tax at this time unhesitatingly say that such a tax is inevitable later on.

"In view of the foregoing we respectfully suggest the propriety of your reminding Congress again of the necessity in the public interest for 'the abolition of the inequities and unjustifiable exasperations in the present (taxation) system.'"

## October Expected to Maintain Pace

### Value of Sales Will Probably Be Higher Because of Enclosed Car Demand

NEW YORK, Oct. 12—While it is probable sales of passenger cars will decline somewhat this month from the total for September, there is every indication that the volume of business will not show a large shrinkage. It would not be surprising if it was found that the next 30 days were approximately as good as the past thirty.

Notwithstanding the unsettling effect of a large number of price reductions, shipments of automobiles in September were only 4 per cent less than in August and it is significant that they were 85 per cent of September, 1920. It is probable the October total will equal or exceed the total for October last year and that comparisons from then on will show a balance favorable to each current month. While predictions are unsafe in a period of deflation and readjustment, there appears to be little danger in asserting that so far as the automotive industry is concerned the worst is over.

### Higher Priced Cars Gain

The slight falling off in business last month was in the lower and medium priced cars, and almost without exception the companies making cars in the higher price classes had material gains in business. Orders for high priced cars continue to come in on a basis which indicates that the September gain in sales will continue this month.

Production schedules for October have been curtailed in only a few instances although production will be kept strictly to a sales basis and accumulation of surplus cars in the hands of dealers or in warehouses will not be permitted. The largest decline in car production last month was in the Ford plant where the total was approximately 90,000. The company expects to produce an equal number of cars in October, but if there is a sharp falling off in orders, of which there is no indication at present, this output will be curtailed.

### Truck Market Improves

The indications are that while the actual number of cars sold in October will be smaller than in September, the aggregate value will be higher because with the slackening of demand for touring cars there will be an increased sale of enclosed models, which are all in a higher price class. Almost without exception, body builders are running close to capacity on enclosed models, and dealers report an exceptionally strong demand for cars of this class.

One of the most gratifying features of the situation to-day in the automobile field is the increased call for motor trucks. Sales of light delivery trucks have been better for several weeks and

## "JITNEY" DISCARDED; IS REPLACED BY "BUS"

NEW YORK, Oct. 10—The motor truck manufacturers of the country propose to take the "jit" out of jitney. In fact, they are opposed to the use of the word at all and will use all the influence they have to bring about the substitution of motor bus or just plain bus. They believe "jitney" has come into bad repute and the public generally misunderstands the term. A good many people who would be glad to ride in a motor bus shun the jitney in the belief that it is likely to be a converted ice wagon.

they now are extending into the heavy duty field. This is an unmistakable indication that general business is improving and that the larger volume of freight makes necessary an extension of transportation facilities.

## Gustafson New Manager of R. & V. Motor Co.

EAST MOLINE, ILL., Sept. 21—Discontinuance of the Moline Engine Co., proposed taking over of the poppet valve business by the Moline Plow Co. and recent sale of a portion of its properties to the Troy Laundry Machine Co., have necessitated changes in personnel of the R. & V. Motor Co.

Executive staff and directorate of the company remains unchanged with H. A. Holder president, but G. L. Walker of East Moline, assistant secretary and treasurer, becomes assistant to the president, and Gust Olson is elevated to chief engineer. A. A. Gustafson is made general superintendent or works manager directing assembling of chassis, plant maintenance, tool room and stores, machine shop, test and inspection.

D. M. Beal, who has been assistant sales manager, assumes responsibility for the finished car, a department which embraces chassis test, painting, trimming, assembly and final test. Department executives continue unchanged.

## Firestone in Alabama Surpasses War Times

BIRMINGHAM, ALA., Oct. 10—As a barometer of the improved conditions in the automobile industry in the local field the branch office of the Firestone Tire Co. here has done a larger business in the past ninety days than it did during the peak of the war days, and with a smaller sales force. This, according to P. D. Mingledorf, manager of the branch, is due to the fact that more cars are moving now than have been moving at any period since last December and also to the fact that farsighted dealers, seeing the rush coming with prosperity's return, began stocking up long before the crest of the hard time wave had passed.

## Plan of Lafayette Is 100 Cars Monthly

### Schedule Will Continue Through Fall and Winter With Increase in Spring

INDIANAPOLIS, Oct. 10 — The Lafayette Motors Co. of this city is celebrating the completion of the first year of production with a convention of distributors here. According to data given out by Charles W. Nash, president of the company, to the men attending the meeting, 800 Lafayette cars have been shipped to distributors and more than 700 are now in the hands of owners. Since May 1 orders at the factory have run approximately 100 ahead of production and, on the basis of present orders and the feeling among distributors, plans have been laid for the steady production of 100 cars a month during the fall and winter, with a large increase in the spring. The productive capacity of the plant as it is now is ten cars a day. Nash and officials of the company are confident of reaching this mark in 1922.

The Lafayette company now is represented by thirty direct distributors, a large percentage of whom handle the Lafayette in conjunction with the Nash. While the production for the first year falls considerably short of the mark set, Nash considers the record a good one, inasmuch as the industrial depression set in almost simultaneously with the shipment of the first car from the plant in 1920.

With only minor details, the chassis has not undergone change during the first year and no change is expected. One new body style, a roadster, has been added, and Nash states that there may be other body styles to satisfy any justifiable demand.

## Case Against Buffalo Broker Is Dismissed

INDIANAPOLIS, Oct. 10—Charges of extortion, preferred against John B. Porter of Buffalo, N. Y., who recently filed charges of grand larceny against Newton VanZandt, former president of the Revere Motor Car Corp. of Logansport, have been dismissed by authorities at Erie, Pa., where the case was filed, according to information received here. Porter was arrested in Logansport several weeks ago on the charge. At that time he was in the city to testify before the Cass County Grand Jury in connection with an investigation into the rumors and allegations concerning the Revere corporation.

### SHERMAN VISITS LOUISVILLE

LOUISVILLE, Oct. 8—Ray W. Sherman, merchandising director of the Automotive Equipment Association, was the principal speaker at the meeting of the Louisville Automobile Dealers' Association.

## Car Makers Urged to Give More Help

Used Cars, Financing and Contracts, Subjects Considered at  
N. A. C. C. Meeting

(Continued from page 736)

Shale contended that the automotive industry cannot be placed upon a really solid foundation until the manufacturer assumes a greater share of the dealer's financial burden. He pointed out the large volume of sales made on the deferred payment plan and held that unless business was continued on this paper there would be a large falling off in sales. This was his advice to the manufacturer:

### Shale's Suggestions

"Your margin to the dealer should be sufficient to enable him to give a cash discount, allowing him to receive a like discount from you if he pays in cash, or allowing him to pass this installment paper to you in settlement of his obligation at par, with legal interest added. The manufacturer can at all times have a reserve set up for this cash discount, either to be taken by the dealer when settlement is made in cash or to provide you with a fund that will enable you to use this reserve to sell the installment paper to produce cash.

"I believe it is essential that the manufacturer should be the pivot point through which this paper should be handled, so that the sales by his dealer will be readily taken care of. This would be in lieu of your giving the dealer unsecured credit.

"The manufacturer, in establishing new distribution, should require that his dealer have sufficient capital to carry his stock for all display purposes, necessary parts for service and take care of his selling expenses, to the period when his profit begins to come back to him by reason of these sales on the installment plan, which in the ordinary case would be about six months."

### Schumann's Contentions Similar

It was also the contention of Schumann that manufacturers should bear a greater share of the burden. He said that an investigation made by his company disclosed that banks in the Central West and New England preferred truck paper to passenger car paper, but that on the Pacific Coast the reverse was true.

In the discussion of the used car problem some of the suggestions made were:

That all used cars be reconditioned before they are sold and given the same backing by the dealer that he gives to new cars. This would inspire confidence on the part of prospective purchasers and bring many new prospects into the market. It was felt that every purchaser of a used car was a potential purchaser of a new one.

That dealers establish co-operative repair shops where used cars could be reconditioned instead of each dealer maintaining his own shop.

That each dealer assign his best salesmen to the task of selling used cars instead of leaving it to the "cubs."

That each salesman be compelled to find a purchaser for every car he takes in a trade.

That there be a co-operative advertising campaign on the part of the manufacturers to promote the sale of used cars. There was a sharp division of sentiment on this question, however, and it seemed to be the general idea that each manufacturer should work with his own dealers in advertising used cars.

As a result of the discussions, the N. A. C. C. will make an investigation of markets to determine in what way dealers can best be helped and educated.

Contract changes proposed by the committee representing the N. A. D. A., which has had two sessions with a special committee appointed by the N. A. C. C., were explained to the members. They were discussed at some length and the N. A. C. C. committee was authorized to hold another session with the N. A. D. A. representatives. This meeting will be held next week in Detroit.

Some of the contract changes proposed by the dealers probably will be accepted by the manufacturers, but not all of them. No matter what recommendations are made by the N. A. C. C. committee it will be impossible to carry them into effect except through their acceptance by each individual manufacturer.

There is a general feeling on the part of the vehicle builders that some of the unsatisfactory conditions which existed when the two committees were appointed already have righted themselves and that these readjustments will continue automatically. They assert that the attitude taken by factory sales managers is less arbitrary than in the past and that relations with dealers will become increasingly closer in the future.

### NOMA PRICES CUT

NEW YORK, Oct. 8.—The second reduction in 60 days has been announced by the Noma Motor Corp., manufacturer of Noma cars. The change made is as follows:

	Old Price	New Price
Roadster .....	\$2,800	\$2,500
4 passenger touring....	2,850	2,550

The prices are f.o.b. factory, plus war tax. No change has been made in the prices of the other models.

### INCREASE FOR NATIONAL

INDIANAPOLIS, Oct. 8.—The National Motor Car and Vehicle Corp., manufacturer of the National has increased the prices on its sedan and coupe as follows:

	Old Price	New Price
7 passenger sedan.....	\$3,990	\$4,240
4 passenger coupe.....	3,990	4,140

There is no change in the prices of other models. All prices are f.o.b. factory.

### TRACTORS REDUCED

CHICAGO, Oct. 8.—The Emerson Brentingham Co. has made a reduction of 10 per cent in the price of tractors and 20 per cent in that of farm implements.

## Price Reductions Spur Texas Trade

Liquidation of Accounts Contributes to Improvement of  
Automobile Business

DALLAS, Oct. 11.—While no figures are available as to the exact number of automobiles sold by Dallas dealers during the month of September the dealers themselves declare the business was as good as that during the preceding months when sales records for the past eighteen months were hung up. Practically every dealer in Dallas reported business brisk with sales getting better. They attribute the improved business in the automotive trade generally to more money in circulation and the customers, actual owners or ultimate consumers of all lines having more confidence in the financial stability of the period.

Lower prices of cars coupled with marketing of the cotton and grain crops and the placing of that money in actual circulation through liquidation of accounts are the actual reasons for better automobile business in this section. The farmers are marketing cotton at prices that have enabled them to pay accounts and have something left. The automobile dealers have not overlooked this and as a result sales have been made. Scores of persons who have bought cars in Dallas during the past month have been waiting for reductions along pre-war lines. When those reductions came the selling began in earnest.

As during the preceding month, the normal priced cars led in sales. High priced cars, however, were going right along and dealers said the outlook was brighter. Indications are now that the total automobile business in Dallas this year will amount to \$225,000,000, which is a considerable increase over the business for the past year.

Truck and tractor men reported better business, especially with the farmers. A great number of trucks, tractors and trailers have been shipped out of Dallas to the farmers of the wheat belts of Texas, Oklahoma and the cotton belts of these two States and Louisiana and the ranchers and cattlemen of Texas and New Mexico during the past month.

### NEW SOCIETY FOR ENGINEERS

NEWARK, N. J., Oct. 8.—Realizing the importance of co-operation in the development of friction drive, now becoming a recognized factor in many industries, a number of prominent engineers have formed the Friction Drive Engineering Society. Temporary officers have been elected as follows: President, C. A. S. Howlett of Divine Brothers Co., Utica, N. Y.; vice-president, W. D. Hamerstadt of the Rockwood Mfg. Co., Indianapolis, Ind.; secretary and treasurer, C. W. Kelsey of the Kelsey Motor Co., Newark, N. J.

## INDUSTRIAL NOTES

**S-P Mfg. Co.**, Cleveland, has purchased the former American Air Chuck Co. of Chicago. The work of re-establishing the business is well under way and with the aid of J. A. Colson, inventor of the American company's product, who will be associated with the S-P concern, the product will be ready for the market within a short time. The regular business of the S-P company has consisted of the design and manufacture of special machinery, fixtures, jigs, tools, etc., a line that will be continued and, as the demand increases, additional equipment will be installed for the manufacture of the air devices. The company plans to develop further the use of air power equipment for production to replace the hand methods of chucking work and similar operations.

**Victor Rubber Co.**, Springfield, Ohio, earned a profit of \$62,030, during July and August, according to President H. S. Berlin, and in addition set aside \$36,781 as a reserve for unanticipated contingencies. Thus far this year the production of the plant has been doubled by installing improved methods in manufacture; operating costs have been substantially decreased and the sales for the twelve months will be the largest of any period in the company's history, Berlin says. The number of sales agencies will be doubled. The directors of the company have declared the quarterly dividend of 1½% payable Oct. 25, on all preferred stock.

**Kendall Tire & Rubber Co.** and **Arlston Tire & Rubber Co.**, Massillon, Ohio, have been placed in the hands of W. S. Adams, receiver, on a petition of the First National Bank of Louisville, which claims \$22,000 on notes given by the two companies. **Fidelity Tire & Rubber Co.** of Illinois, which has been operating the plant by lease, is made a party to the action. The bank holds that its claim is secured by mortgage on the machinery and equipment of the companies and that the use of this material under lease to the Illinois concern lessens its value. Judgment on the note and foreclosure of the mortgage are asked.

**Bush Mfg.**, Hartford, Conn., manufacturing airplane, truck and tractor radiators, has purchased the property of the Ellison Construction Co. in that city, comprising a tract of three acres improved with a factory building, storage house and gasoline station. Continued growth of business in recent years has made the removal of the Bush company from its present location in the city necessary.

**Moline Plow Co.**, recently organized by a creditor's committee, plans resumption of business at its Rock Island plant, the Universal Tractor Co., early in December. Two hundred former employees of the tractor branch will be placed at work. In order that its warehouse stock may be disposed of a new work started, the company, at a loss, will reduce the price of all farm machinery.

**Quaker City Rubber Co.** of Philadelphia, manufacturer of Quaker tires and tubes, reports that its factories have been busy the entire year. At the main offices of the company the demand for space for the officers and salesrooms has been so great that it has been necessary to erect a new building at 624 Market Street, Philadelphia, which will be occupied Nov. 1.

**St. Louis Pump & Equipment Co.**, St. Louis, engineers and manufacturers of gasoline and oil handling units for filling stations, has acquired a location at Forest Park Boulevard and Spring Avenue, that city, and

will centralize its general offices and plants there, the new location providing facilities for largely increased production.

**Massey-Harris Implement Co.** will open a plant in Australia for the manufacture of tractors. The company produced \$6,000,000 worth of machinery for Australia last year. The new Australian tariff has closed the commonwealth to outsiders and it becomes necessary to set up a plant there in order to hold this trade.

**White Motor Co.** has increased its production schedule 20%, inventory for certain models of trucks having been reduced to such an extent that greater production was necessary. September sales of the company were 8% better than August, a month that was 10% better than July.

**Mikesell Bros. Mfg. Co.**, which occupies the former plant of the Perfection Tire & Rubber Co. at Wabash, Ind., is working full force, the only local industry on such schedule. The company manufactures brake linings, fan belts and other automotive equipment.

**Chevrolet Brothers Manufacturing Co.**, organized by Arthur and Louis Chevrolet, will soon occupy its own building, Louis Chevrolet has announced. The company will manufacture Frontenac cylinder heads and also will do machine repair work.

**J. G. Riggs & Sons Co.**, Springfield, Mass., handling automotive equipment, has opened its new building in that city constructed especially to suit the needs of the jobber. The company maintains branches in Pittsfield and Holyoke.

**Goodyear** sales for the first nine months of the year exceed those of the same period last year, during which the first six months sales were the greatest in the history of the company, according to President E. G. Wilmer.

**Moon Motor Car Co.** reports that September sales for this year were 33% greater than sales for the same month in 1920. Business was not spotty, the cotton situation adding substantially in an increased demand in the South.

**The Racine Rubber Co.** of Racine, Wis., has removed its sales department to New York. The company is a subsidiary of the Ajax Rubber Co.

**Charles H. Harris**, Norwalk, Conn., has completed a factory in that city for the manufacture of high grade plate glass for automobiles.

Farmers Oppose Plan  
for Trade Commission

WASHINGTON, Oct. 11—Proposals originating within the administration for the abolition of the Federal Trade Commission have provoked widespread comment. It is understood the plans call for closing up the affairs of this Federal agency before June 30, 1922, if possible. Members of the commission are entirely familiar with the arrangements.

It is understood to be the purpose of the administration to reorganize the commission with a view to consolidating it with the Department of Justice. Opposition to the proposal has arisen among the farm organizations and they have appealed to the "agricultural bloc" in the Senate to prevent it if possible. It is contended in some quarters that the commission has become a persecutor of business rather than an aid in rehabilitating industry.

## METAL MARKETS

THE character of recent price changes in the steel market furnishes the key to the proper interpretation of whatever alteration quotations may undergo during the year's remainder. From all that can be learned about the sheet orders now on the books of producers the preponderating bulk was placed at the recent low level, and the \$5 a ton advance, ample notice of which was given to every possible buyer, merely served as a magnet to bring out business at the old figure. The tonnage of sheet orders placed at the advanced prices is so negligible a one that it furnishes very little succor to the mills. Undoubtedly a good many sheet consumers just came in under the wire with their orders before the advance went into effect, but some of the smaller producing interests appear not to have been unduly exacting as to the time limit for acceptance of orders at the old prices. This past record, together with the plentitude of prophecies of higher prices for this or that steel product, which market reporters encounter these days, permit of the conclusion that whatever predictions of price advances will be launched into market reports in the next three months will be in the nature of efforts to bring out business at the old prices. Moreover, there will be far more predictions of price advances than actual raising of price levels. In fact, there are still a few commodities in the finished steel list that will very likely come in for reductions as a more direct means of inducing buyers to place orders. As the application of the Eastern trunk line railroads for permission to reduce freight rates on iron ore by 28 per cent, which was made to the Interstate Commerce Commission, has been granted the price of iron in the Pittsburgh district should eventually be cheapened by about 75 cents a ton and in the Schuylkill valley district by about \$1.25. It remains to be seen whether reductions in freight rates, which are confidently looked for all along the line, will result in immediate savings to consumers or whether, for a time at least, the revenue which the railroads will forego will wander into producers' pockets. Eventually, of course, competition will adjust this problem.

**Pig Iron.**—Automotive foundries are buying in a routine way only. Additional furnaces are contemplating resumption and October production will very likely pass the million-ton mark. With the elimination of surplus offerings by steel mill furnaces the merchant market is becoming more and more steady.

**Steel.**—Demand for full-finished automobile sheets is easing off as the result of seasonably lessened production schedules of passenger car builders. The same condition holds true of the strip steel market, although the Buick Motor Co. has recently figured as a fairly large purchaser of cold-rolled strip steel. The market for alloy steels lags, but producers hope for broader demand from refinements in 1922 passenger car models.

**Aluminum.**—On the surface there appears to be but little change in the situation, German 98 to 99 per cent ingots having been offered in the last few days at as low as 17c., duty paid, and a tonnage of French metal being hawked around the market at a similar price level, provided the entire lot would be taken. These offerings, however, appear in the light of clearance sales.

**Copper.**—London's opinion of the recent advances in the copper market are of interest. That market ascribes the advance solely to manipulation. There is no question that consuming buying here has broadened.

## MEN OF THE INDUSTRY

William M. Chamberlin has been appointed to the sales department of the Maxwell Motor Sales Corp. and Chalmers Motor Car Co. He will be concerned with the development of better merchandising methods. Chamberlin has been connected in various capacities with the Wright Mfg. Co., Detroit; Wilder Tannery, Waukegan, Ill.; Irving National Bank of New York, Detroit Lubricator Co., and Detroit Twist Drill Co. He was also president of the Chamberlin Co., a technical advertising agency.

J. A. Gelzer, Chicago, formerly associated with the Wagner Electric Mfg. Co., St. Louis, has been appointed sales manager of the Hoosier Clutch Co., Muncie, Ind. Gelzer is a university graduate in mechanical and electrical engineering and has been associated with the Wagner company for the past fifteen years, the last eight of which were spent in the automotive branch of the company's business as manager of sales in the western district.

J. H. Greer has been appointed manager of the Kansas City branch of the McGraw Tire & Rubber Co., succeeding W. S. Chambers, resigned. Greer has had 14 years' experience in the tire business. During this time he had served as branch manager for several prominent tire companies, among them being the United States for whom he functioned as branch manager at Kansas City.

Dr. Walter E. Boveri has arrived in New York to make a study of business conditions in this country. Boveri is a member of the Swiss electrical engineering firm of Brown, Boveri & Cie., which has important affiliations in many European countries, and which also controls Scintilla Société Anonyme of Soleure, Switzerland, and the Scintilla Magneto Co., Inc. of New York.

W. H. Richardson, manager of the Chicago branch of the Bearings Service Co., has been transferred to the managership of the New York branch. Frank J. Lemper will succeed him. Lemper is a mechanical engineer and a graduate of the University of Michigan. Previous to his present appointment he was connected with the Detroit branch of the company.

T. M. House, Spokane, has taken over the distribution of Rugles trucks for the Pacific Coast territory. He was formerly Western sales manager for the Republic Motor Truck Co. with jurisdiction over the Pacific Coast and later served as general manager for the company.

George H. Phelps, advertising manager of Dodge Brothers, has sailed for England aboard the *Aquitania*, accompanied by Russel Huff, chief engineer, to look over the company's British and continental business.

Victor Gauvreau, for the last four years chief engineer of the Pan Motor Co., St. Cloud, Minn., has joined the staff of the University of Minnesota as instructor of gas engines and machine design.

J. G. Anderson, president of the Anderson Motor Co., Rock Hill, S. C., has started on a six weeks' trip which will take him as far west as the coast visiting company dealers and distributors.

Herbert R. Hyman, for seven years advertising manager of the Cole Motor Car Co., Indianapolis, has become associated with Charles H. Fuller Co., advertising agency in Chicago.

J. Walter Drake, chairman of the foreign trade committee of the National Automobile Chamber of Commerce, has been elected a

director of the American Manufacturers' Export Association.

F. H. Dolbeer, formerly treasurer of the Willys-Overland Co., Toledo, has been made traveling sales manager of the Victor Talking Machine Co., with headquarters at Camden, N. J.

S. W. Reese, formerly representative of the Oldfield Tire Co. in the Kansas City district, will succeed H. T. Roseland as branch manager in that territory for the Star Rubber Co., Akron.

## FINANCIAL NOTES

General Motors Corp. probably will make a better financial showing for the full year than was expected a few months ago. Definite figures for the third quarter have not been completed, but the fact that shipments were as large as in the second quarter, if not larger, indicates that the profits will approximate those of the June quarter. The company is getting constantly increasing benefits from its improved inventory position.

Durant Motors has been granted permission by the securities department of the Secretary of State's office of Illinois to resubmit its statement for filing, which, if filed, will carry with it the right to offer its securities in the State.

Black & Decker Mfg. Co., Towson Heights, Baltimore, builder of portable electric tools, has declared a dividend on outstanding preferred stock for the third quarter this year amounting to 2 per cent, or 8 per cent per annum.

Chevrolet Motor Co. has declared a dividend of 3 per cent on its capital stock, payable Nov. 2 to stock of record Oct. 15.

Service Motor Truck Co., Wabash, Ind., has redeemed \$137,850 worth of preferred stock.

Packard Sets Record  
in Argentine Contest

BUENOS AIRES, Sept. 17 (By Mail) —The swiftest kilometer ever run by an automobile in South America was made by the winner of the kilometer championship of the Automovil Club Argentino, recently held here on the La Plata road and competed for by a field of 27 drivers. The championship was awarded to Alejandro Schoega, who drove a Packard car over the measured kilometer in 21.6 seconds or at the rate of 166-2/3 kilometers an hour. In this, he bettered by practically six seconds the time made in 1918 by Juan Bonamaison, who won the last kilometer championship held by the club. The rate in that race was 130.67 kilometers per hour.

Schoega's victory was in the unlimited class, in which he was pitted against six other cars of North American, French, German and Argentine manufacture. Other categories were of cars limited in cylinder displacement to three, four, five and six liters. In the various classes, victories were scored by the Sunbeam, Wolseley, Poto, Nash, Hudson and Cadillac, cars of the latter makes placing first in two races.

Earl Specifications  
Differ from BriscoeProvide for Smaller Engine and  
Longer Wheel Base on New  
Product

JACKSON, Oct. 10—Closely following on the heels of the change in name of the Briscoe to the Earl comes the information that the new car, which will also bear the name of Earl, will be very much different from the Briscoe.

The engine is four-cylinder block cast, 3 7/16 x 5 1/4 in., a little smaller than the Briscoe. It has a three-bearing crankshaft, splash lubrication, and thermo-siphon cooling. A 10-in. Borg & Beck dry plate clutch will connect the engine with the three speed gearset. The semi-floating rear axle, with spiral bevel gear and pinion, will be arranged for Hotchkiss drive. New Departure ball bearings will be used on the pinion shaft and Hyatt roller bearings in the differential and rear wheels; 14-in. brake drums are fitted on the rear wheels, and an emergency brake is mounted on the transmission.

The 7-in. frame has five cross members and semi-elliptic springs; 36 in. long in front, 56 in. in the rear. The steering gear is of the worm and gear type and a 17-in. steering wheel with horn button top is fitted. The car has 112-in. wheelbase; I-beam front axle with Timken roller bearings in front wheels, is used.

Artillery-type wood wheels with demountable rims are standard equipment, but wire wheels are provided at extra cost. Cord tires, 32 x 4, are standard equipment, straight side. An 18-gal. gasoline tank is mounted at the rear, with vacuum feed to carburetor. Color: touring car, Lake green, with black top, fenders and chassis. Genuine pebbled grain leather upholstery. Nickel-plated radiator shell, lamps, bumper and trimmings. Linoleum covered floor boards. Equipment includes electric side lights, Motometer, windshield wiper, tonneau foot rest, etc. Color: roadster, optional, with choice of upholstery; same equipment as touring car. Color: sedan and brougham, Ultramarine blue. Equipment includes cowl ventilator, sun visor, rear view mirror, running board step mats, interior dome light, heater and silver plated metal trimmings.

John N. Willys Buys  
Estate Near Toledo

TOLEDO, Oct. 10—John N. Willys has purchased a 100-acre estate up the Maumee Valley from Toledo, a distance of about five miles. He plans to build a 30-room residence. It is expected this will mean that Willys plans to spend a large portion of his time each year in Toledo.

Willys recently sold to Arthur Bell, bond broker, Toledo, his city property, which was valued at \$1,000,000. The new up-river home is in a group of large estates.



# Calendar

## SHOWS

Nov. 14-15—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Grand Central Palace, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Oct. 10-22—Olympia, England, Truck Show, Nov. 4-12—Car Show, Nov. 23-Dec. 3—Motorcycle Show.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

Nov. 26—Dec. 3—Shanghai, China, Automobile Show.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador, Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 6-8—Chicago, Second Annual Meeting of American Petroleum Institute.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 17-20, 1922—Chicago, American Road Builders Association.

S. A. E. MEETINGS  
Detroit, Oct. 21, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.

New York, Jan. 10-13, 1922—Annual Meeting.

## Seager Invention Sustained by Court

### Webb Jay System Infringed, Opinion Says in Suit Brought Against Stewart-Warner

(Continued from page 737)

"All of the functions which are ascribed by the defendant to the Stewart-Warner Webb Jay system, over and above Seager and Harrington, are functions resulting solely from additions to, and not departures from the combination of Seager's and Harrington's claims.

"Insofar as the record shows, no one prior to Seager recognized the usability of the suction produced in the intake passageway of an internal combustion engine as a source of power. Certainly, no one prior to Seager in any way applied that power to lifting fuel from a low level tank to an elevated auxiliary reservoir, from which the carbureter might be supplied independently of the level of the fuel in the main storage tank.

"Seager may have failed to claim the broader concept of applying that suction power to every kind of work outside the intake passageway, but certainly the means claimed by him for raising the fuel to an elevated auxiliary reservoir, and then discharging it to the carbureter of the engine, was new and entitled to broad protection.

"I have been urged to resolve any doubts in favor of the defendant, because the plaintiff's device has never been sold to the automobile trade, and because of the enormous investment made by defendant in putting its device on the market. This plea would be important if I were in doubt as to the validity of Seager and Harrington. However disturbing defendant's plea in this behalf has been, I must still bear in mind that whatever the power and activity of the defendant may have been in the past, it has been shown not only that Seager's invention is applicable to automobiles, but also that the defendant's device is applicable to stationary engines.

"As early as 1914 Seager was brought to the attention of the defendant when the Patent Office cited Seager in anticipation of claims made in the then pending application of Webb Jay. The Seager interests then opened negotiations with the defendant,

which proved to be fruitless. At that time the defendant resolved all doubts in its favor. In that it was wrong."

## Will Appeal

CHICAGO, Oct. 12—Stewart-Warner Speedometer Corp. will appeal from the decision handed down in the United States District Court by Judge Carpenter in the suit of Seager, Payton & Thomas against Stewart-Warner, alleging infringement of automobile engine vacuum gasoline feed patents obtained by James B. Seager and Norman T. Harrington. It is said that the Stewart-Warner corporation has sold approximately 5,000,000 vacuum systems at \$10 each. In the absence of C. B. Smith, president of Stewart-Warner, no other statement than that the decision would in no way interfere with the dealer organization could be secured.

According to T. T. Sullivan, vice-president of the corporation, the tanks will continue to be manufactured, pending an appeal, and in the event that the higher court should decide unfavorably a very slight change in the construction of the tank will be made.

## Gold Plaques Given Seiberling Brothers

AKRON, Oct. 10—Officials and employees of the Goodyear Tire & Rubber Co., Ltd., of Toronto, Canada, have presented to Frank Seiberling, founder and former president of all Goodyear companies, and to his brother, C. W. Seiberling, handsome solid gold plaques bearing inscriptions of tribute and respect.

Set in frames of purple plush, the plaques which are about six inches square are handsomely emblazoned with the American and Canadian flags, the American eagle and Canadian beaver. The border is of Canadian maple leaves, handcarved in gold.

The presentation of the plaques was made on Frank Seiberling's birthday on Oct. 7, and on the eve of his return to the rubber industry as a magnate controlling and operating a potentially strong chain of small rubber companies.

## Farmers Hold Back for Price Reductions

### Further Cuts Necessary, N. I. V. A. Members Told, in Order to Induce Buying

CHICAGO, Oct. 12—Members of the National Implement & Vehicle Association who are attending the 28th convention of the organization here were told to-day by C. L. Glasgow, representing the National Federation of Implement & Vehicle Dealers Association that farmers will not buy machinery at present prices, which represent a reduction of only 15 to 20 per cent from the war level. He urged implement manufacturers to cut prices now and take their losses, thereby getting ready for 1922 business. If this is not done, he declared, 1922 will witness a heavy mortality among dealers. Glasgow asserted that the buyers' strike of the farmers is still on and attributed it to the manufacturers' failure to cut prices.

The attempt of implement makers last spring to increase prices 10 per cent was very unwise, Glasgow contended, because it antagonized farmers who have loaned machinery to each other this year rather than buy new. As a result, the warehouses of implement makers are filled with unsold implements. Only a reduction in price will start the farmers buying, he said.

## GRANT HAS NEW TOURING BODY

CLEVELAND, Oct. 10—A new touring body is being fitted to the standard Grant chassis and the complete car is called the Grant Special, priced at \$1,285. The construction of the body is slightly altered from the current model, the running boards are redesigned and the fenders shaped somewhat differently. Otherwise the Special model is similar to the standard touring, which has recently had considerable special equipment added without increase of price.

OCT 20 1921

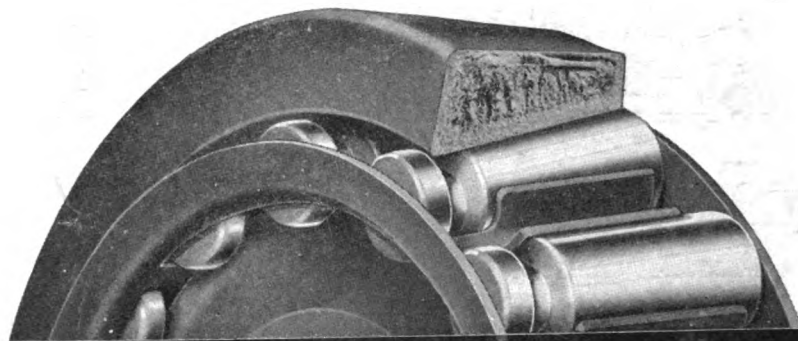
# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

Vol. XLV  
Number 16

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, OCTOBER 20, 1921

Thirty-five cents a copy  
Three dollars a year



“Οχι μόνον εις τὰς Ἡνω-  
μένας Πολιτείας, ἀλλὰ καὶ  
εἰς πᾶσαν ἄλλην χώραν, ὅπου  
εὗρισκονται καλῶς κατεσκευ-  
ασμένα Ἀμερικανικὰ καὶ Εὐ-  
ρωπαϊκὰ Αὐτοκίνητα, Φορ-  
τηγὰ Αὐτοκίνητα καὶ ἐν γένει  
Γεωργικαὶ Μηχαναὶ καὶ κά-  
μουν χρῆσιν τῶν

**TIMKEN TAPERED  
ROLLER BEARINGS**

εἰς μεγάλην κατανάλωσιν, δι-  
αφυλάττουσι σταθερῶς τὴν  
Κινητήριον Δύναμιν.

In a steadily increasing  
majority of the well  
designed automobiles,  
trucks, and tractors of  
the United States and  
of foreign countries as  
well, Timken Tapered  
Roller Bearings play  
a part of ever ascend-  
ing importance in the  
conservation of power

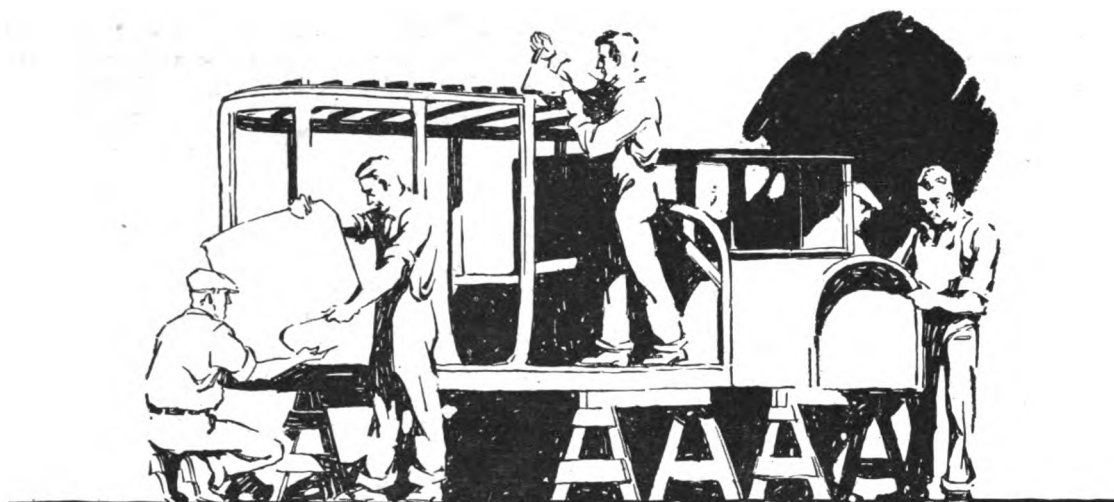
*The original Greek, and the Amer-  
ican translation, of a Timken  
Bearing advertisement appearing  
in Kairon of Cairo*

**THE TIMKEN ROLLER BEARING CO., CANTON, OHIO**  
*Timken Tapered Roller Bearings for Passenger Cars, Trucks, Tractors,  
Trailers, Farm Implements, Machinery, and Industrial Appliances*

# TIMKEN

## *Tapered*

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In every phase of motor car manufacture, simpler ideas, simpler processes, simpler ways of doing things are earnestly being sought. For simpler methods mean better workmanship—greater speed—lower manufacturing costs.

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# AUTOMOTIVE INDUSTRIES

## THE AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, OCTOBER 20, 1921

No. 16

## N.I.V.A. Discusses Difficulties of Farm Implement Industry

No immediate market, but future holds large possibilities. Dealers urge lower prices. Large inventories not yet liquidated by manufacturers. Power farming idea must be sold. Standardization necessary.

By David Beecroft

CHICAGO, October 15.

**T**HAT leaders in the manufacture of farm equipment machinery, which includes farm tractors, are deeply concerned because of the existing depression was evidenced by the phenomenal attendance at every session of the three-day convention of these makers which ended here to-night. The National Implement and Vehicle Association, which counts within its membership practically every manufacturer of farm equipment from pumps to binders and tractors, held its twenty-eighth convention, and company executives who have not been seen at these conventions for a dozen years were on hand and sat throughout the forenoon and afternoon sessions. Approximately 150 to 175 attended throughout each session.

The program was largely drafted to suit the present exigency, which finds our agriculture at the lowest point in its history and finds these 150 or more machinery manufacturers passing through almost a complete state of selling coma. In most lines there has been a cessation of sales which set in last November and has continued with almost unbroken regularity up to the present. Call it the farmers', buyers' strike, or label it with any other name, and the situation remains the same; namely, one which has caused

very many of the factories to remain closed for months and which has resulted in material inventories not being much reduced in the last ten months. Branch houses and machinery warehouses throughout the country are stocked to the roofs with unsold farm machinery.

These farm machinery manufacturers have had one handicap during the current year which has not been at the doorstep of many other national manufacturers: They have had the misfortune, or fortune, according as you view it, of selling to one class of customers, farmers. The motor car manufacturer has had a broad selling field, the doctor, banker, lawyer, merchant, manufacturer, contractor, broker and a hundred other classifications, but these farm equipment makers have had to concentrate on one classification, the farmer.

This exclusive character of their selling field has made the present year proportionately worse in that no other class of citizens has suffered such a cut in the price of their commodities as the farmer. It is true that the farmer came through four or five years of prosperity culminating with the 1919 crop, but, unfortunately, such years of plenty found the farmer a very ready buyer, even of luxuries, and often a poor conserver of money. The high-priced crop that

he grew in 1920 suddenly stopped the buying career of almost millions.

A year ago few of us believed that the farmer was in such straitened circumstances as a few keen students of agriculture declared existed. When he stopped buying in the autumn of 1920 his case was not taken much more seriously than that of his town and city cousin; both went on a buyers' strike. But when the farmer failed to come into the market with the warm days of spring, and when he failed to enter the market when the fields were waving with ripened harvests the concern of the manufacturer grew still more real. It has only been in the last few months that the country as a whole has realized the plight of the farmer. It is only within the last few months that the truth of the farmers' buying power has become generally understood.

Last February at the national tractor show held in Columbus, Ohio, most of the tractor manufacturers were speculating on the probable time the farmer would return to the market. Then there was no doubt but that he would come in time for the spring crop and the harvest as well. It was merely a question of when and in what proportions. As spring wore on and he did not come; when summer came and went and he still held out, then the manufacturer had a complete realization of the problem that faced him. At once there arose a painful consciousness that the industry faced the greatest problem of its history.

A pretty accurate clue to the American agricultural situation was contained in the words of Hon. Henry C. Wallace, Secretary of Agriculture, speaking before the convention, and also in the same address which he delivered to over 1000 business men, members of the Chicago Association of Commerce:

"For more than a year we have passed through a period of severe agricultural depression. It has been a trying period. The prices the farmer is getting to-day for his major agricultural commodities are considerably below the prices he received for them in the five pre-war years, 1909 to 1913, inclusive. The prices for basic commodities that the farmer must buy are still above pre-war prices. Farmers constitute 40 per cent of the population of our country and you cannot have such a terrific reduction in the prices of commodities they have to sell and keep the prices of what they have to buy considerably above pre-war prices without compelling those farmers to practise the most rigid economy. This cannot happen without all industry having to suffer, and those industries most closely related to the farm—namely, farm equipment—suffer first and most severely.

"I think it true that many forehanded farmers who had money accumulations as a result of long years of work and saving have at times been unwise in their program of economy, but the psychology of the situation accounts for it, but from this time on purchases by farmers of equipment needed will gradually and steadily increase.

"We must get back onto an even keel, and it would be far better if prices of farm products could be brought up to a fair level rather than that wages and prices of other commodities should be brought down to the present level of farm prices. One or the other must happen.

When we get on an even keel again, very likely we shall find ourselves riding on a plane of prices about 50 or 60 per cent above pre-war levels, but we would reach that desirable state much sooner and with less hardship if there were a clearer recognition of the relations of agricultural property to national prosperity."

It will assist in gaining a more comprehensive conception of the present-day agricultural situation by bearing in mind that the average purchasing power of the farmer is but 70 per cent of what it was in the five pre-war years, this figure being based on current prices of thirty-one major farm commodities. Corn states are to-day quite severely hit in that the average purchasing power of corn is 50 per cent of what it was in the five pre-war years. In this may be found an explanation of why wholesale and retail motor sales have slumped very heavily in corn territory in the last few months.

With this as the background from which to study the business outlook for 1922 for farm equipment, it is not surprising that the keenest market students of this group of makers are not deluding themselves as to the demand for next year. They are not looking for any active demand for another twelve months. These makers face the situation calmly and discuss it equally calmly. They do not attempt

to conceal the fact that there has been practically no buying this year; they do not look for much in 1922; but they are studying overtime to learn just what must happen.

Here is how some of the leaders are reasoning with regard to two or three years hence:

Basing calculations on the fact that farm machinery wears out every seven years; further, that during the last

four years purchasing by farmers has been 10 per cent less than normal; they estimate that to-day the average condition of farm machinery is only 80 per cent of normal. This, in the words of William Black, president of the National Implement and Vehicle Association and president of one of the large makers of farm equipment, "means that in two or three years there will come a season when the supply of new equipment will not equal the demand, and the longer the depression lasts the greater will be the demand.

"The manufacturer for the past year has been concerned with the problem of liquidation and that of earning profits, but he is now beginning to realize that the only way he can stay in business is to do business. The only way to make a profit is to sell goods, as without sales there are no profits."

One session of the convention was occupied by the leaders in manufacture wrestling with the problem of how better to conduct business so as to make a profit. These studies were entirely concerned with methods of finance, and the question of what volume of business you should attempt to do on a given amount of capital. In this program three of the leading manufacturers very frankly analyzed the affairs of their own businesses, and it was commendable to see a group of makers considering so openly and frankly this fundamental of business. They feel that fluctuations in business can largely be avoided by more careful studies.

It was disappointing in the convention that the big problem of reducing cost of merchandising to the farmer by virtue of reducing merchandising

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**STANDARDIZATION** of machinery parts has not yet been favorably received by tractor and farm implement manufacturers. There are some who think, however, that the farm machinery industry is on the verge of the greatest revolution in manufacture it has ever faced. The present crisis is driving home manufacturing lessons that have not heretofore been heeded.

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costs was not even directly discussed. The manufacturers riveted their attention too generally on financing and company economics. There was little if anything said on greater economy in factory manufacturing methods; in fact, the subject of standardization as a means of reducing costs seems still a long way off from many of these makers.

The question of lower prices and the imperative necessity for such was brought home to the convention in no unmistakable manner by a representative of the farm equipment dealers of the country. These dealers held their annual convention last week in order to be ready to lay their thoughts on the present situation before the makers this week. There was no doubting the meaning of the message they handed to the manufacturers, and in selecting Hon. C. L. Glasgow of Michigan to present it they selected a man who apparently had no fear and one whose words showed that conviction was the major reason for what he uttered.

He openly charged the farm equipment manufacturers with bad judgment when, at the opening of the 1921 season, they increased the price of their equipment 10 per cent, apparently hoping to stampede the farmer into buying on the fear of still higher prices. That has since proved to have been a very serious error. It proved so in the motor car field. It antagonized the farmer. He lost confidence in an industry that he had been dealing with since his start in farming. Since then prices have dropped 15 to 20 per cent in general, and in some instances as high as 27 per cent, but the farmer is still obdurate, and not only does not buy but is firmly convinced that prices must come still lower, and is frankly resolved that they will go still lower before he buys.

The dealers are also convinced that prices must fall, and Mr. Glasgow, speaking for the dealers, urged all manufacturers to cut prices right down and so get the farmer in a better humor for the start of 1922 business. Unless this is done there is going to be a very heavy mortality among farm equipment dealers.

The suggestion of one manufacturer that the dealer work, work, work was openly resented by the dealers, who declared that it was little use working unless the manufacturers' price program was better suited to the condition of the times. They have worked and have witnessed farmers loaning binders, seed drills, disk harrows and tractors among themselves in order to avoid buying new ones. Some speakers at the convention who are manufacturers and own farms openly admitted that they need certain farm equipment and are borrowing from neighbors rather than buying new. They are waiting for lower prices.

While the convention apparently studiously avoided any consideration of price reductions, it is certain this subject was very much discussed by groups around luncheon tables and in quiet corners of the hotel lobby during the convention. The farm equipment manufacturers have not been able to reduce inventories very much in the past year. In the summer of 1920 they walked knee deep into too heavy purchases of materials and parts. They were led into this by sales reports of tremendous orders. Few of them realized that often these sales reports represented protecting orders from

dealers who, feeling they could not get machinery from one concern, placed orders with five or six, hoping out of all to get their demands filled. Suddenly this situation appeared, but not before vastly too heavy inventories had been accumulated. These inventories are still very largely on hand, because of the almost complete cessation of buying. Much liquidation has yet to be accomplished. In the past year these manufacturers have reduced forces in many cases to mere skeletons, they have closed factories and taken other steps, and in the year ahead it is not going to be possible for them to make further reductions; they must carry on business on the positive method of creating sales.

It is still quite apparent that standardization of machinery parts as a means of reducing costs has not been favorably received by these machinery makers. Some attention was given to this subject at the convention, one speaker, E. A. White, president of the American Society of Agricultural Engineers and engineering editor of the *Farm Implement News*, read a paper on it, but, following the general rules of the convention, there was no discussion. After the close of the session one maker, perhaps unconsciously, made one of the strongest statements in favor of standardization. He spoke of how

certain materials are costing him nearly double what they used to and in the next breath gave the reason in the small orders that it was necessary for him to place. Had certain materials been standardized by specifications there would not be much necessity for short orders. The material makers could carry stocks of standard lines, being sure of certain demand for such.

There are those who think that the farm machinery industry stands

to-day on the verge of the greatest revolution in manufacture that it has ever faced. This farm machinery crisis, the worst in its history, is driving home lessons of manufacture that formerly fell too often on deaf ears. There are some of these concerns who frankly admit they have no engineering organization but have such work in the hands of a head draftsman. It is difficult for standardization to make that progress that the times demand until each concern has a properly organized engineering department. There is still too general use of castings and scrap iron. The field of the stamping and in some cases the forging lies ahead.

There must come into the industry that spirit of co-operation in manufacture that will admit of standardization which will reduce costs.

A recent example is that of a mowing attachment for cutting hay to attach to tractors. Last summer three makers, International Harvester, Cletrac and Fordson, marketed attachments in which the old conventional mowing machine was superseded by merely a cutter bar that was carried direct on the tractor, thereby eliminating the major part of the mowing machine. There was no evidence of standardizing these cutting attachments. They were attached in three different ways; in fact, three different manufacturers built the attachments. They had but one thought, namely, of building for an individual type. It is not surprising that in some cases the prices were much higher than what the farmer had been in the habit of paying for a complete mowing ma-

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**T**HE farmer has not been overstocked with farm equipment up to this time, according to Department of Agriculture figures. There has been little business during the past year and little is likely during 1922. Wm. Black, President of the N. I. V. A., states, however, "that in two or three years there will come a season when the supply of new equipment will not equal the demand and the longer the depression lasts, the greater will be the demand."

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chine, drawn by horses. In the babyhood of such an industry, thought must be given to standardization of such attachments, otherwise prices will not come down to the levels they should, and whenever prices are thus unsoundly maintained the manufacturer is contributing to erecting a wall of sales resistance. He is making it harder and more costly to do business.

Automotive manufacturers in general can cut a few leaves from the note books of farm equipment makers in the respect in which the latter study agriculture and make use of the Department of Agriculture. A few figures will give the outline of a picture that will stand study: Of the 6,500,000 farmers, the ownership of automotive equipment is about as follows:

Percentage of farmers owning motor cars.....	40
Percentage of farmers owning tractors.....	63.6
Percentage of farmers owning motor trucks.....	2
Percentage of farmers owning isolated house lighting plants .....	7

While the farmer has not been purchasing motor cars in the past year, there are still, according to these government figures, 60 per cent of them who yet have to purchase cars, and this in itself is a market worth studying. There is one trend that is taking place in agriculture that augurs favorably for wider buying of cars by farmers, namely, the fact that each decade finds the average size of the farm in older settled sections increasing in size, and in some of the later farm sections where too large farms have been used they are decreasing in size.

The ranks of farm equipment manufacturers are divided on just what is the best method of selling tractors. There are two schools of tractor sales; let us say two groups.

Group One has as its objective the dominant thought of selling tractors.

Group Two has as its dominant idea that of selling the power farming idea.

The two groups are widely separated in viewpoint. AUTOMOTIVE INDUSTRIES stands back of Group Two in its conception of selling. The idea must precede the machine. There has been altogether too much attempt to sell a tractor on the ground that you can plow an acre of land cheaper with a tractor than with a horse. The national tractor demonstration last summer had this fact fundamentally in mind. The motor car was never sold on the argument that you could travel two miles cheaper in a car than you can go the same distance behind a mule.

The idea of the motor car was sold whether we were conscious of it or not. It was what the car would do for the person who bought it. With the motor truck it is what the truck can accomplish by way of extending the boundaries of business and accomplishing those one hundred things that the horse and mule simply cannot accomplish.

So the school of tractor sales that has as its objective the selling of the power farming idea is going to win out. It is fundamentally sound and must win. There are today too few of the tractor makers who realize what a tractor means to a farmer. In Kansas it enables him to plow the ground in the hot days of July, when horses cannot do the job well, and thus gives a greatly increased yield of winter wheat as compared with the same land plowed in August or September.

In North Dakota it makes it possible to summer fallow in July and thus get increased yields of spring wheat.

In Illinois it enables the corn farmer to get his corn sown early in May and thus reap an increased yield.

These are facts, borne out by years of experience and attested to by scientific farmers. The tractor never will come into its own if it is just sold as a substitute for horses. So tractor sales school two is going to win out and these days of depression should stimulate its growth.

Those farm equipment manufacturers who in the halcyon war years took up the development of a line of motor trucks have not reaped the harvest visioned by them. Their business has been practically nil. It is generally conceded that it was an ill-advised move. Some of them developed too-large-capacity machines for economic farm use. They have also discovered that it calls for a different sales effort to sell trucks to farmers. The net result is that with the depression that has been rather general over the truck industry in the past year, the farm equipment makers have had no encouragement and it will not be surprising if some of them discontinue their contemplated programs. Undoubtedly the success of the International Harvester Co. had some influence on starting some of them in this field, but they may have overlooked the fact that many of the trucks built by this concern are not sold through their farm machinery dealers. There are cities where the I. H. C. has its large farm machinery branch from which it sells its farm lines, but its trucks are marketed by a dealer along automotive row or in some other suitable part of the city.

Concerning the general future of United States agriculture, there is a consensus of opinion that although the American farmer, thanks to modern machinery, produces four or five times as much food products as the European farmer, yet days calling for deep consideration of all problems are ahead. Secretary Wallace thinks that the other great agricultural nations of the world are going to play a growing part in supplying the world's needs of farm products and that our great Mississippi valley has as great if not greater farm problems ahead than it has yet faced. He favors standardization of machinery and implements and his department stands ready to assist in this work.

Up to this time the farmer has not been overstocked with farm equipment, according to Department of Agriculture figures, which show that farm equipment purchased annually represents only 5 per cent of the value of the crop. The value of farm crops for 1920 was \$9,165,348,000, and for the same year the sale of farm equipment was \$471,442,000. In agriculture man labor, power and machinery constitute 31 to 69.5 per cent of the total cost of producing crops.

There has been in demand to changing times a heavy elimination in the number of types of different farm implements in the last seventy years, as shown by the following figures. The first column shows the number of models eliminated and the second column the number retained:

Machine	Type Eliminated	Type Retained
Seed drills .....	32	18
Mowing machines .....	2	6
Disk harrows .....	53	44
Corn planters .....	759	29
Riding plows .....	32	16
Walking plows .....	179	34
Cultivators .....	165	10
Wagons .....	4,336	224

These figures do not refer to trade models but to types. One example cited as to how standardization might be carried out was that of the left-hand plow. There is nothing that a left-hand plow can do but can be done equally well with a right-hand plow. Notwithstanding this the manufacture of the left-hand design is continued

(Continued on page 772)

# Excellent Technical Papers Read at Gear Makers' Convention

Detailed program of standardization work as formulated at Niagara Falls committee meeting was ratified. Members witnessed new machines for bevel gear manufacture in operation. Two new companies were admitted to membership. Various committee reports were presented.

By P. M. Heldt

A NUMBER of excellent technical papers were presented at the semi-annual convention of the American Gear Manufacturers' Association, which was held at the Powers Hotel, Rochester, Oct. 13 to 15. In the line of standardization work, a definite program to guide the activities of the different subcommittees—which program was worked out at a meeting of the Standards Committee at Niagara Falls last summer—was ratified, with slight changes and additions in some cases. The program of the convention also included a visit of inspection to the Gleason Works, where a number of new gear cutting machines were shown the members, and a clambake at Corbett's Glen as the guests of the Gleason Works.

In the report of the Secretary it was brought out that the Association is still growing; at the time the convention opened it had 92 member companies with 110 executive and 59 associate members, making a total of 169 members. Two applications for company membership were favorably voted on at the meeting. The new companies admitted were the Central Products Co. of Detroit and the Harris Machine Co. of Bridgeport, Conn. It was announced that a foreign membership clause was to be added to the constitution for the benefit of firms in the gear business in other countries.

## Cost Accounting

J. H. Dunn presented the report of the Committee on Uniform Cost Accounting. He said that the committee had issued a questionnaire to the membership concerning their cost accounting practice, but that the returns from this had been rather unsatisfactory. President Sinram, referring to this report, said that practically all member companies were running very light and had cut their overhead expense as low as possible, so that insufficient office help might account for the fact that no more replies had been received; but as business was getting nearer to normal again all would be in need of the information which the questionnaire was to bring out, and he urged members to give the committee all possible help in the future.

The questionnaire of the committee brought in replies from 44 member companies, of which seven had less than 50 employees, 11 between 50 and 100, 15 between 100 and 500, six between 500 and 1000 and three over 1000, while two did not state the number of employees. Of these same companies 16 had adopted the Association's system of uniform cost accounting, five used a similar system and one had adopted it in part. The machine-hour rate by machine or group is used by 16 companies; one percentage of direct labor for entire plant, by 14 companies, departmental percentage of direct labor rate, by 8 companies and the productive hour rate by two. Thirty-six companies

stated that they had the totals of the amount of factory expenses to compare with the total amount distributed to cost of jobs. The following table gives a survey of the methods of distributing administrative, general and selling expenses to costs:

	Companies
Percentage of factory cost.....	22
Combined with shop overhead and distributed on a percentage of direct labor basis.....	7
Combined with shop overhead and included in machine rate .....	1
On productive hour basis .....	3
On productive labor basis.....	2
Percentage of sales .....	1
Do not keep job costs .....	1
Question not answered .....	7
	<hr/> 44

In discussing the problem of cost accounting, Geo. Markland said that his firm in making cost estimates used the machine rate basis, but doing this in obtaining their actual costs in case they were awarded the job took too much time under present conditions.

In connection with the report of the Industrial Relations Committee and the discussion thereon a warning was issued to members by one of the speakers not to take any work below cost; if they were doing so because they thought it would cut down their overhead, they were fooling themselves. Another point brought out was that if allowance is made for the increase in freight rates, steel is selling cheaper to-day than it was before the war.

## Standards Committee Report

B. F. Waterman made a report for the sectional committee of the American Engineering Standards Committee. He said that Mr. Buckingham, vice-chairman of that committee, had now in hand the preparation of a digest of all standardization work on gears that had been done in this country and abroad. A letter had been received from the German Standardization Committee asking for information on stub tooth standards. The Canadian Engineering Standards Committee had offered to co-operate with the American Engineering Standards Committee and had been asked to send a representative to each executive meeting. A copy had been received of the French stub tooth standard, based on the metric system, with a request that it be considered by the committee.

## Tooth Wear with Different Steels

A paper on Tooth Wear with Different Gear Steels, by E. R. Ross, experimental engineer of the Warner Gear Co., was presented by S. O. White, chief engineer of the same company. The intermediate speed gears of a three-

speed transmission were run under heavy load for a period of six hours and the wear on the tooth flanks was carefully measured with a micrometer caliper. Gears of different steels, both oil hardening and case hardening, were thus experimented with, and the results plotted in the form of wear diagrams. We expect to reprint this paper in an early issue. Mr. White was asked what he considered to be the best backlash between the teeth of a transmission gear; he replied that this had nothing to do with the subject of the paper, but that his company generally allowed between 0.007 and 0.008 in. backlash. It was also asked why it was that the diagrams all showed the greatest wear to occur at the pitch line, when it was a well-established fact that at the pitch line action was that of pure rolling motion. It was explained that this was due to the dwell at the pitch line, which allowed time for the oil to be squeezed out between the contacting surfaces and thus causing maximum wear at that line. A curve of temperature rise showed that the oil on the transmission case attained a working temperature of 274 deg. Fahr. in the tests, and Mr. White said that it was then about as thin as kerosene.

On Thursday evening E. S. Sawtelle, assistant general manager of the Tool Steel Gear & Pinion Co. of Cincinnati, gave a talk on a European trip made by him the past summer. He dwelt mainly on points that arouse the interest of the general tourist, but also gave some impressions of business conditions in the several countries visited and their possible effect on American export trade in the future. Mr. Sawtelle visited England, Holland, France, Switzerland and Germany.

#### Duralumin as a Gear Material

On Friday morning R. W. Daniels of the Baush Machine Tool Co. presented a paper on Duralumin as a Material for Worm and Other Gearing. Mr. Daniels first gave an outline of the history, composition, heat treatment and mechanical properties of duralumin and then discussed its adaptability to worm wheels and other types of gearing. He said in substance:

Duralumin is an ideal material for worm wheels, provided the bearing or wearing qualities are satisfactory. For a given section the weight is one-third that of the conventional bronze. The tensile strength and relative high elastic limit insure superior tooth strength. The homogeneous structure and uniform hardness of heat treated duralumin forgings insure entire freedom from hard spots, porosity and spongy areas so common in bronze castings, which entail not only machine loss but uneven tooth wear in service. The excellent machining qualities insure the manufacturer a saving in his machining costs over bronze.

The wearing qualities of worm wheels for automotive purposes is best determined by actual road service, as bench or laboratory test results do not always correspond. It is instructive, however, to compare results obtained from duralumin with those of other materials under identical conditions. The data from various laboratory tests under, the writer's observations on bronze and duralumin worm wheels may be summarized by saying that tests destructive to duralumin worm wheels were also destructive to those made of bronze. Where duralumin and hardened steel are run together the results are always good. An example of this application is shown by duralumin connecting rods running direct on the wrist-pins with better life at this point than with the conventional bronze bushed rod of equal bearing area.

Comparative tests of bearings made from duralumin against bearings made of genuine babbitt, show that for shaft speeds exceeding 700 r.p.m. and loads over 200 lb. per sq. in., duralumin bearings develop less friction, re-

main cooler and show practically no loss in weight under most severe conditions. For lower bearing pressure and lower speeds, babbitt metal is superior.

#### Tested on Fifth Avenue Buses

Some tests made by the Research Department of the Fifth Avenue Coach Co. on worm wheels of duralumin were quoted by Mr. Daniels. Three duralumin worm wheels were procured and installed in the standard worm carriers, and road tests were started on three buses (2-A type.) These wheels were inspected periodically during the first few weeks' service, and again at the time of the next annual overhaul of the buses. The results obtained with these sample worm wheels are given in the following table:

	Bus 30Z	39	40
Date in .....	8/27/20	9/15/20	9/11/20
Date removed .....	6/20/21	In Service	6/17/21
Mileage. ....	26,672	24,143	32,253
Miles per gal., aver. ....	6.75	6.52	6.65

From this it will be seen that 83,068 miles were covered with these units, all of which at the end of the period showed excellent resistance to wear along the pitch line. In the case of one unit there had been a failure of the bearing behind the worm, and the sides of this wheel were slightly chipped, but not sufficient to prevent it from being put back in service with the others. Inspection of the wheels after the above service indicated wearing qualities equal to those of the standard bronze gear wheel. In view of the advantages to be gained from the use of this material, the acquisition of several more, for a more exhaustive test, was recommended.

Examination of the lubricating oil threw an interesting light on conditions of wear. With bronze wheels, if the oil has not been changed for a long time, an examination of the oil always shows particles of bronze in suspension. This not only indicates wear, but also deterioration of the lubricating value.

#### For Gears of Other Types

The same qualities that make duralumin a desirable material for automotive worm wheels also make it valuable for plain spur and other gearing. It is suitable for this class of work where the pressures are sufficiently within its elastic limit of 30,000 lb. per sq. in. Where this condition is met, and weight and quietness are desirable, it replaces iron, steel, brass, fiber, fabric, etc. Where duralumin can be run with steel rather than against itself, the best results are obtained. An example of this application is found in the timing gear trains of automobile motors where both long life and quietness are essential.

Helical cut spur gears of duralumin alternated with steel gears have been most successful in service. Detailed test reports are not especially interesting, as the gear design varies with every motor, but the fact that upwards of 60,000 duralumin camshaft and idler gears are now in use, is conclusive.

#### Further Standards Reports

A number of reports by subcommittees of the Standards Committee were presented on Friday afternoon and evening, discussed and acted upon. Some of these contained only the program according to which the subcommittee planned to work, while others contained definite proposals in the way of standardization.

Frank E. Eberhardt presented the report of the Spur Gear Sub-Committee. In this connection it was recommended by Frank Burgess that when the committee gets to work it adopt a rule prescribing a greater face width for a pinion than for the mating gear. J. B. Foote reverted to the matter of the rule for face width, discussed

at some length at the previous meeting in Cincinnati. He said that the multiplier 9, which had been used for many years, was based on scientific considerations and should not be discarded in favor of 10, as proposed, unless good reasons for the change could be adduced. The report was adopted. The report of the Sub-Committee on Gears and Pinions for Electric Railways and Mines, presented by Chairman W. H. Phillips, was also adopted.

A Nomenclature Sub-Committee has been appointed which consists of the chairmen of all the other sub-committees. This has been collecting names, terms, symbols and formulae from catalogs, lists and books, and they are now going over these lists of terms, etc., to eliminate inconsistencies. A report of progress was made and this was adopted.

J. C. O'Brien made a report for the Sub-Committee on Worms, Worm Gears and Spirals. This committee will be known hereafter as the Sub-Committee on Worm Gears. Frank Eberhardt stated that one of the most important items in the program of this committee was the collection of data on successful and unsuccessful worm gears. After a change in the order of the items in the program the report was adopted.

#### Inspection Methods

F. G. Eppley read the report of the Inspection Sub-Committee. This also covered only the program of the work the committee plans to do, with some comments on the different items. It was noted from this report that the committee is making some efforts to obtain a standard of comparison and a means of making comparisons of gear noises. It was stated that the Bureau of Standards is now working on a method of measuring sound. In connection with this report it was pointed out by one of the members that the methods of inspection worked out would be used by customers of the gear makers, and that therefore no tests and no standards should be recommended which were of such a high order that they could not be lived up to by the members. Mr. Phillips said that his company had an inspection method for each type of gearing and other companies undoubtedly the same, and he suggested that all these data be turned over to the Inspection Sub-Committee. B. F. Waterman said that it would be necessary to differentiate between manufacturer's tests and customer's tests as regards instruments to be used, and that any test standardized must be commercial. The report was adopted.

The report of the Bevel and Spiral Bevel Gear Sub-Committee, F. E. McMullen, chairman, also was merely a program of the work to be done and was approved of by the meeting. C. R. Weiss, chairman of the Sprocket Committee, presented the report of that committee. In addition to the program for future work, this covered matters which have already been adopted by the S. A. E. and the A. S. M. E. and are therefore known. The report was adopted.

#### Special Steel Specifications Discarded

C. B. Hamilton, Jr., chairman of the Metallurgical Sub-Committee, reported for that body. This committee some time ago worked up specifications for a special screw stock, but in as much as the screw stock specifications of the S. A. E. and the A. S. T. M. are alike, it was felt that there was no need for introducing an additional specification, and this proposal was therefore dropped. In fact, it was decided to drop all of the special steel specifications of the American Gear Manufacturers' Association (known as A. G. M. A. steels) with one exception. This is the 1045 A. G. M. A. steel, which differs from the No. 1045 S. A. E. steel in having 0.30 to 0.60 per cent manganese instead of 0.50 to 0.80 per cent. Mr. Frost said that he had always objected to the No. 1020 S. A. E. steel, which has a

carbon range of from 15 to 25 points. If you happen to get practically the maximum carbon limit and at the same time high manganese content, it is impossible to properly carbonize the steel. There was some discussion as to the advisability of eliminating this steel from the list, but it was brought out that it is one of the most widely used gear steels; moreover, the proposal to use the 1015 steel instead met with the objection that with this specially low carbon steel it is hard to keep down the sulphur content. Mr. Frost said that he was not speaking from selfish motives, as his firm tested every shipment of steel it received, but some of the other firms which had no testing facilities might possibly have trouble. He suggested that if the proposed table of specifications be adopted it be printed with a foot-note warning users of the danger pointed out by him. The report was adopted as revised. Proposed brass and bronze specifications, which cover S. A. E. specifications Nos. 62 to 65 inclusive, were adopted. For steel castings the committee proposed the adoption of the specification already in use by the A. S. T. M. (Specification A-27-21), with the addition: "All gear castings must be properly annealed." This part of the report was also adopted.

In connection with the report of the Keyways Committee, Mr. Burgess made an appeal for multiple keyways, as a single key in his estimation was not sufficiently secure, but W. H. Diefendorf suggested that he use a taper on his shaft and a nut on same, in which case he would not need multiple keys. This, too, was only a progress report and was adopted. Mr. Petersen, who represented the S. A. E. Iron and Steel Division at the convention, requested that two members of the A. G. M. A. metallurgical committee be delegated to attend every meeting of the Iron and Steel Division. This request was acceded to.

#### Visit to Gleason Works

On Friday afternoon a visit was made to the plant of the Gleason Works. There J. B. Foote of Chicago spoke on some of the welfare features introduced by the Gleasons for the benefit of their employees. These included old age pensions, a dining room, a library, musical entertainments and a mutual aid society. In the factory the members inspected a number of new machines used in the production of bevel gears, including a 4-in. spiral bevel gear generator, an 8-in. spiral bevel gear generator (used among other things for the production of spiral bevel gears for driving overhead camshafts) a bevel gear burnishing machine, a 38-in. two-tool gear planer, a 9-in. two-tool gear generator, a three-spindle bevel gear rougher, a three-spindle bevel gear generator and a tool grinder for the 4-in. spiral generator.

On Friday evening the association held its banquet at the Powers Hotel. J. E. Gleason acted as toastmaster, and the speakers were the Hon. Arthur E. Sutherland, who spoke on "Capital and Labor," and Ernest Paviour, former president of the Rochester Ad Club, who spoke on "Advertising."

On Saturday morning, at the final session of the convention, E. W. Miller, chief engineer of the Fellows Gear Shaper Co., presented a paper on "Tooth Forms." Mr. Miller said that the only tooth curve which deserved consideration was the involute, but he showed that even by adhering to this curve there was a possibility of considerable variation in the form and efficiency of the tooth by changing the part of the involute to the base circle which is used. It was proven that in order to have a tooth form system which could be produced by all of the methods now extant, it was necessary to use a pressure angle of 24 deg. and a few minutes, if the whole system from a 12-tooth pinion to a rack was to be interchangeable. We expect to reprint this paper in an early issue.



# First German Automobile Show in Ten Years

Marks re-entry of German automobile industry into world competition. Some concerns book orders for year's production. Forty-six manufacturers show 90 models ranging from 14 to 75 hp. Four-cylinder and L-head engine and four-speed gearset predominate. One stock engine shown.

By W. F. Bradley

**B**ERLIN'S automobile show, the first since 1911, marks the complete re-entry of the German automobile industry into world competition. The show is held in a big hall specially built by the German automobile manufacturers for exhibition purposes, and finished just before the outbreak of war. At the same time the German makers opened their own speedway, the only one of its kind on the Continent. This has its main entrances some 200 yards from the exhibition hall. This track undoubtedly served as an immense attraction to the show. It is estimated that on the opening and following days 500,000 persons paid for admission to the speedway. On the days of the race tickets were resold privately at a minimum of 1000 marks.

Business conditions at the show were entirely satisfactory, and as a result of the exhibition many factories are booked up with orders for one year. Berlin is full of foreign buyers, who are interested, among other things, in automobiles because of the low price made possible by reason of the depreciated value of the mark. For the purpose of rough comparison the value of the mark may be taken as being equal to one cent in American currency. Sometimes it gets a little above this figure, but more often it is below. On this basis the most costly car in the Berlin show is the Maybach 90-hp. six-cylinder which, with high-grade open body and all modern fittings, is listed at \$4,300. A few other prices, selected haphazard, are as follows:

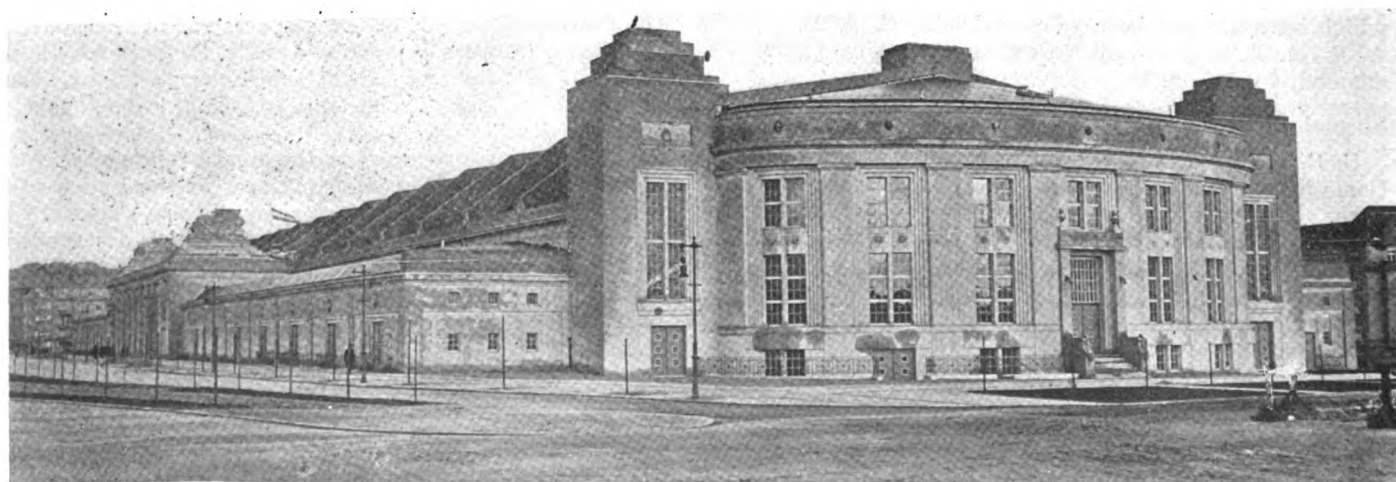
Mercedes, 6 cyl., 90 hp., open body .....	\$3,300
Benz, 6 cyl., 50 hp., open body .....	3,200
Opel, 6 cyl., 75 hp., open body .....	3,000
Horch, 6 cyl., 80 hp., open body .....	2,750

Rumpler, 6 cyl., 50 hp., open body .....	\$1,500
Rumpler, 6 cyl., 50 hp., sedan body .....	2,000
Adler, 4 cyl., 18 hp., open body .....	1,300
Adler, 4 cyl., 26 hp., open body .....	1,800
Dinos, 4 cyl., 30 hp., open body .....	1,600
Ego, 4 cyl., 20 hp., 2 seater open body .....	710
Brennabor, 4 cyl., 25 hp., open body .....	700
Bob, 4 cyl., 20 hp., 2 seater .....	620

The majority of these are really high-grade cars with excellent body work, comparable to the most costly types produced in America or elsewhere. The open six-cylinder Rumpler, for instance, is a car which would be sold in any other European country at twice the price asked on the Berlin market. Considered as a whole, equivalent models built by Italian, French, Belgian or English firms would cost 50 to 75 per cent more in American currency. In all cases these are retail selling prices in Berlin. For export business lower prices would prevail.

In the above list the only car really laid out for cheap production is the four-cylinder Brennabor, designated as 25 hp. This power, in common with others quoted above, is really the actual power of the engine, an equivalent rating in other European countries being 10 to 15 hp.

Germany is in a position to challenge the world with medium and high grade cars which are cheaper than those of any other nation by reason of the depreciated value of the mark. There has been very little attempt as yet to get down to low prices by simplified design and cheap production methods, as they are known in America. One of the reasons for this is that the home market is very small, and the foreign market being varied, it is difficult to select one type which will be successful for a wide range of



Germany's new building used exclusively for automobile show purposes and known as Kaiserdamm Palace

countries. Another reason is that Germany has not yet had time to learn the lessons of cheap production, and her engineers have preferred to continue on the same general lines as before the war, merely bringing their chassis up-to-date in comparison with French, English and Italian makes.

The three companies best known on the world's market are Mercedes, Benz and Opel, all of which are purely automobile concerns, unconnected with other industries. Some of the others, although not so well known abroad, are linked up with very powerful combinations. N. A. G. forms a branch of the A. E. G. (German General Electric Co.), which in turn is allied in a certain measure with the American General Electric. The Protos Co. is a branch of the Siemens Electric concern, one of the biggest manufacturing and industrial organizations in Germany. The Dinos car is in the hands of Hugo Stinnes, probably the biggest manipulator of capital in Europe. Krupp, of gun fame, is also interested in automobile construction, but up to the present the factory has confined its attention to trucks and scooters.

While capable of competing on nearly all foreign markets, with the exception of France, where there is a prohibitive duty against former enemy countries, Germany is doubly protected in her own territory. Not only does the exchange rate make it impossible to import cars into Germany, but it is necessary at the present time to obtain a Government permit to import, and this is not readily given. This state of affairs applies not only to automobiles, but to tires and all accessories. There is an opportunity, however, for American capital to interest itself in the German industry. This has been done by Goodrich, who has secured 50 per cent of the shares of the Continental Tire & Rubber Company of Hanover. Packard has also just bought the Ventzky automobile factory at Graudenz (now named Grudziacz), in West Poland, formerly Prussian territory. It is reported, although no confirmation of this has been obtained, that the Ford Motor Co. has secured a controlling interest in the Hansa-Lloyd Company. Among accessory firms, Klaxon and Zenith manufacture in Germany.

#### Show Statistics

Forty-six passenger car manufacturers are represented at the Berlin show, these firms producing 90 models. Twenty factories build one type only; 15 produce 2 models, 5 have 3 models, 5 have 4 models, and one firm produces 5 different types. About one dozen of these firms are interested also in automobile trucks. The 90 models represented at the show can be divided as follows as regards horsepower:

- 5 models with engines of about 14 hp.
- 3 models with engines of about 15 hp.
- 11 models with engines of about 18 hp.
- 13 models with engines of about 24 hp.
- 4 models with engines of about 25 hp.
- 18 models with engines of about 30 hp.
- 3 models with engines of about 40 hp.
- 13 models with engines of about 45 hp.
- 3 models with engines of about 50 hp.
- 7 models with engines of about 55 hp.
- 4 models with engines of about 75 hp. and more.

The bore-stroke ratios and the engine speed are given in the following table, which indicates the minimum and the maximum:



General view of the recent German automobile show

Brake hp.	Bore-stroke-ratio	R.p.m.
14	1.1 -1.5	1800-2400
15	1.3 -1.55	1600-2500
18	1.25-1.8	1800-2600
24	1.25-1.8	1500-2600
26	1.3 -1.9	1400-2200
30	1.35-2.1	1400-2200
40	1.35-1.7	1600-2200
45	1.3 -1.7	1400-2000
50	1.3 -1.6	1400-2000
55	1.4 -1.45	1400-2200
75	1.1 -1.5	1400-1600

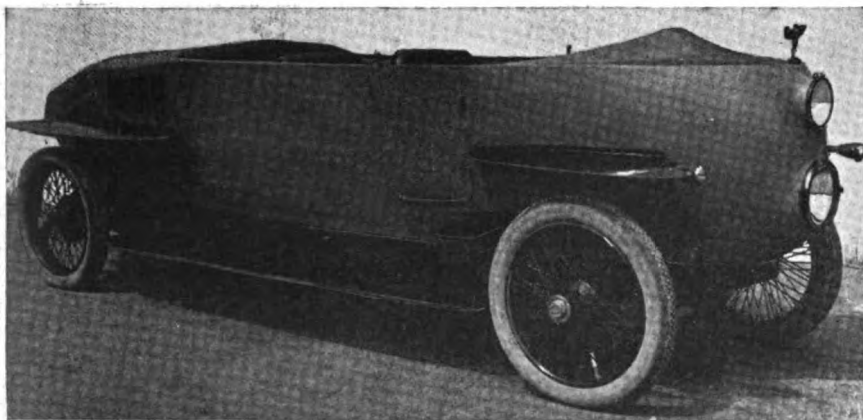
The four-cylinder engine is used in 80 per cent of German automobiles. Six-cylinder engines represent 16.6 per cent, eight-cylinders are 1.13 per cent, and twins and singles are each 1.13 per cent. Germany has not been carried away with the multi-cylinder idea, for there is only one eight-cylinder in the show, this being the Apollo V-type. There is also only one single-cylinder, a two-stroke air-cooled used in a cyclecar.

Vertical cylinders are used on 96.6 per cent of the engines; the W-type is used on the Rumpler six-cylinder, and represents 1.13 per cent of the whole; the V-type is also in the proportion of 1.13 per cent, as applied to the Apollo eight, and the horizontal opposed is 1.13 per cent.

Four-cylinder engines are in one casting in 83.2 per cent of the models; and pairs 16.8 per cent. For six-cylinder engines block casting is found on 33.3 per cent, pairs in 40 per cent, and in threes on 26.7 per cent. In the great majority of cases cylinders are grey iron casting. Mercedes is using steel cylinders for all poppet valve models. There is an increased number of aluminum cylinders with steel liners, most of these having cylinders and crankcase in one casting, detachable heads and overhead valves. Examples are Dinos, Audi, B. M. W., Swave, and Horch. Detachable heads represent only 11 per cent of the whole, while aluminum pistons are used on 42.2 per cent of all models.

#### Head Type Predominates

The L-head engine is at the top of the list with 67.7 per cent, followed by the overhead valve type with 21.1 per cent. L-head engines with inclined valves are 3.3 per cent.



The novel Rumpler car with powerplant aft. Note the appearance of the streamline body

The Knight engine is used by Mercedes, the proportion being 2.2 per cent. There are no other substitutes for the poppet valve. One valve in the head and one operated from below is found on 4.4 per cent of the cars.

On four-cylinder engines the crankshaft bearings are as follows: 2 plain bearings, 5.5 per cent; 3 plain, 76.4 per cent; 4 plain, 4.4 per cent (Dinos car); 2 ball bearings, 6.9 per cent; 3 ball bearings, 2.7 per cent; 4 ball bearings, 1.3 per cent; 5 ball bearings, 2.7 per cent. On six-cylinder engines the proportions are 2 plain bearings, 6.7 per cent; 3 plain, 6.7 per cent; 4 plain, 66.6 per cent; 7 plain, 20 per cent. Ball bearing shafts are not used for six-cylinder engines. The front end drive is by spur pinions on 27.7 per cent of the engines; spiral bevels are used on 21.1 per cent, and chain drive on 43.3 per cent. Bevel gear drive for overhead camshaft is used on 7.9 per cent of the engines.

Cooling is about equally divided between thermo-syphon and pump circulation, the former representing 47.7 per cent and the latter 48.8 per cent. Air cooling represents 3.5 per cent. Fan designs are as follows:

Aluminum	Sheet Steel
2 blade 14.9 per cent	2 blade 14.6 per cent
3 blade 33.3 per cent	3 blade 18.4 per cent
4 blade 11.4 per cent	4 blade 4.8 per cent
6 blade 2.4 per cent	Flywheel-fan 4.8 per cent

Radiator cores are 83.9 per cent tubular and 16.1 per cent honeycomb type. Pointed radiators are found on 92.2 per cent of the cars, half round on 2.3 per cent, and flat on 5.5 per cent. Materials used for the radiator shell are brass, 93.1 per cent; German silver, 2.2 per cent; copper, 3.4 per cent, and aluminum, 1.2 per cent.

The full pressure lubricating system holds the field with 74.4 per cent, combined splash and pressure is 17.7 per cent, splash system 3.5 per cent, and Bosch oiling system 4.4 per cent. Gear type oil pumps are 63.9 per cent of the whole; eccentric pumps, 16.3 per cent; plunger pumps, 19.8 per cent.

In the carburetor field Zenith has a proportion of 38.8 per cent; Pallas, 31.1 per cent; other makes, 15.7 per cent, and car makers' own carburetors are 14.4 per cent. Carburetor control is 1.2 per cent by hand only, 8.7 per cent by accelerator pedal only, and 90 per cent with both. The gasoline tank is at the rear on 78.3 per cent of the cars, on the dash on 21.6 per cent, and below the driver's seat on 1.1 per cent. Fuel feeds are 11.1 exhaust pressure, 22.3 air pressure, 45.5 vacuum, 21.1 gravity.

#### Ignition Systems

Ignition by a single magneto is 90.3 per cent; double ignition is 6.6 per cent, and battery-dynamo 2.2 per cent. Bosch equips 80 per cent of the cars with magnetos. Spark

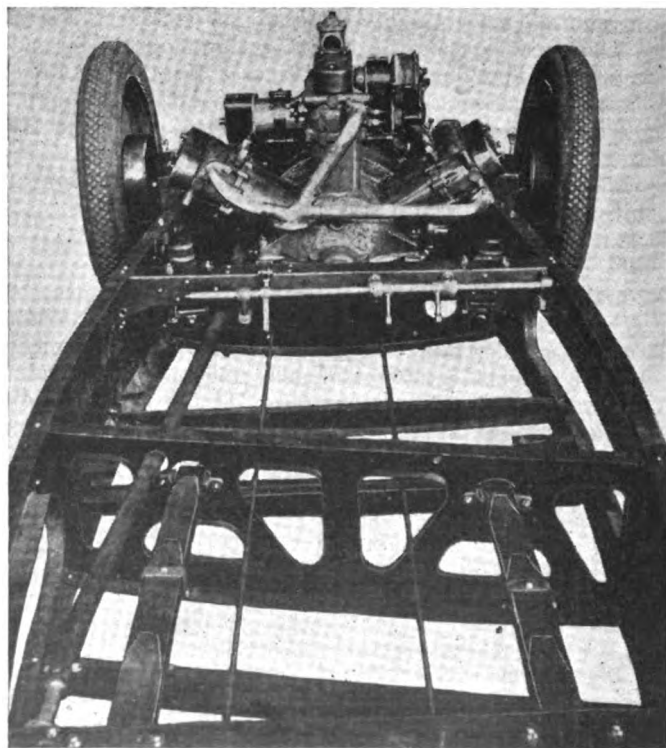
control is by hand lever on 72.2 per cent of the cars, fixed on 8.8 per cent, and automatic on 20 per cent. N. A. G. has a combination of hand lever and automatic control. Electric lighting is used on 94.5 per cent of the cars, practically all of these being Bosch, and acetylene on 5.5 per cent. Electric starting is 67.7 per cent, and cars without starter 32.3 per cent. Battery boxes are mounted on the running board on 60.1 per cent of the cars, inside the frame on 30.1 per cent, and below driver's seat on 9.4 per cent.

The clutch systems are 48.2 per cent leather cone; Ferodo cone, 16.6 per cent; double cone, 4.4 per cent; metal cone, 5.5 per cent; steel disks, 14.4 per cent; brass and steel disks, 7.7 per cent; dry disks, 3.3 per cent; three plate, 4.4 per cent; extension clutches, 1.1 per cent, and reversed cone, 4.4 per cent. A clutch stop is fitted on 58.8 per cent of the cars.

Unit construction of engine and transmission is 21.1 per cent; engine and transmission separate is 75.6 per cent, and transmission on rear axle 1.1 per cent. Rumpler has engine and transmission forming a block mounted at the rear, the percentage being 2.2. Four speeds ahead represent 83.4 per cent; three-speed transmissions, 14.4 per cent; two-speeds, 1.1 per cent, and a single-speed, 1.1 per cent. This latter is the Maybach so-called transmission-less car.

Spiral bevel gears for the final drive are 39 per cent; straight bevels, 58.6 per cent, and worm gear, 2.4 per cent. Differentials are nearly all bevel type, only four cars having spur gear differentials.

Wood wheels hold the premier position with 40 per cent; wire wheels, 27.7 per cent; steel disk wheels, 11.1 per cent; steel spoke wheels, 18 per cent. Detachable wheels are 43.2 per cent; detachable rims, 53.3 per cent; fixed wheels and rims are 4.5 per cent. All rims are clincher bead



Rear end of Rumpler chassis. The W-type engine, gearbox and differential housing are built in one unit, most of the weight being sprung. The springs are inside the chassis frame

type. Front axles are 37.5 per cent open jaw type and 62.5 per cent closed jaw.

Front springs are 91.2 per cent half-elliptic, 3.3 per cent cantilever (Rumpler car), 3.3 per cent transverse, and 2.2 per cent quarter-elliptic. At the rear 62.1 per cent are half-elliptic, 24.4 per cent cantilever, 6.6 per cent three-quarter-elliptic, 2.2 per cent transverse, 1.1 per cent quarter-elliptic, 1.1 per cent spiral, and 2.5 per cent other systems.

Right-hand steering and right-hand control represents 89.4 per cent; left-hand steering with center control is 6.7 per cent, and right-hand steering with center control 3.6 per cent. Steering-gear is worm and sector on 43.3 per cent; screw and nut on 55.5 per cent, and other types 1.1 per cent.

Front wheel brakes have only just made their appearance in Germany, being found only on 2.2 per cent of the cars. Foot brake on the transmission is 91.2 per cent and on rear wheels 8.8 per cent; hand operated brake on rear wheels is 97.8 per cent. Fifty-seven per cent of transmission brakes are external and 33 per cent internal. Only 3.6 per cent of these are water cooled. The percentage of external rear brakes is 4.4. Brake equalizers are 82.2 per cent by balance lever, 14.4 per cent by cable and 3.3 per cent by bevel gears.

The following chassis weights, without fuel and oil, show wide ranges of difference. In each case the lightest and the heaviest chassis has been taken.

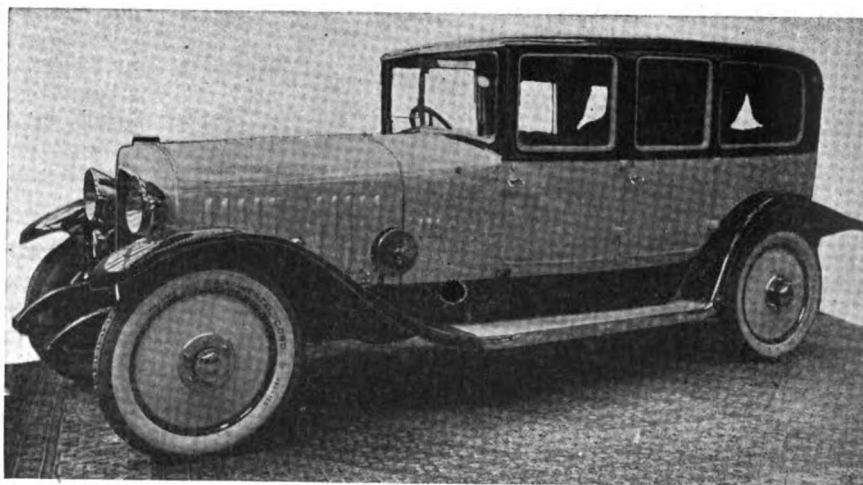
Engine hp.	14	15	18	24	30	45	55	75 and more
Weight in	840	925	1150	1655	1985	2115	2645	about 3970
pounds:	1100	1230	1870	2095	2910	3085	3750	

### Rumpler Design Radical

Two cars stand out as distinctly different from the others. They are the Rumpler and the Maybach. Before becoming an airplane manufacturer Rumpler was chief designer in some of the leading German automobile factories, and has tackled the problem of automobile production from the double standpoint of the automobile engineer and the aviation expert. He has sought to eliminate unsprung weight and by the general arrangement of his chassis to obtain the best stream-line form. While other makers have sought to reduce head resistance by modifications of existing types of chassis, Rumpler has laid his whole car out with stream lining in view. These cars attracted immense attention and generally favorable comment, despite their unusual appearance. Rumpler puts his engine and transmission at the rear, inside a boat-type chassis. He has adopted a six-cylinder W-type engine with all-aluminum cylinder and overhead valves, but any type of four-cylinder engine can be used equally well.

A clutch and gearbox form a unit with the engine, and the final drive is through a common differential to the two road wheels, there being two driving and two driven pinions, of different size, but with the same ratios. On the inner end of each of the two axle housings is a bronze semi-circular guide to allow of the rise and fall of the axle as the wheel passes over obstacles on the road. There is a stay from each extremity of the axle housing to a bronze bushed trunnion bearing on a rear extension of the differential housing. With this design, which Rumpler declares to be fully covered by patents, the only unsprung weight is the wheel, the driveshaft and a portion of the spring.

Cantilever springs are used front and rear, the front springs being entirely inside the boat type chassis, and the rear springs having about half their length inside the



The Maybach six-cylinder "transmissionless" car with salon body was the most expensive car at the Berlin show

frame. Steering is at the front, with the axle and steering control lever passing through openings in the frame. This design gives an exceptionally low center of gravity. Even the spare wheels are carried inside the frame. Each one is placed flat on a small bogey, which is pushed through openings in the frame on to rails flush with the bottom flange of the frame members. A perfectly stream-lined body is mounted on this chassis. The underpan is just as efficient as the upper works, and no provision is made for external projections which would spoil the effect sought. It is impossible to hang a trunk or a bag on the outside of the car. Fenders, door steps, headlights and windscreen are all treated from an aviation standpoint. The rear seat is practically in the center of gravity and all passengers are carried within the wheelbase. In addition to building this car himself, Rumpler is arranging to grant licenses for its production by other firms.

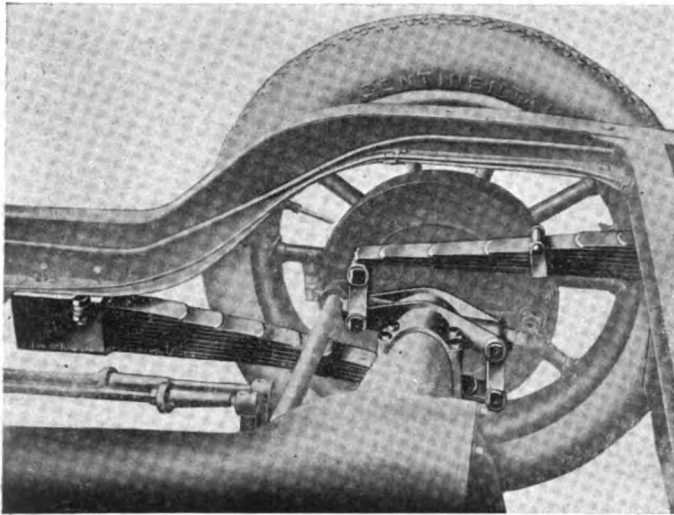
### The Maybach

Maybach has produced what is termed a transmissionless car. A six-cylinder engine, built to the same designs as the Dutch Spyker, and having a bore and stroke of 95 by 135 mm., is mounted in the usual type of chassis and drives direct by propeller shaft to a bevel type rear axle. The starting motor is sufficiently powerful to move the entire car on the level until the engine begins to fire, and this is the usual method of starting away, all the driving being done on the throttle. A planetary emergency gear is fitted, however, as well as a clutch, although it is claimed that these have only to be used for exceptionally steep hills, or when starting on hills. The rear axle is an all-aluminum structure, and the conical housing carrying the driving pinion is also aluminum. Large diameter brakes are fitted on front and rear wheels, with an adjustment for the application of the rear brakes ahead of those on the front wheels.

Brennabor is the only maker who appears to have laid out his chassis with cheap production in view. The car is a four-passenger with four-cylinder engine, 70 by 102 mm., cylinders and crankcase in one casting, two bearing crankshaft, overhead valves with push rods, three-speed transmission forming a unit with the engine, a generator-battery type of ignition, center control with left-hand steering, and cantilever suspension. This is the European type four and five-passenger economical light car which by reason of low exchange can come into direct competition on all open markets with similar productions of British, French and Italian construction.

Considered as a whole, German manufacturers have specialized in a good quality, medium price car. There





The novel double quarter-elliptic spring construction employed on the Horch chassis is said to prevent rolling and make for easy riding

has been no attempt to compete with the cheapest American types, and the Germans have avoided the French mistake of two years ago of producing mechanical masterpieces irrespective of price. Compared with France, they have made no progress on brakes and have not seriously tackled the problem of four wheel brakes. There are three or four cars in the show with brakes on all the wheels, but it is obvious from an examination that they have been produced without any important amount of practical experience behind these braking systems.

Cantilever springs in Germany are looked upon as a novelty, whereas in most other European countries this system of suspension is on the wane, for it has been found defective for really fast cars. One of the few interesting and new types of suspension is that on the Horch car. On this model use is made of double quarter-elliptics, one of the springs being ahead of the axle, with its thick end forward, and the other to the rear of the axle, with its thick end at the extremity of the frame. The two thin ends are attached by an eye bolt to a sleeve mounted with a bronze bushing on the axle housing. The advantages claimed for this type of spring are flexibility equal to that of the cantilever, reduced weight, and an absence of rolling at high speeds.

#### Central Drive Favored

German engineers are not at all partisans of the Hotchkiss drive, not a single car on this principle being found in the show. There is an increasing number of cars with central drive, the forward end of the propeller shaft housing either being forked or forming a sphere. This latter is a type of drive which has become particularly popular in France and Italy. Invariably, however, when this type of drive is adopted, stays are used from the extremities of the axle housing to a point on the front end of the propeller shaft housing. Benz continues to make use of tubular radius rods, although these went out of existence in other European countries several years ago. One of the exceptions to the German school is the Horch, in which a T-shape combined axle and propeller shaft housing is used, this being formed of two stampings welded together, the drive being through the spherical end of the propeller shaft housing. This exception is explained by the fact that the engineer had long experience with the Fiat Company in Italy, and has been influenced by Italian practice. On this car the differential is contained in an oil tight housing inside the axle housing, not only eliminating all possibility of leakage along the drive shafts but, it is

claimed, reducing noise by reason of this double housing.

Since pre-war days there has been a wonderful cleaning up of the details of engine and chassis. External oil pipes, straggling ignition leads, external manifolds, visible bolt heads, etc., have been removed, some of the best German constructions now approaching the clean lines for which Italian chassis are famous.

#### Steel Cylinder Liners Popular

Overhead valve engines and aluminum cylinders with steel liners are not in a majority, but it is evident that German engineers are working along these lines. There are some really good examples in this connection. A good example is the powerplant built in Munich by the Bayerische Motoren Werke for car assemblers. This firm made a reputation during the war on aviation engines, and since then has specialized on automobile engines. Its latest type is designated a compound motor and has cylinders and base chamber in one aluminum casting, steel liners for the cylinders, a detachable cast iron head, and four valves per cylinder inclined in the head. This being a sporting type engine, double ignition is fitted, with two magnetos driven off a cross shaft at the front. As the illustration shows, very clean lines have been obtained. A reserve oil tank is cast in the housing around the flywheel. This engine being a high efficiency type, 95 by 170 mm., with five bearing balanced crankshaft, it is intended to put it on the market with a two-speed transmission.

Horch, although exhibiting two L-head types with cast iron cylinders on an aluminum crankcase, having unit transmission, has two new all-aluminum engines ready, one with four and the other with six cylinders. These are steel lined cylinders with overhead camshaft and concealed vertical drive. Swave is another case of all-aluminum unit construction, with a detachable cast iron head and inclined valves in the head, the general lines of which can be gathered from the illustrations.

N. A. G. has a cheaper production job with detachable head, cast iron cylinders on an aluminum base chamber, and overhead valves with push rods concealed in the cylinder casting. The design is not costly and the general layout equal to that of the best to be found elsewhere. One of the features of this chassis is the direct mounting of the separate gearbox on a stiffened mud pan, instead of on the main or sub-frame. All-aluminum engines have even made their appearance for trucks, the best example being the Hille, produced in Dresden. This has aluminum cast cylinders with detachable cast iron head and overhead valves. Generator-battery ignition has not made its presence felt in Germany for, with the exception of the Dinos, controlled by Hugo Stinnes, and one or two others, the magneto is used everywhere. The reason for this is that Bosch dominates the German automobile industry, and so long as that firm adheres to the magneto, automobile manufacturers will doubtless follow suit. Bosch has produced a combined generator and magneto, but this is not a generator-battery ignition as exemplified in the Delco, but a combination of the two units which facilitates mounting. A German branch of the Delco exists, but no car was seen in Germany with Delco equipment.

#### Body Design

The open body dominates in Germany, with the sedan following a long way in the rear. German body designers have developed distinctively Teutonic lines. Invariably radiators are pointed, body sides are hollow, the stern generally is brought to a point, and the folding top is always concealed. All bodies are bright colored. Very frequently the top of the hood and a deep line running round the body and taking in the top housing is in a dark color with the rest of the body in a lighter tint of the same



color. There are infinite variations on these general lines, but there are no exceptions to this general type. There is a great love for beaten metal radiator shells and even engine hoods, many of these imitating beaten bronze. Fantastic designs in paneling are very common, and it would almost seem as if the body designers had sought to make automobiles which would attract attention by reason of their eccentricity. As an example there is an all-aluminum body with etched designs on it. In itself the typical German line is not displeasing, but when it is accentuated by strong contrast in panels, by abrupt angles in the fenders, and by startling colors, the result is often hideous—at any rate to any one trained to body lines as developed in all other countries of the world.

For passenger cars only clincher bead fabric tires are used. The Continental detachable rim is very extensively used, being seen more often than the detachable wheel. Steel disk wheels are not much in favor, but the steel spoke wheel is growing in popularity. Aluminum disk wheels have appeared, but are not yet employed to any great extent.

By reason of American participation in the Continental Rubber Company, giant straight side cord tires have made their appearance on the German market, and are being used for trucks and passenger-carrying sight-seeing automobiles. This is an important development for Germany, which during the war was totally deprived of rubber and a year ago had not seen a giant pneumatic tire or had any experience with straight side tires. The new tire is being used on three to five-ton trucks, both as singles and as duals. The combinations most generally seen were 40 by 8 in. dual on four and five-ton trucks and 42 by 9 in. single on three-ton trucks and sight-seeing automobiles.

### Truck Industry

The German truck industry has been left free to develop on commercial lines since the war, for the army subsidy, with the military restrictions which were formerly imposed, has been abolished. As a consequence considerable improvements have been made in design, and in particular an effort has been made to reduce weight. For truck engines there is a very extensive use of overhead valves, with the camshaft in the base chamber, and with or without detachable head. The most popular type of final drive is double reduction.

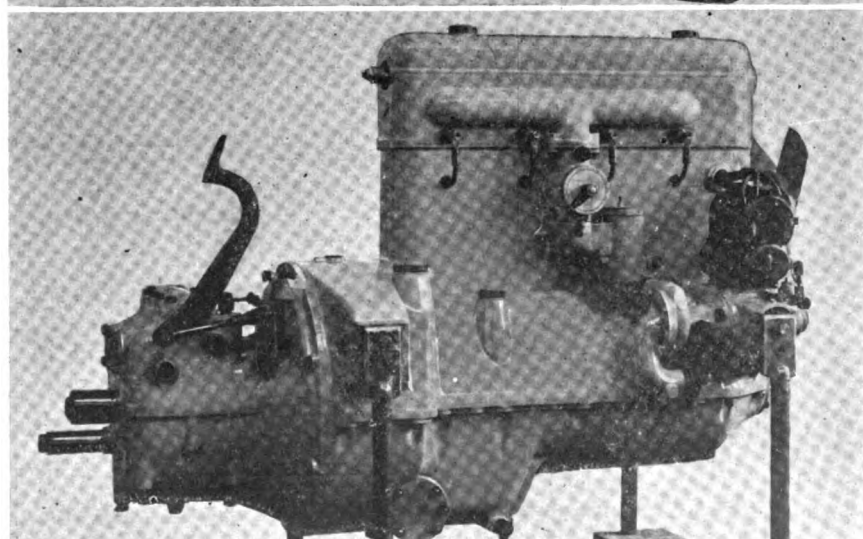
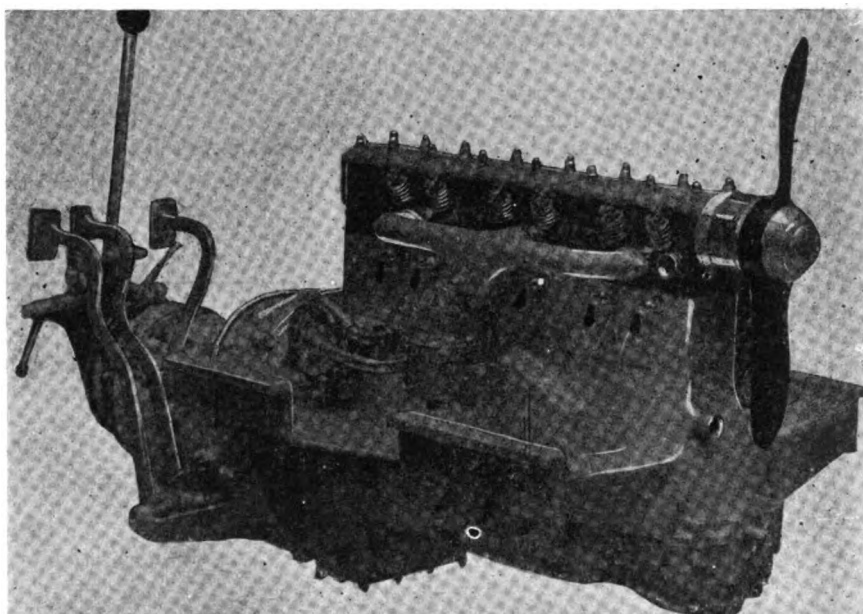
There was nothing in the German show to indicate that agricultural tractors have been adopted. It is known that Mercedes and Benz have produced this type of machine, but without any great amount of success. Speaking generally, the tractor has still to be developed in Germany.

Germany's speedway is jointly owned by the German Association of Automobile Manufacturers and the German (formerly the Imperial) Automobile Club. Its construction was begun in 1913, but all work was stopped during the war, and it was only by an effort that the track was finished in time for the first races to be held on the day the German automobile show opened.

The track has a very choice location at Grunewald, on the western end of the city of Berlin, about six or seven miles from the heart of the city, and is conveniently

reached by subway, railway and surface cars. The main entrance to the track is but a short distance from the Kaiserdamm Exhibition Hall, belonging to the German Association of Automobile Manufacturers. By reason of its location it should be an easy matter to make this track a paying proposition.

The speedway consists of two parallel tracks, with a loop at each end, running in a dead straight line through Government-owned forest land. The length of the track is 12.4 miles. On the straightaway the average width of the tracks is 33 feet, this width being increased to 70 feet on the loops. The space between the two tracks is about 25 feet. Banking on the loops is very slight, and the outer protecting wall is quite insufficient to arrest a car which has got out of control. On the straightaways there are no safety zones, and the trees which line the track constitute an additional danger in case of a burst tire or breakage of the steering gear. In its present condition the track is neither safe nor of such a nature that records can be broken on it. On the first practice day a car went over the top of the banking and during the first day's racing there were accidents of a minor nature. Material used for the surface is tar macadam. This doubtless will be satisfactory on the straightaway, but it will not stand up on the loops.



Above—The Swave aluminum overhead valve engine, a good example of modern German construction. Below—The all aluminum four-valve B. M. W. unit powerplant resembles some American powerplants in external appearance

# Longer Wheelbase and Larger Engine in New Haynes

New model "75" has 132 in. wheelbase and 299 cu. in. engine with block-cast cylinders, inclined valves, chain distribution, three-piece separate head, aluminum crankcase and hollow shaft lubrication. Pump circulates water through radiator when thermostatic valve is closed.

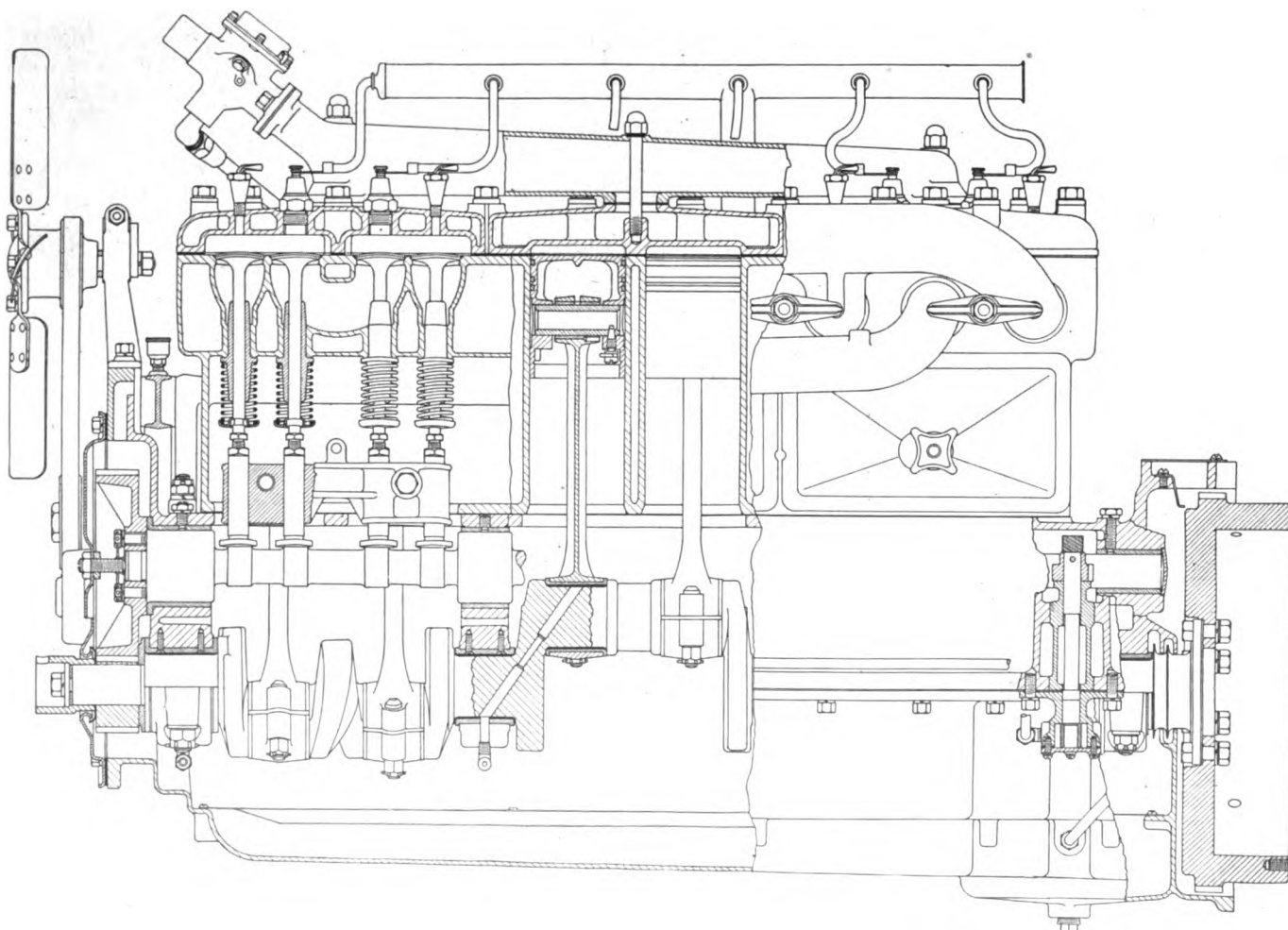
By J. Edward Schipper

**T**HE 1922 Haynes is a newly designed car with a 132-in. wheelbase and incorporates an entirely new and more powerful engine than any of the preceding sixes. It is known as model 75. The smaller six, known as the "55," with 121-in. wheelbase, is continued.

Production is just starting on the new model, including the new engine with which it is equipped. The Haynes factory manufactures a very high percentage of its own parts. It has its own forge shop and extensive machine shop equipment so that the new engine, as well as the majority of parts which enter the car, are

produced in the one plant. The "75" chassis is a refinement of the larger type which Haynes put out last year equipped with the same engine which is now in the "55."

The new powerplant is an L-head, six-cylinder type, developing 75 b. hp. at 2600 r.p.m. It is of conventional L-head construction incorporating all of the features which characterize the later units of this type, such as inclined valves, extreme rigidity in crankshaft and crankcase construction and accessibility, particularly in the valve mechanism. One of the new features is an installation of the Link-Belt chain drive at the front



Lateral sectional view of the new Haynes  $3\frac{1}{2} \times 5\frac{1}{8}$  in., six-cylinder engine.

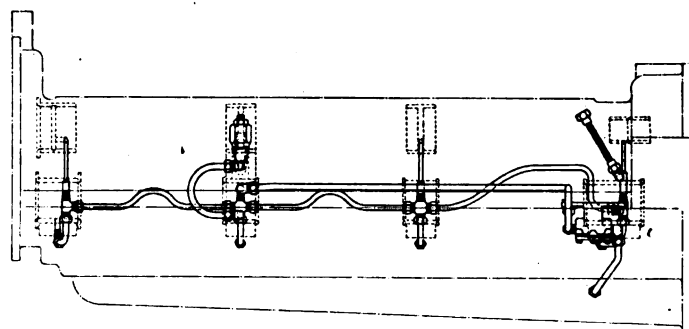
end with the new automatic spring take-up recently brought out by this concern in connection with a double-sided chain having sprocket contact on both sides.

### How Operated

The engine is block-cast with  $3\frac{1}{2}$  by  $5\frac{3}{16}$ -in. cylinders, giving a displacement of 299 cu. in. The bore of the new engine is the same as that used in model 47, but the stroke is  $\frac{3}{16}$  longer. The valves, which were formerly on the right, are now on the left side of the block and are inclined at an angle of 4 deg. toward the center of the cylinder. This results in a combustion chamber shape which can be readily machined out. The cylinders and water jacket are cast in one piece and the head is detachable. The head is made in three sections to allow for expansion without warping. In machining the cylinder heads, they are located from the inner surface so that the clearance in all cylinders is the same, giving uniformity in compression pressure.

The crankcase is an aluminum casting. The lower half of the case, or oil pan, is also an aluminum casting instead of the conventional stamping. The main bearings are supported in the crankcase, and six through bolts from the bearing caps pass through the case to the cylinder block, thus tying the units together and relieving the case of certain stresses which would otherwise be imposed.

The cast iron pistons are  $4\frac{1}{2}$  in. in length and have three rings all located above the piston pin. The piston pin is  $1\frac{1}{8}$  in. in diameter and is clamped in the piston boss by a tapered lock screw which is threaded into the bottom of the boss and is held in place by a steel locking spring which replaces the cotter pin ordinarily used for this purpose. The bearing is in the upper end of the rod, which carries a bronze bushing. The piston is



Plan view of oil piping used in the new Haynes

grooved below the bottom ring and is drilled around the periphery with twenty  $\frac{5}{32}$  in. holes. There are two grooves at the bottom of the skirt which act as oil scrapers.

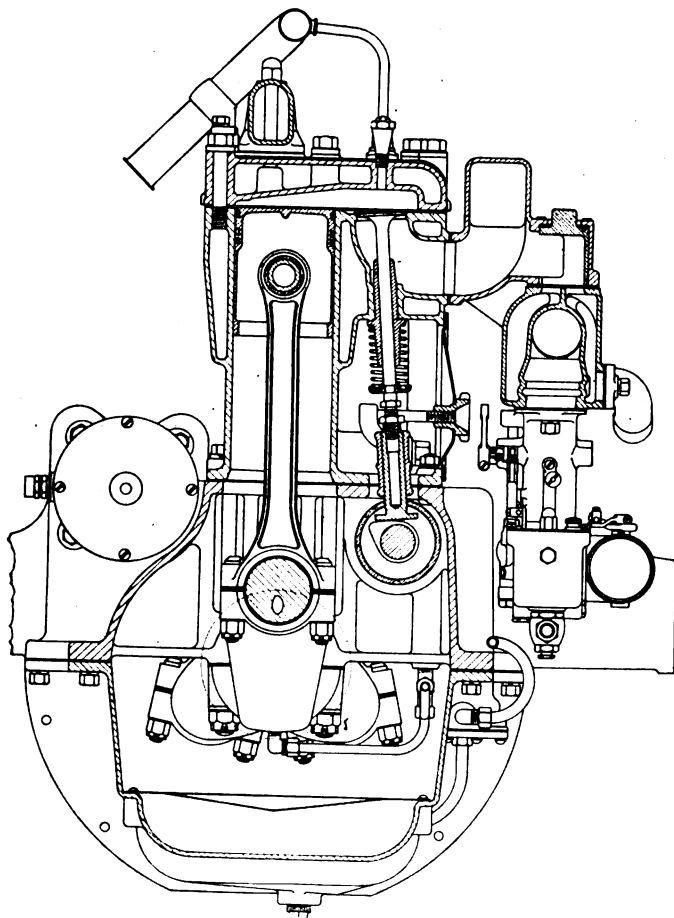
The connecting rods are of H-section flared at the lower ends. They are 11 in. in length, center to center. The big end bearings are  $2\frac{1}{4}$  in. diameter by  $2\frac{1}{4}$  in. in length. The crankshaft is carried in four bearings. It has a nominal diameter of  $2\frac{1}{4}$  in. The lengths of the four crankshaft bearings from front to rear are,  $2\frac{1}{4}$ ,  $2\frac{1}{4}$  and  $3\frac{1}{4}$  in.

The front end drive is a triangular layout with the addition of the spring tension idler, which is placed against the back of the chain. Some of the links in the Link-Belt liner type chain are reversed to engage with this idler sprocket. The entire auxiliary drive is taken off the timing chain. The auxiliary shaft carries the fan pulley at the front end forward of the timing chain case and the water pump and generator, which incorporates the distributor, at its rear end on the other side of the timing chain case. The oil pump is driven from the camshaft. Flexibility in the drive between the water pump and the generator is secured by the insertion of a three-disk flexible coupling. By placing the distributor on the rear end of the generator, near the center of length of the engine, it is possible to minimize the length of high tension wires from distributor to plugs.

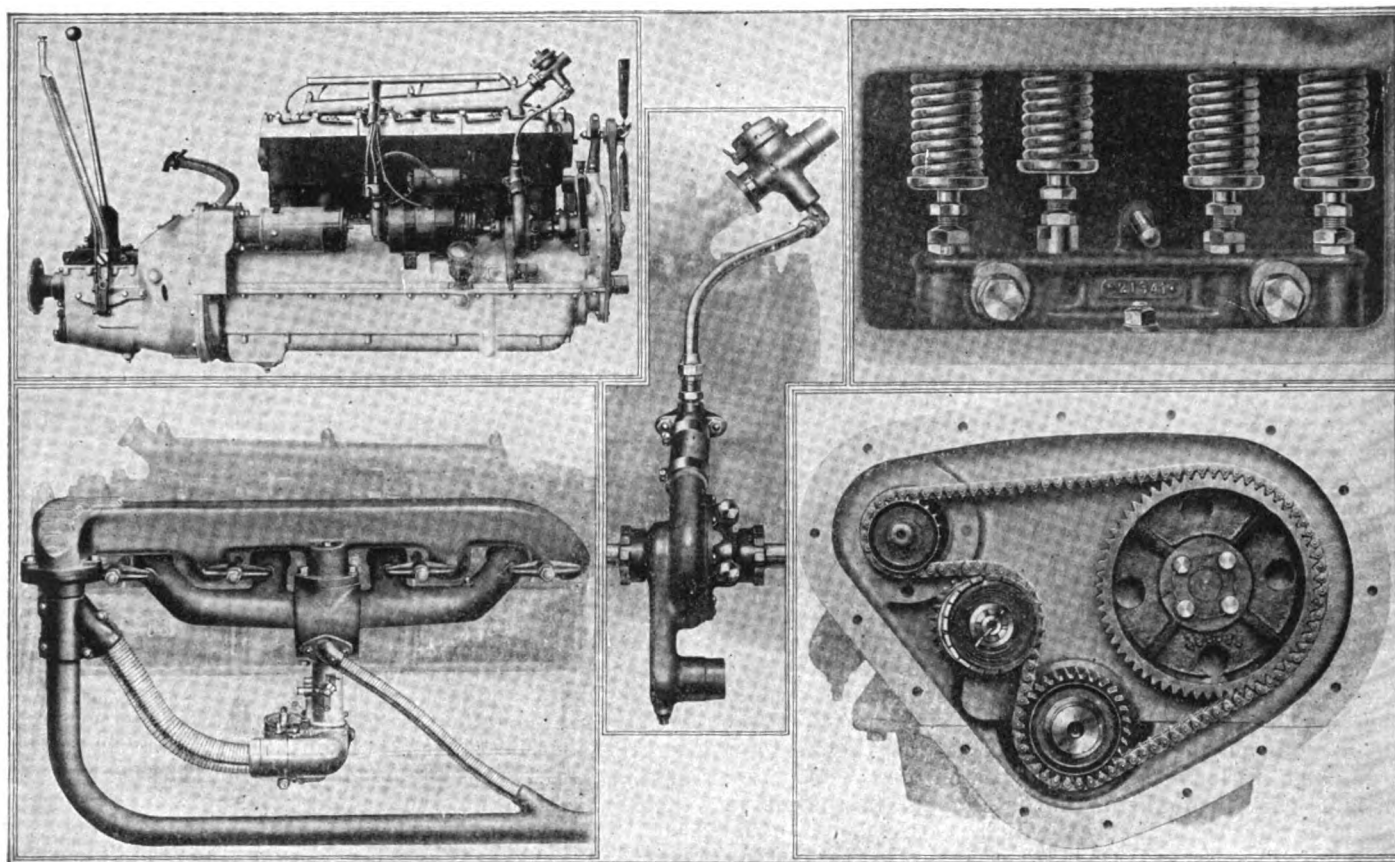
The valve followers are mushroom type and these, together with the tappet guides, are mounted in assemblies of four, held in position by two cap screws and pilot tubes for proper alignment. This gives an accessible layout for, by removing the cap screws, the entire assembly can be lifted from the engine. The engine fires 1-4-2-6-3-5, and the valve timing is such that the exhaust opens 50 deg. before lower center and closes 6 deg. after upper center. The intake opens at 8 deg. after upper center and closes 44 deg. after lower center.

The camshaft is carried in four bearings. The valves are  $1\frac{3}{4}$  in. clear diameter and have  $\frac{11}{32}$ -in. lift. The exhaust valves are tulip-shape and of different composition than the intake valves, being made of an alloy which has greater heat resisting characteristics.

A pressure feed lubricating system with a maximum of 40 lb. per sq. in. pressure is used. At a running speed of 25 miles per hr. the pressure on the oil varies from 20 to 25 lb. The oil is circulated by a gear pump driven through a short vertical shaft from the rear end of the camshaft. The pump is mounted outside and on the bottom of the upper half of the crankcase. The lower pan has an external recess into which the oil pump is set. It can be removed without disturbing any of the other parts of the engine. It delivers into the main oil line inside the crankcase and leads, from this line, conduct the oil under pressure to the camshaft bearings and to an annular groove in each of the crankshaft



Transverse sectional view of new Haynes engine, showing inclined valves



The new Haynes six, showing details of the vaporizing system, water pump and thermostat, valve tappet assembly and chain distribution with spiral-spring-controlled idler sprocket

main bearings. The crankshaft is drilled from each main bearing to the adjacent crankpin, the holes lining up with the oil groove, so that the connecting rod bearings are also pressure oiled.

There is a lead from the front crankshaft bearing to the timing chain idler sprocket and to the accessory shaft bearing. The idler sprocket shaft is hollow, and the oil works its way through the shaft to the sprocket, and through a hole in the sprocket on to the chain. A relief valve is fitted to prevent excess pressure at high speeds. The pistons, piston pins and valve mechanism are lubricated by oil spray thrown from the connecting rods.

The fuel is fed by vacuum from a gasoline tank, mounted on the rear of the chain to a  $1\frac{1}{8}$ -in. vertical Stromberg carbureter. A number of innovations have been made in the manifolding to facilitate vaporization of the fuel. The exhaust manifold is led forward on this powerplant and cooling fins placed upon it at its forward end, where it bends downward. The center of the intake manifold is partially exhaust jacketed. Some of the exhaust gas passes through this jacket and enters the exhaust pipe at a point near the rear end of the engine. A damper, by means of which can be controlled, is provided the amount of exhaust gases which enter this jacket. In addition, all of the air which enters the carbureter is pre-heated by means of a stove clamped around the exhaust pipe at a point just below its connection with the manifold. There is a sleeve adjustment on this air intake which permits of admitting cold air at this point when desired.

The electrical equipment comprises a Leece-Neville generator and starter with a Kingston distributor for ignition and a Bendix gear for flywheel engagement. The starter is controlled by a magnetically operated switch which is controlled by contacts on the ignition

switch lever. Both the generator and starting motor are located on the right side of the engine away from the steering gear. The carbureter and manifolding are on the left side of the engine.

A Rayfield thermostatic control is employed on the water circulation which is by centrifugal pump. The thermostat is mounted on the water outlet above the cylinder block. The thermostat is so arranged that it permits circulation through the entire system at 140 to 150 deg. Fahr. When the engine is cold the water is circulated through the radiator and as it warms up only enough water is by-passed through the jacket to keep the engine at the desired working temperature. This differs from the practice of circulating the water through the jacket and leaving it stationary in the radiator, which is apt to cause freezing in cold weather. In this system, some thermo-syphon circulation takes place around the cylinder block before the radiator comes into action.

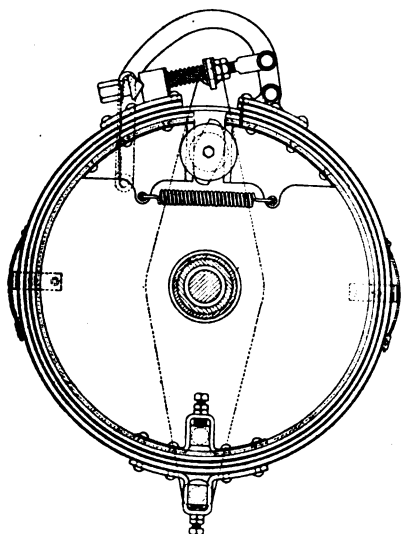
A 12-in. Borg & Beck clutch transmits the power to a three-speed selective gearbox manufactured at the Haynes plant. The gearbox is of conventional construction, but incorporates an air pump for the tires. The mounting of the shifter lever is so arranged that a coil spring forces a compressed felt packing against the bottom of the lever. This prevents any throwing of oil from the gearset up through the shifter lever joints into the driver's compartment.

The drive to the three-quarter floating rear axle, which is also a Haynes product, is through two universal joints. The axle is mounted on Gurney ball bearings and is equipped with spiral bevel gears. The drive is through the springs, but torque and braking reaction is taken by a torque arm, which has been added in this model. The external and internal brake has also been adopted in place of the side-by-side internal brakes



formerly employed. The brakes are 16 in. in diameter by 2½ in. in width. The tires are 34 by 4½-in. cords all around. The front axle is a conventional Elliot type and steering is by Jacox gear.

All the body types are mounted on the same 132-in. wheelbase chassis. The bodies are all made of aluminum

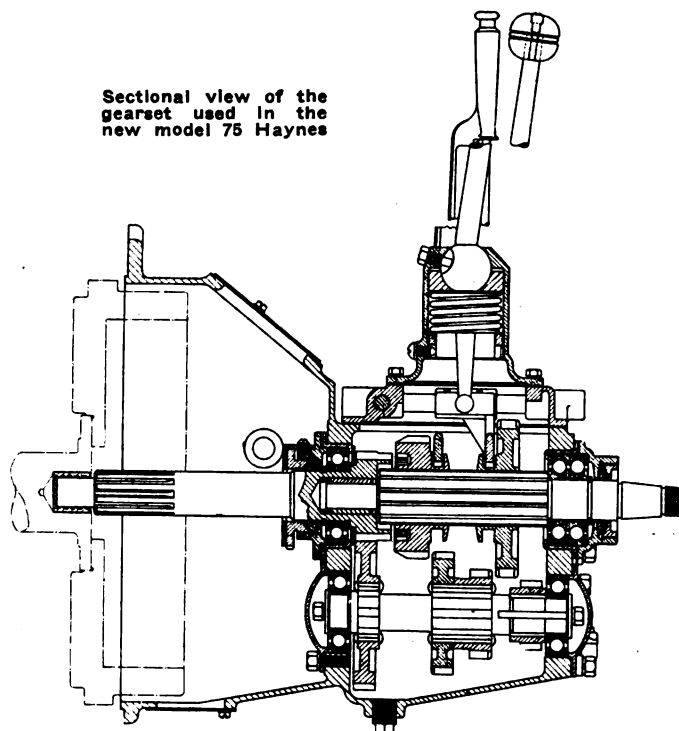


The new external and internal brakes, which take the place of the pair of internal, side-by-side brakes formerly used

formed over a wooden frame. The lamp equipment comprises exterior side cowl lights of a design identical with that of the headlamps. A feature in the control system is that the starting and lighting is operated from the instrument board.

The touring car, "tourister" and "speedster" model, are upholstered in genuine leather applied in front plaits over the seat springs. The brougham, sedan and

Sectional view of the gearset used in the new model 75 Haynes



suburban models are equipped with mahogany fittings, vanity cases, smoking cases, etc. There is an indirect dome light and a car heater on the closed cars. Prices on the model 75 are as follows: Seven passenger touring, \$2485; four-passenger "tourister," \$2485; two-passenger special "speedster," \$2685; five-passenger brougham, \$3185; seven-passenger sedan, \$3485; seven-passenger "suburban," \$3485.

## From Passenger Coach to Truck

**A** FEATURE of the summer touring season in England and Scotland has been the big extension of public automobile coach services. Until a few weeks since these services had the summer touring season much to themselves, for their fares relatively were lower than the normal rail fares and the public were able to explore scenic beauties away from the railroad tracks. The competition had the effect of forcing down rail fares and leveling up competition, until now there is evidence of a shrinkage in the paying capacity of a number of auto-coach ventures.

This fact, coupled with the approaching end of the tourist season, has led the coach interests to devise means and routes to find work for the vehicles as carriers of goods. But again there are signs that the railroad interests are likely to reduce rates, even to the extent of starting a cut-rate war. Such a war is less likely to succeed now because, within a short time, British railroads will be working on the group system, as a measure of economy imposed by the Government through the Ministry of Transport. It follows that if the railroads cannot cut rates among themselves to compete for local traffic when the localities are served by two or more rival companies, they are unlikely to cut rates against automobile traffic to the limit possible if each company were fighting its own battle against all comers. What is more likely, however, is that the railroads themselves will start automobile service ostensibly for collecting and delivering rail borne traffic, the cost being included in a through terminal rate. At present much commercial vehicle traffic is really rail consigned.

However, the interests concerned are alive to the situation and scores of automobiles are being prepared for a

winter's use as merchandise carriers. The tactics of the railroad interests also are being adopted as regards organization and co-operation, through rates and standard changes and clearing house facilities, which include provision for insuring full or at least a paying return journey. Altogether things look like being lively in traffic affairs during the next few months, provided there is an improvement in trade. It may be added that the trend toward using smaller capacity and air-tired coaches offers a better prospect for the automobile carriers than would have been the case last year.

## New York Electrical Show

**T**HE New York Electrical Show, which closed Oct. 8, had on display a number of electric trucks, and the manufacturers exhibiting them reported gratifying results. There was not an enormous number of sales made at the show, but the various exhibitors said they had entertained many prospective buyers and felt that the results would be felt in due time. The Walter Motor Truck Corporation of New York made the largest number of sales during the show, disposing of twelve trucks. The locking differential and other new features attracted buyers who said they were users of the gasoline truck but were anxious to give the electrics a trial.

The Commercial Truck Co. of Philadelphia made two sales, and the Landsden Co. of Danbury, Conn., made one.

Next year's exhibit will be held in the Grand Central Palace, it was announced.



# The Testing of Motor Fuels

## Part II\*

In Part I of this manual the need for careful tests of motor fuel and interpretation of results of tests were covered. Part II describes in detail the apparatus required and the methods to be followed in the tests.

### 1—Specific Gravity

**T**HE apparatus for determining the gravity of gasoline may be a Westphal balance (Fig. 7) or an accurate hydrometer of the long stem type (Fig. 10) graduated from 0.700 to 0.800 at 60 deg. Fahr. (15.5 deg. C.). If benzol mixtures are met with, a hydrometer having a scale graduated from 0.800 to 0.900 is also necessary.

Care should be taken that the gravity determination is made at 60 deg. Fahr. (15.5 deg. C.).

### 2—Distillation Range\*\*

The equipment required consists of the layout shown in Fig. 8 made up of

Standard 100 cc. Engler Flask for oil distillation made of Pyrex glass to dimensions given in Fig. 9.

Suitable support with  $\frac{1}{8}$  in. to  $\frac{3}{16}$  in. thickness of asbestos 6 in. square having an opening  $1\frac{1}{4}$  in. in diameter. Only this limited portion of flask is to be heated. Wire gauze must not be used.

Thermometer of selected enamel backed tubing, as described below under Apparatus Specification.

Condenser. The dimensions and construction to conform to standards as described below under Apparatus Specification.

Graduate. 100 cc. glass graduated cylinder. See Apparatus Specification.

Source of heat may be a gas burner, alcohol lamp, or electric heater.

### Procedure and Details of Manipulation in Conduction of Distillation

1—The condenser trough is filled with water containing a liberal portion of cracked ice. The temperature should not be lower than 32 deg. Fahr. nor above 40 deg. Fahr. (0 deg.-5 deg. C.). The condenser tube is swabbed to remove any liquid remaining from a previous distillation.

2—One hundred c.c. of gasoline is measured, at a temperature of 60 deg. Fahr. (15.5 deg. C.) into a clean, dry Engler flask from a 100-c.c. graduate. The same graduate is used as a receiver for distillates without any drying. This procedure eliminates errors from an apparent distillation loss due to the impossibility of draining the gasoline entirely from the graduate.

3—The same graduate is placed under the lower end of the condenser tube so that the latter extends downward below the top of the graduate at least 1 inch. If the room temperature be above 80 deg. Fahr. (27 deg. C.), the receiving graduate shall be placed in a bath maintained at a temperature not less

than 65 deg. Fahr. (18 deg. C.) nor more than 75 deg. Fahr. (24 deg. C.). The condenser tube shall be so shaped and bent that the tip can touch the wall of the graduate on the side adjacent to the condenser box. This detail permits distillates to run down the side of the graduate and avoids disturbance of the meniscus caused by the falling of drops. The top of the graduate is covered, preferably by several thicknesses of filter paper or blotting paper, the condenser tube passing through a snugly fitting opening. This minimizes losses due to circulation of air through the graduate and also excludes any water that may run down the outside of the condenser tube on account of condensation on the ice-cooled condenser box.

4—A boiling stone, a piece of unglazed porcelain or other similar material not exceeding one-fourth inch in any dimension, is dropped into the gasoline in the Engler flask. The thermometer is equipped with a well-fitted cork and its bulb covered with a thin film of absorbent cotton (preferably the long-fibered variety used for surgical dressing). The quantity of cotton used shall be not less than 0.005 nor more than 0.010 gram (5 to 10 milligrams). The thermometer is fitted into the flask with the top of the bulb just below the lower level of the side neck opening. The flask is connected with the condenser tube by means of a well-fitted cork or stuffing box. The vapor tube must extend at least  $1\frac{1}{4}$  inches into the condenser tube.

5—Heat must be so applied that the first drop of the gasoline falls from the end of the condenser tube in not less than five nor more than ten minutes. The initial boiling point is the temperature shown by the thermometer when the first drop falls from the end of the condenser tube into the graduate. The amount of heat is then increased so that the distillation proceeds at a rate of from 4 c.c. to 5 c.c. per minute, which is approximately two drops a second. The graduate is moved occasionally in order to permit the operator to ascertain whether the speed of distillation is right as indicated by the rate at which the drops fall. The thermometer is read as each of the selected percentage marks is reached. The maximum boiling point or end point is determined by continuing the heating until the column of mercury reaches a maximum and then starts to recede consistently.

6—Distillation loss is determined as follows: The condenser tube is allowed to drain for at least five minutes after heat is shut off and then a final reading taken of the quantity of distillate collected in the receiving graduate. The distillation flask is removed from the condenser and thoroughly cooled as soon as it can be handled. The condensed residue is poured into a small graduate or graduated test tube and its volume noted. The sum of this volume and the volume collected in the receiving graduate subtracted from 100 c.c. gives the figure for distillation loss.

### 3—Acidity†

The cooled residue from the distillation flask is collected in a test tube and its volume noted. Three volumes of distilled water are then added and the tube is shaken thoroughly. The mixture is allowed to separate and the aqueous layer is removed to a clean test tube by means of a pipette and one drop of a 1 per cent solution of methyl orange in distilled water is added. No pink or red color should be formed.

\*This manual was prepared by the General Motors Research Corporation and edited by T. A. Boyd of the Fuel Section of that organization.

\*\*The apparatus specified and the procedure to be followed in this test is adapted from "Report of Committee on Standardization of Petroleum Specifications." Bulletin 5 of the U. S. Bureau of Mines.

†Method recommended by Committee on Standardization of Petroleum Specifications.

#### 4—Percentage of Unsaturation

The most convenient form of apparatus for use in this test and one which gives sufficient accuracy for commercial work is the ordinary 10 cc. graduated cylinder with ground glass stopper (Fig. 12).

Exactly 5 c.c. of the gasoline is put into the graduated cylinder by adjusting the level so that the bottom of the meniscus is just even with the 5 c.c. mark after the gasoline has been well shaken in the cylinder with the stopper closed and has been allowed to come to rest.

The cylinder and gasoline should then be thoroughly cooled in ice water; after which slightly less than 5 c.c. of sulphuric acid (specific gravity 1.84) is poured into it, care being taken that the acid does not splash onto the surface of the gasoline but runs quietly down the side of the cylinder. After securely replacing the stopper and thoroughly cooling the graduate and contents in ice water, the acid should be brought into more intimate contact with the gasoline, first, by rotating the graduate in a nearly horizontal position. If no appreciable heat develops in this way, the acid may then be thoroughly mixed with the gasoline by a vigorous endwise shaking. This shaking should be continued intermittently for several minutes and between the periods of agitation the graduate should be cooled in ice water to prevent loss of gasoline. After allowing the cylinder to stand for several hours, preferably over night, the absorption is read directly.

#### 5—Content of Gummy Materials (Corrosion Test)

A freshly polished hemispherical dish of spun copper, approximately 3½ in. in diameter is required.

Pour into the dish 100 c.c. of the gasoline to be examined, and place the dish in an opening of an actively boiling steam bath so that the steam comes in contact with the outer surface of the dish up to the level of the gasoline. If a steam bath is not available a 500 or 600 c.c. glass beaker half filled with water will serve the purpose. The water should, of course, not be heated with an open flame, because of the danger of fire from the vaporized gasoline, but either an open steam line or an electric hot plate should be used. Allow the dish to remain on the steam bath until all volatile portions have disappeared. Then note—

1—Whether there is a visible amount of gum deposited in the dish. The weight of this gum may be determined if the empty dish has been accurately weighed at the beginning of the test. The dish should be cooled and thoroughly dried before it is weighed.

2—Whether the bottom of the dish is colored gray or black.

#### 6—Content of Aromatic. Hydrocarbons (Benzol, Etc.)

**Detection of Presence in a Gasoline:** The presence of benzol in a gasoline can usually be determined from the relation between its specific gravity and distillation data, as outlined under the corresponding heads in Interpretation of Results given in Part I. The following method is given for the determination of the amount of benzol in a fuel.

**Determination of the amount of aromatics present—**The method which is given here for the quantitative determination of benzol and similar hydrocarbons in gasoline has been worked out at the General Motors Laboratory. It is based on the reaction between nitric acid and aromatic hydrocarbons to form nitrobenzene (oil of mirbane), nitrotoluene, etc. The nitrating mixture has no action on the paraffin or naphthene hydrocarbons in the cold. The method is fairly rapid and is sufficiently accurate for commercial work. Because of the nature of this process it should not be attempted by anyone unless he has had some experience with chemical reactions. This is because of the very strong and highly corrosive mixture of acids which it is necessary to use, and because the rate of the reaction must be controlled in order to prevent the danger resulting from the development of too much heat.

**Apparatus—**Westphal balance, or accurate hydrometer as above (Figs. 7 and 10); 500 c.c. round bottom flask with long neck (Fig. 14); 500 c.c. separatory funnel with ground glass

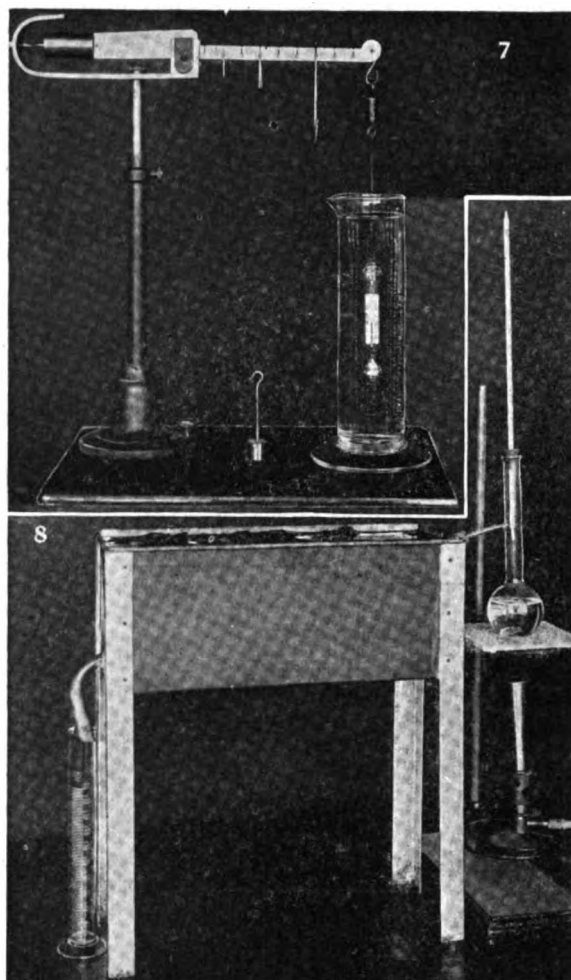


Fig. 7—Above: The Westphal Balance used for accurate determination of specific gravity. Fig. 8—Below: Standard Engler distillation apparatus, showing arrangement of flask, condenser, etc.

stopper (Fig. 15); glass filter funnel, about 2 in. in diameter.

**Reagents—**A nitrating mixture composed of acids in the ratio of

150 g. sulphuric acid (sp. gr. 1.84)

100 g. nitric acid (sp. gr. 1.42)

Solution of sodium hydroxide (30 per cent sodium hydroxide in distilled water)

Fused calcium chloride.

**Method—1—**Determine accurately the specific gravity of the fuel at 60 deg. Fahr. If the percentage of unsaturated hydrocarbons as previously determined exceeds 5, the fuel should be cooled in ice water and thoroughly washed with sulphuric acid (sp. gr. 1.84), the acid completely removed by washing with water, with a dilute solution of sodium hydroxide, and with water again, and the resulting gasoline dried with fused calcium chloride before the specific gravity is determined.

**2—**Place about 200 c.c. of the fuel in a 500-c.c. round bottom flask with a long neck. If the percentage of benzol in the blend is over 50, as indicated by its specific gravity and distillation data, it should be diluted with a measured amount of gasoline which is known to contain practically no aromatics and which has previously been thoroughly washed in the cold with sulphuric acid (sp. gr. 1.84) so that the final percentage of benzol is from 30 to 40. The specific gravity of this mixture should be determined and the value used in the calculation of the percentage of benzol in the original fuel as given below. After thoroughly cooling the flask and contents in ice water about 50 c.c. of the nitrating mixture is added to it, being careful to add it in such a way that it does not splash onto the surface of the fuel, but runs down the side of the flask. The flask is closed by a rubber stopper into which is inserted a piece of capillary or small bore glass tubing which extends about a foot above the stopper. After the flask with

its contents has been again cooled in ice water, it is removed and the fuel and nitrating mixture are mixed by a gently endwise shaking. A large amount of heat is generated by the reaction which is thus induced, and care must be taken that the temperature of the nitrating mixture does not rise above 40 deg. C. (104 deg. Fahr.). The temperature of the reacting mixture must be kept low by means of the cooling bath, both to prevent loss of the low boiling constituents of the gasoline and to prevent the reaction between the nitric acid and the benzol from accelerating to a dangerous velocity.

As soon as this portion of nitrating mixture loses its strength, which it does after three or four alternate periods of agitation and cooling, the contents of the flask is removed to a separatory funnel and the acid separated from it. The gasoline layer is then returned to the flask, another portion of nitrating mixture is added to it, and the operation as just described is repeated. After this has been done a few times, three layers will form in the separatory funnel, only the upper of which is retained. The middle layer is a solution of nitrated benzene in gasoline, and the gasoline can be separated from it only with difficulty. In order to prevent this layer from containing so much of the gasoline that an insufficient amount is recovered in the upper layer the percentage of aromatics in a fuel to be examined by nitration must be kept below 50, by dilution with gasoline if necessary, as described above. When an intermediate layer no longer forms and the nitrating mixture after thorough agitation with the fuel remains colorless or assumes only a faint yellow color, the nitration may be assumed to be complete.

The nitrating mixture is separated and the gasoline layer is washed several times with sulphuric acid (sp. gr. 1.84). This washing is best conducted in a separatory funnel by agitating the gasoline with several successive small portions of sulphuric acid, separating the acid after each wash, and continuing the operation until the acid layer becomes only very slightly yellow. After washing once with water the gasoline is washed with small portions of a 30 per cent solution of sodium hydroxide until a yellow color is no longer imparted to the sodium hydroxide solution. Finally the gasoline is washed two or three times with water, and dried by filtering through a small amount of fused calcium chloride placed in a filter paper.

3—The specific gravity of the gasoline so obtained is accurately taken at 60 deg. Fahr. (15.5 deg. C.).

4—The percentage of aromatic hydrocarbons present in the original fuel is calculated as follows: (An increase in volume occurs when aromatic and paraffin hydrocarbons are mixed. However, it is not large enough to seriously affect the accuracy of this method from a commercial standpoint.)

0.879 (sp. gr. motor benzol)—Sp. gr. gasoline after nitration = A

Sp. gr. of fuel under analysis (see note)—Sp. gr. of gasoline after nitration = B

$B \times 100 = \text{percentage of aromatics (benzol)}$

**Note:** If the percentage of unsaturation of the fuel exceeds five, and it has been washed with sulphuric acid before nitration, as is recommended above, the specific gravity used here should be that of the fuel after the sulphuric acid treatment. (See above.)

Thus, if  
Specific gravity of fuel under analysis is 0.789  
Specific gravity of gasoline after nitration is 0.740  
 $0.879 - 0.740 = 0.139$   
 $0.789 - 0.740 = 0.049$

$\frac{49}{139} \times 100 = 35 \text{ per cent benzol}$

## 7—Purity of a Fuel As To Its Content of Paraffin Hydrocarbons

This test\* is conducted as described below, using the fuel after the unsaturated and aromatic hydrocarbons have been removed by nitration and washing as de-

scribed under the head, Methods for Determining the Content of Aromatic Hydrocarbons.

**Apparatus**—Thermometer with scale graduated by tenths of a degree from 0 deg. to 100 deg. C.

Test tube (6 in. x 1/2 in.).

150-c.c. glass beaker.

2 one cubic centimeter pipettes graduated to tenths of a cubic centimeter.

Flask and separatory funnel as given above under the head Methods for Determining Aromatics.

**Reagents**—Nitrating mixture composed of acids in ratio of 100 grams sulphuric acid (sp. gr. 1.84).

30 grams fuming nitric acid.

30 per cent solution of sodium hydroxide in water.

**Aniline.** The aniline should be freshly freed from water and decolorized by distilling from a larger quantity using direct heat, instead of steam for the distillation, and collecting the aniline for use as reagent while a thermometer in the vapor shows it to be distilling at about 183 deg. C. When exposed to light and air, aniline gradually darkens until it finally becomes black. Aniline light in color may be prepared from the dark material by distilling as described above.

**Method**—The fuel after nitration and washing for the determination of aromatic hydrocarbons as described above is treated at ordinary temperatures with two or three small portions of the nitrating mixture containing fuming nitric acid. It is then thoroughly washed with sulphuric acid, water, sodium hydroxide, water, and dried as described under Method for Determining Content of Aromatic Hydrocarbons. The fuel so obtained is used in this test.

An ordinary 6 in. x 1/2 in. test tube is fitted with a one-hole stopper and a thermometer so adjusted through the stopper that the bulb will be about 1/16 in. from the bottom of the test tube. From a 1-c.c. pipette, graduated to tenths of cubic centimeters, a sufficient amount of aniline is run into the test tube to cover one-half of the bulb of the thermometer.† An amount of the fuel under test equal to the amount of aniline used should then be added to the test tube. The total volume should be such that the bulb of the thermometer is completely covered. The stopper holding the thermometer is then put into the test tube and the whole placed in a beaker of clean distilled water over a gas flame, or on an electric hot plate.

The water should be stirred and heated slowly to such a temperature that the layers of aniline and fuel become completely miscible and perfectly clear. To aid in this the test tube should be frequently and gently shaken in an endwise direction. The beaker is then removed from the flame and the water stirred with the test tube using both a rotary and an endwise motion. As the water cools slowly a point will be reached at which a distinct and almost opaque cloudiness will appear in the test tube. At this point the temperature is quickly read to 0.1 degree accuracy, the tube being kept in the water all the time. An amount of gasoline equal to 1/5 of the original portion used is then added to the test tube and the determination of the dissolution temperature repeated as above. If the temperature at which the turbidity appears rises or falls more than 0.2 of a degree, the *critical range* has not been found. Aniline or gasoline is added to the mixture until the critical range is obtained. The highest dissolution temperature in this range is the Temperature of Critical Dissolution (T. C. D.) of aniline and the gasoline.

The highest temperature thus obtained (the T. C. D.) seldom varies more than 1 deg. C. from the Temperature of Dissolution (T. D.) of a 50 per cent aniline + 50 per cent gasoline solution. So that, unless a high degree of accuracy is desired, the work can be greatly facilitated by determining only the T. D. of a 50-50 aniline-gasoline solution, and using this value instead of the more accurate T. C. D.

If the T. C. D. of the gasoline is above its initial boiling point, as it usually is and as may be recognized by the gasoline in the tube beginning to boil before the solution of the aniline in it is affected, it is necessary to observe the following precautions:

1—A one-hole rubber stopper should be used for closing the test tube and holding the thermometer.

2—Care should be taken to heat the water to a temperature no higher than is necessary for the solution of the aniline in the gasoline.

\*The test described herein is based on the work of Chavanne, Simon and Dort, Comptes rendus, Vol. 168, pages 1111-4 (1919) and is supplemented with results of the experience of this Laboratory.

†The aniline pipette—which should be used only for aniline during the procedure—is conveniently kept through a hole made in the cork of the aniline bottle. In order to prevent contact of the aniline with air when not in use, the pipette itself should be stoppered with a small bit of cork.

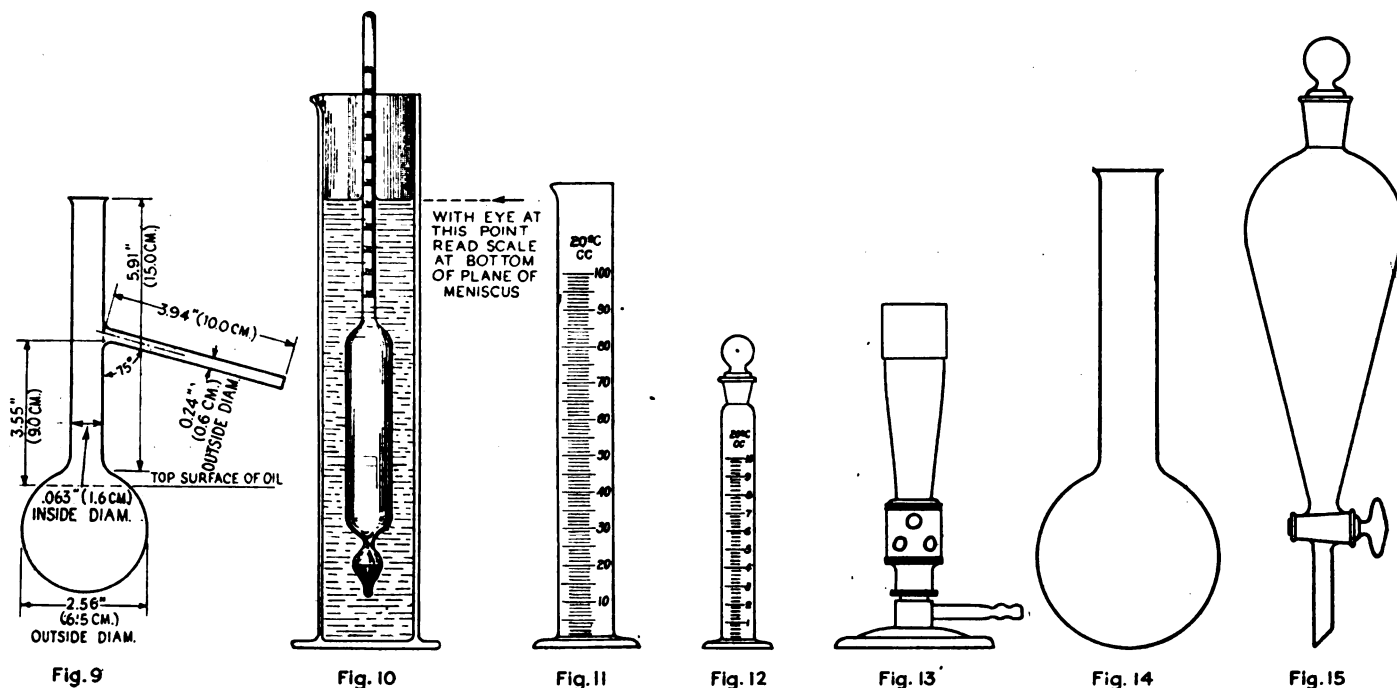


Fig. 9—Standard 100 c.c. Engler Flask. Fig. 10—Long stem hydrometer, showing method of reading. Fig. 11—100 c.c. graduate. Fig. 12—10 c.c. glass stoppered graduated cylinder. Fig. 13—Meker Burner. Fig. 14—500 c.c. round bottom flask. Fig. 15—500 c.c. separatory funnel

3—Before opening the tube for the addition of more of the constituents the test tube should be cooled under the tap in order to prevent loss of gasoline as vapor.

4—If the gasoline has a very low initial, such as might be given by a casinghead blend, and boils in the test tube, it is best to place the entire sample in a clean distilling flask and distill until the vapor coming off has a temperature of about 60 deg. C. (140 deg. Fahr.). The residue in the flask may then be used in the T. C. D. determination.

If a highly accurate value for the T. C. D. of a very volatile gasoline is desired, it is necessary to make the determination in sealed glass tubes. For this purpose aniline and gasoline in varying proportions around the critical range suspected are placed in small glass tubes sealed at one end and having a constriction in the other end. These tubes are placed in a freezing mixture and sealed off at the constriction. Each in turn is then secured to the thermometer by rubber bands and the T. C. D. determined as above, using gentle endwise shaking and vertical stirring of the heating bath.

A determination made on an untreated gasoline gave this result.

C.c. Aniline	C.c. Gasoline	Temperature of Dissolution, Deg. C.
1.0	1.0	42.7
1.0	1.2	42.0
1.4	1.2	43.0
1.6	1.2	43.0 T. C. D.
1.8	1.2	42.4

### 8—Content of Alcohol

Because of the very great solubility of alcohol in water and the fact that it will not dissolve in gasoline alone if water is present, the detection and determination of alcohol in gasoline or gasoline-benzol blends is simple.

A 10 cubic centimeter graduated and glass stoppered cylinder (Fig. 12) is required. The determination is made in the same way as the percentage of unsaturation in gasoline as described above, except that water is used instead of sulphuric acid and that cooling is unnecessary. The amount of alcohol is read directly by the decrease in the volume of the gasoline layer.

### Specifications of Apparatus

**Important**—In order to obtain test results that are comparable with other laboratories, it is necessary to

use apparatus of the correct design. The following specifications cover such apparatus, and are standard as the equipment used for testing gasoline.

**Westphal Balance**—Shown in Fig. 7. To be accurate to the fourth decimal.

**Hydrometer**—Fig. 10. To be of the long stem type. Scale to be graduated from 0.700 to 0.800 at 60 deg. Fahr. (15.5 deg. C.). For benzol mixtures, scale to be graduated from 0.800 to 0.900 at 60 deg. Fahr. (15.5 deg. C.).

**Engler Flask 100 cc.**—Fig. 9. The prescribed dimensions are considered essential to attaining uniformity of results.

Dimensions as follows:	Centimeters	Inches
Outside diameter of bulb...	6.5 + or — .10	2.56 + or — .04
Inside diameter of neck...	1.6 + or — .05	.63 + or — .02
Length of neck .....	15.0 + or — .20	5.91 + or — .08
Length of vapor tube.....	10.0 + or — .20	3.94 + or — .08
Outside diameter of vapor tube .....	.6 + or — .05	.24 + or — .02

Position of vapor tube 9 cm. (3.55 inches) above surface of the gasoline when flask contains its charge of 100 c.c. The tube is approximately in the middle of the neck and is set at an angle of 75 deg. from the perpendicular. For safety, gasoline should be distilled only in a flask made from "Pyrex" glass.

**Thermometer**—The thermometer shall be made of selected enamel-backed tubing, having a diameter between 5.5 and 7 mm. The bulb shall be of Jena normal or Corning normal glass; its diameter shall be less than that of the stem and its length between 10 and 15 mm. The range shall cover 0 deg. C. (32 deg. Fahr.) to 270 deg. C. (518 deg. Fahr.) with the length of the graduated portion between the limits of 210 to 250 mm. The point marking a temperature of 35 deg. C. (95 deg. Fahr.) shall not be less than 110 mm. nor more than 135 mm. from the bottom of the bulb.

When the thermometer is made according to the Centigrade scale it shall be graduated in 1 deg. intervals. Each tenth degree shall be numbered and each fifth degree shall be distinguished by a longer mark. When made according to the Fahrenheit scale, it shall be graduated in 2 degree intervals, each

## List of Apparatus and Reagents Required for Testing Gasoline

	Approximate Cost		Approximate Cost
1 Electric heater for gasoline distillation .....	\$19.25	2 500-c.c. separatory funnels with glass stoppers..	3.76
1 Westphal balance .....	29.70	2 2-in. filter funnels .....	.44
2 Standard Engler distillation flasks .....	1.32	1 pkg. (100 sheets) 4-in. filter paper .....	.20
1 Standard condenser for distilling petroleum oils.	31.90	144 Corks for assembling distillation apparatus...	1.50
2 Gasoline thermometers .....	11.00	1 set cork borers .....	1.25
1 Thermometer, 0-100 deg. C. by tenths.....	7.15	1 pkg. cotton for thermometer bulbs .....	.15
2 100-c.c. graduates .....	.89	9 lb. sulphuric acid .....	1.87
1 Meker burner .....	2.64	8 lb. nitrating mixture, made with 1.42 nitric acid.	1.90
1 Burner connection, flexible metallic .....	.30	4 lb. nitrating mixture, made with fuming nitric	
1 Ring stand, 5-in. ring, and 5-in. table ring.....	1.76	acid .....	1.40
1 Burette clamp .....	.44	2 liters 30 per cent solution sodium hydroxide....	1.08
6 Test tubes, 6 in. x ½ in.....	.66	1 lb. fused calcium chloride .....	.80
2 1-c.c. pipettes, graduated by tenths .....	.46	1 lb. Aniline .....	.55
4 10-c.c. glass stoppered graduated cylinders.....	2.55	200 c.c. 1 per cent solution of methyl orange.....	.28
2 Pans for ice water baths .....	2.20	1 Asbestos board for gasoline distillation, 6 x 6 x	
2 3½" hemispherical copper dishes .....	1.98	½ in. with 1¼ in. dia. hole .....	.15
2 500-c.c. round bottom long neck flasks equipped		1 lb. rubber stoppers .....	1.65
with stoppers for nitration .....	.88		
2 Suberite rings for 500-c.c. flasks .....	1.43		
2 500-c.c. beakers .....	.55		
		Approximate cost of total kit .....	\$125.00

twentieth degree being numbered and each tenth degree being distinguished by a larger mark.

The scale shall be graduated for total immersion. The accuracy shall be within about 0.5 deg. C. (1.0 Fahr.). The space above the meniscus shall be filled with an inert gas, such as nitrogen, and the stem and bulb shall be thoroughly aged and annealed before being graduated. All materials and workmanship shall be the best.

**Condenser**—Fig. 8. The condenser shall consist of a thin-walled tube of brass or copper ½ in. internal diameter and 22 in. long. It shall be set at an angle of 75 deg. from the perpendicular and shall be surrounded with a cooling jacket of the trough type. The lower end of the condenser shall be cut off at an acute angle and shall be curved down for a length of 3 in. The condenser jacket shall be 15 in. long.

**Graduate**—Fig. 11. The graduate shall be of the

usual type, with a pressed or molded base and a lipped top. The graduated portion shall be for the quantity of 100 cc. It shall be numbered from the bottom up at intervals of 10 cc. Markings shall be for single cubic centimeters, and each fifth mark shall be distinguished by a longer line. The length of the graduated portion shall be not less than 7 in. nor more than 8 in. The distance from the upper graduated mark to the rim shall be not less than 1¼ in. nor more than 1¾ in.

**Heater**—If a gas burner is used it should be preferably of the Meker type, Fig. 13. Electric heaters especially designed for the distillation of gasoline may be readily obtained from reputable chemical supply houses.

**Graduated cylinder with ground glass stopper**—Fig. 12. 10 cc.

Polished hemispherical dish of spun copper approximately 3½ in. diameter.

## N. I. V. A. Discusses Difficulties of Farm Implement Industry

(Continued from page 754)

because some makers find a demand for it, but the question is if it would not be much better to eliminate it. The cost of carrying it is believed to be greater than the profits that come from its sales.

While the question of the farm implement dealer was not a subject discussed at the convention it came to the surface on one or two occasions. It was stated by one speaker that power farm equipment includes motor cars, motor trucks, isolated house lighting plants, as well as tractors and stationary gas engines and all that goes therewith. The natural conclusion was that the dealer selling all of this equipment was the logical farm equipment dealer; in a word, this is the type of dealer to sell to 40 per cent of the population of the country. For years our publications, *Motor World* and *Motor Age*, have been urging on the dealer the value of selling tractors and the other equipment that goes therewith. To-day some of the implement makers are approaching this from the other end of the line by including motor cars, trucks and isolated house lighting in the classification of power equipment for the farm, and at the same time are aiming to develop the power equipment dealer.

This dealer question is one that will be very much on the surface in the next few years and in reducing the

cost of all automotive products to the consumer we should keep in mind that of merchandising by not burdening our rural communities with several classifications of dealers, one for cars, one for trucks, one for tractors, one for house lighting, but rather follow the trend of big consolidations in the steel industry, in the meat packing industry, in finance, in publication work, etc. The cost of our apparatus to the consumer will be reduced by such consolidations and in so doing we are lowering walls of sales resistance and making it easier to own, operate and maintain our equipment, whether motor cars, trucks, tractors, house lighting, etc. Let us remember that new conditions make new methods necessary. For the new wine new bottles are essential. The old order of a score of years ago is passing and to succeed we must correctly interpret the needs of to-day. The situation calls for analysis rather than post mortems.

**P**UBLIC motor services in France are encouraged by Government bonuses. Thus the Minister of Public Works recently has granted Government subventions to lines in the Departments of Herault, Drome, Loire, Yonne, Correze, Doube, Ardeche, Cantal, Saone-et-Loire and Eastern Pyrenees.



# The Application and Manufacture of Silent Chain

A description of recent developments in applying chain to front end or distribution drives. Operation of automatic tension idler is explained. The manufacture of chain parts, their assembly and inspection, is outlined.

By J. Edward Schipper

**M**UCH has been learned during the past three years on front end chain drive installation for automobile engines. From all indications there will be more chain-driven front ends in the near future than we have at present, as there is a decided drift in that direction. It has been pointed out recently through these columns that practically all of the installations made on high-priced cars brought out during the past two years have been silent chain drive, and while it is admitted by car manufacturers and chain makers alike that perfection has not as yet been attained, there have been some distinct improvements which have been due not only to improvements in the design of the chain itself, but even more to the knowledge of how to install the chain and how to manufacture it.

Some of the installations which have been made recently are more or less revolutionary from a front end drive standpoint. The double-sided chain, automatic spring tension device and some new methods of making adjustments with the triangular layout are examples. These new types of installation give the designer a choice which enables him to suit any condition of auxiliary drive he is likely to encounter.

Chain life in the front end drive of an engine would be immeasurably increased if the high, momentary stresses could be eliminated. However, it is seemingly impossible to separate this condition of high momentary stress from internal combustion engine design as we now have it. With this condition prevailing, high factors of safety and accuracy are necessary. Where the accuracy of manufacture comes in, is not only to secure the proper spacing of the links and the proper action of individual links, but also to keep the contact line or the line of stress directly across the chain. An inaccurate chain will squirm, because the line of stress moves about, with a result that it is noisy and short lived.

There are certain inherent advantages to a chain drive which can be fully realized if the chain is accurately

manufactured and properly designed and installed. In the first place, quietness is readily secured in this type of installation, when the proper type of installation is selected. Probably the greatest advantage of chain drive, however, is the introduction of an elastic element into the drive which absorbs vibration that a positive drive would transfer to the housing. To put this in another way, a great many of the timing gear noises which are charged up to the front end drive are simply transferred to this drive from other parts of the motor and do not originate in the timing gearcase at all. This condition is not so apt to prevail with an elastic type of drive such as the chain.

Another definite advantage is the ease of overhauling and restoring the front end drive to its exact original condition. Adjustability in a chain drive is, of course, highly essential, and engineers should not countenance a design in which there is not an adjustment feature of some sort to take up initial stress and wear.

The qualities necessary to accomplish the results outlined in these requirements must be built into the chain if good results are to be obtained. These are the basic requirements of chain design and form the fundamentals which have been considered in the working out of the chain types. The Link-Belt chain with which this article is concerned, is now being made up in a new type which is known as the unit chain and which is suitable for single-sided contact drives. This unit type of chain will shortly be in production at the Indianapolis plant and has a great many unique features which are of great interest.

The unit chain is so-called because the individual links combine the functions of spacing as well as of the bushings. It has been intended in the design of the Link-Belt unit chain to impart extreme uniformity in each part in order to insure absolute load distribution and no change of stress direction or weave as each succeeding row of links comes into contact with the sprockets. There are spacing lugs on the links to keep the stress line at

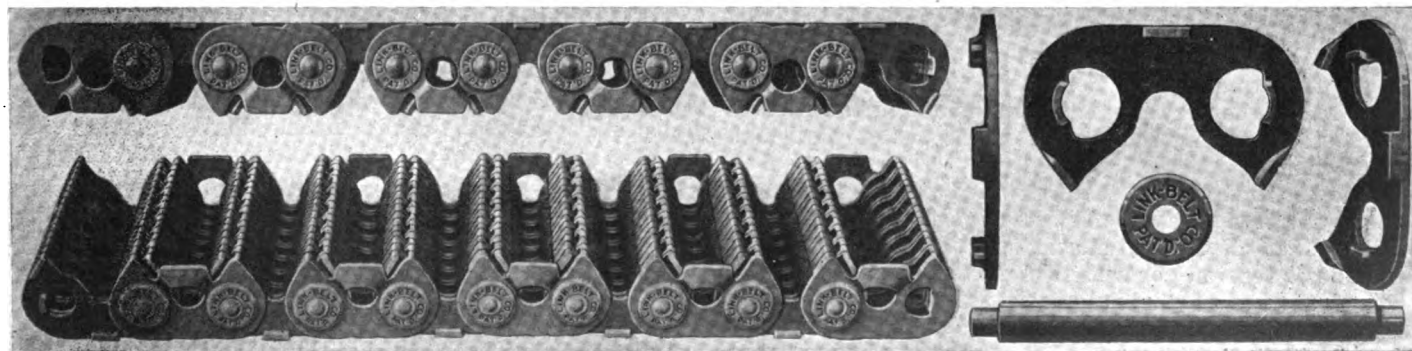


Fig. 1—Link-Belt chain and units of which it is composed

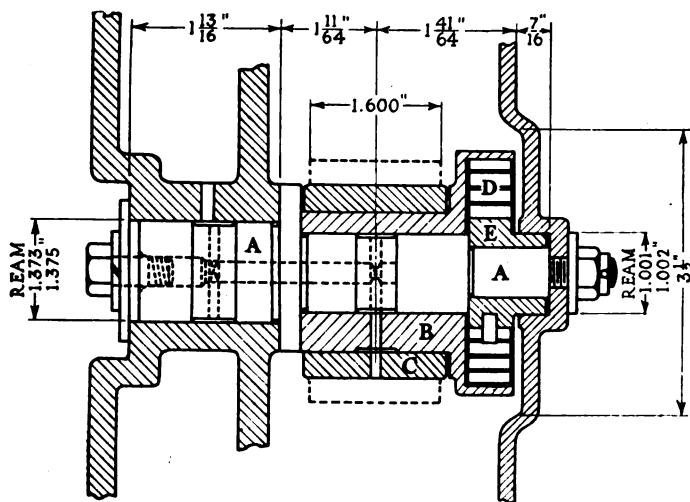


Fig. 2—Link-Belt automatic tension governor for front end drive

all times straight across the chain and equally distributed, this being a most necessary requirement in order to prevent weaves in the chain as it passes around the sprocket in performing the driving function.

One of the main features of the unit chain is that it presents a continuous surface to the sprocket rather than a broken one. This property, it is claimed, resists rough action and also maintains the oil film. Maintenance of the oil film permits cushioning of the drive and consequently much longer life on the chain. It is claimed that the oil film will not break on this type of chain because the continuous surface is far more conducive to maintaining the integrity of the film than is the case with a broken surface which would permit the oil to escape much more readily. In the unit type of chain there is no bushing. The continuous bearing for the pin is coined integrally with the links, which gives equal pin bearings to each length and allows each link in the chain to do a uniform and equal amount of work. The individual links, as well as the entire chain assembly, is designed to put in the qualities necessary to resist the stresses peculiar to camshaft drives.

Some interesting installations of Link-Belt liner type silent chains have been made by the use of the double-sided chain in which some of the links are reversed in order to provide a bearing surface on both sides of the chain. This permits a greater flexibility in design layout, particularly in the drive of auxiliaries. It is possible to obtain sufficient wheel contact with the double-sided chain with shafts in a position where it would be practically impossible to secure the desired amount of contact in any other way. An installation of this kind makes it practically impossible for the timing chain to jump a sprocket tooth as has been known to occur with installations where the chain has not had sufficient contact with the sprocket wheels. The double-sided chain permits of a reverse bend in the chain, which allows it to wrap itself around the wheel with a far greater area of contact than would be possible in any other way. This feature is very clearly brought out in the illustrations accompanying this article on the use of the double-sided chain.

Another installation feature which provides the engineer with greater elasticity of design in using the Link-Belt product is the automatic adjustment device. This includes a tension governor which compensates for wear. The functions of the automatic adjustment are, maintenance of proper tension in the chain; compensation for elongation; increase of effective angle of driving contact; insurance of smooth engagement between the chain and the wheels; elimination of vibration or whipping

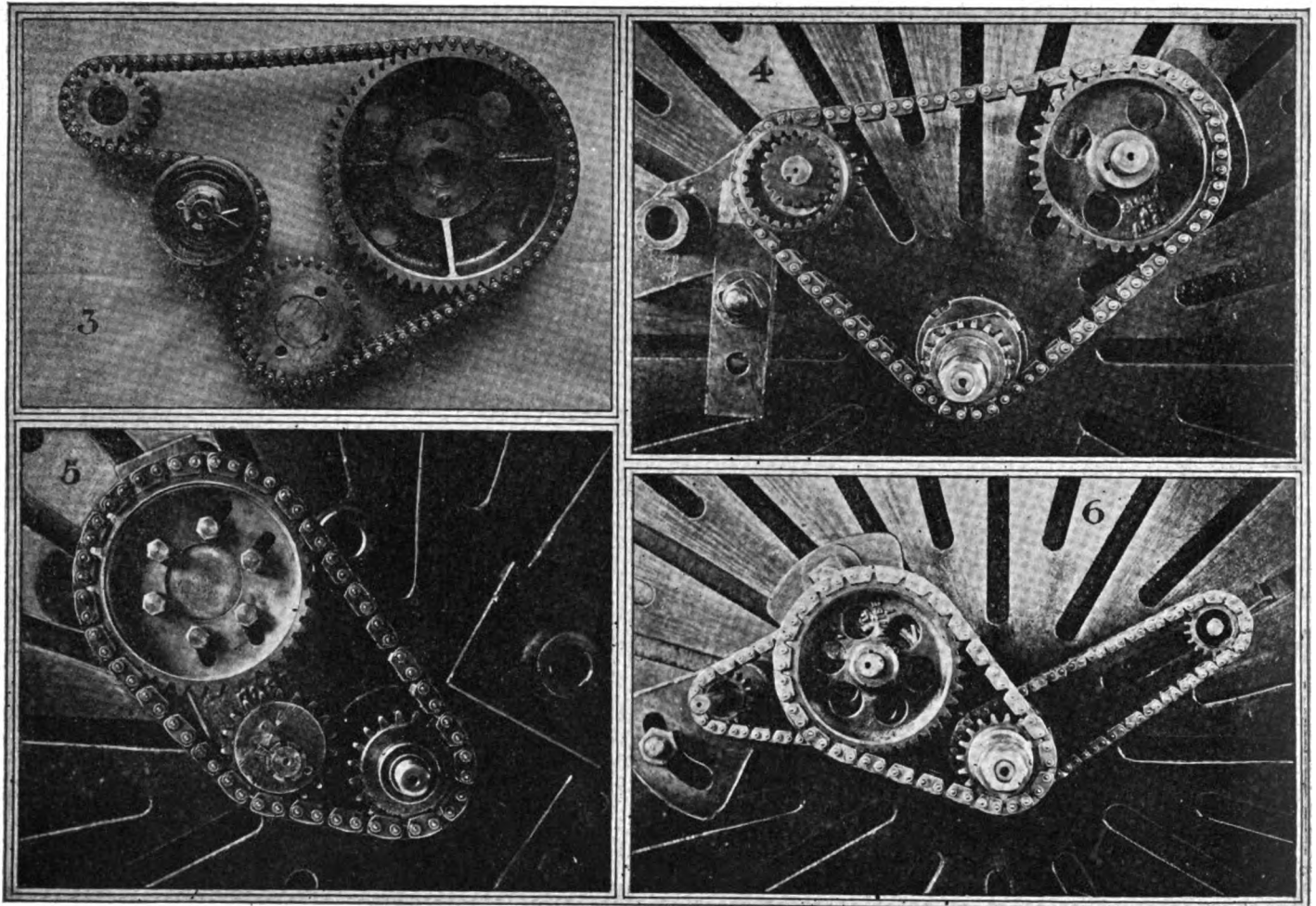
from the chain; and reduction of the amount of attention it is necessary to give the chain in service. The automatic adjustment feature is shown in the sectional drawing, Fig. 2. This is an eccentric device with a spring mounting to maintain constant tension in the chain. The stud, A, is mounted rigidly with the timing gear-case. The eccentric, B, on the stud carries the wheel, C. When the eccentric, B, rotates the wheel, C, moves, regulating the tension in the chain. The amount of tension is controlled by the flat clock spring, D, which is anchored by means of the collar, E, and adjusted by the exterior adjustment nut. The device is lubricated by oil which enters the center of the shaft, as shown in the section. The variety of installations permitted by these different types of layouts permit taking care of any sort of arrangement of the main and auxiliary front end drives.

The manufacture of silent chains is of particular interest because the individual units are very small and yet must be highly accurate. It is self-evident that any error in accuracy in chain manufacture is cumulative; that is, it builds up with the length of the chain and consequently presents a problem in accuracy which is second to none in the line of automotive parts. Link-Belt chain is manufactured from strip alloy steel. This is 3½ per cent chrome nickel stock and for the automotive front end drive chain, which is ¾ and ½ in. pitch, the strips come in lengths of about 100 ft. Practically all of the machinery used in the manufacture of Link-Belt chain has been developed at the Link-Belt factory and is of a highly specialized character.

The initial operations in the manufacture of the links are the perforating, broaching and blanking. The tool equipment for these three operations is shown herewith. The punches and dies are the only details which differ from those shown. The operation illustrated is broaching. The inspection gages for the operator are shown on the table of the machine. This punch press, which is a Ferracute, operates at the rate of 120 strokes per min., and hence turns out links at the rate of 2 per sec. The strip steel utilized for this purpose is 1 in. in width. An interesting feature of this machine is that the punch pins are longer than the other cutting tools, thereby permitting them to act as locating points. This operation, as well as the majority of operations which follow, is taken care of by girl operators.

After the links are blanked out, they are "shaved" to size. This shaving operation removes metal from all around the outside of the links and makes the edges square with the flat side of the link. The machine is fed by a centrifugal feed hopper, which system is used quite extensively in handling the great number of small links which the machines are required to take care of in the manufacture of the chains. The shaving operation is held to very close limits, as this squares up the entire link and is really one of the vital points in the manufacture of the chain. The centrifugal hopper whirling around throws the links into the feed channel and a scoop device is so arranged that the links cannot enter this channel upside down, but have to go in the desired position so as to be ready for the shaving tool.

The liner type of Link-Belt chains, not the unit type mentioned, employs a chrome nickel steel bushing. The stock for this bushing, which bears upon the chain pin, is strip steel. The first operation on the strip steel is to shear it into more narrow strips. This is accomplished in one operation, the shears splitting the stock into three parts. These narrow strips are then cold rolled to a partial round and this partial round is straightened and cut off to size. This work is done on special machines designed by the Link-Belt Co.



3—Double sided Link-Belt chain installation as used on the new Haynes car incorporating the automatic tension governor. 4—Typical triangular Link-Belt chain arrangement as used on the Rochester-Duesenberg. 5—Automatic tension governor with single sided chain as used on the Mercer. 6—Link-Belt chain installation employed on the Chandler.

The washers which hold the links in position are automatically punched from strip stock. The washers are embossed in an automatic embossing machine and then are sent, together with the bushings and links, to what is known as the "laundry." This consists of a series of tumbling barrels where the various parts are given wet and dry washes to prepare them for heat treatment. A feature of the laundry is the use of heat on the tumbling barrels. These are heated by a flame which plays on the side of the barrel while it is rotating.

The heat-treating furnace is particularly interesting in that it is automatic in its operation. The furnaces are the Bellevue rotary and are electrically heated. They are pitched on an angle so that the parts gradually rotate down to the bottom in the proper time and then drop into the oil quench. The parts which are quenched are conveyed automatically up through the oil and dropped into trays from which they are transported back to the laundry and recleaned.

There are two heat-treating operations. The parts are first packed in compounds in pots and put into the Bellevue furnace, after which they are cleaned and then returned to the heat-treating room and put into cyanide furnaces for hardening. The links are given a 1/64-in. skin. They are taken back to the laundry after this final hardening process and given a wet wash to thoroughly clean them to make them ready for assembly.

The pins and bushings are brought to a group of girls who straighten them. These girls use little steel mallets to hammer the pins and bushings which are not straight against flat plates. They are very expert at

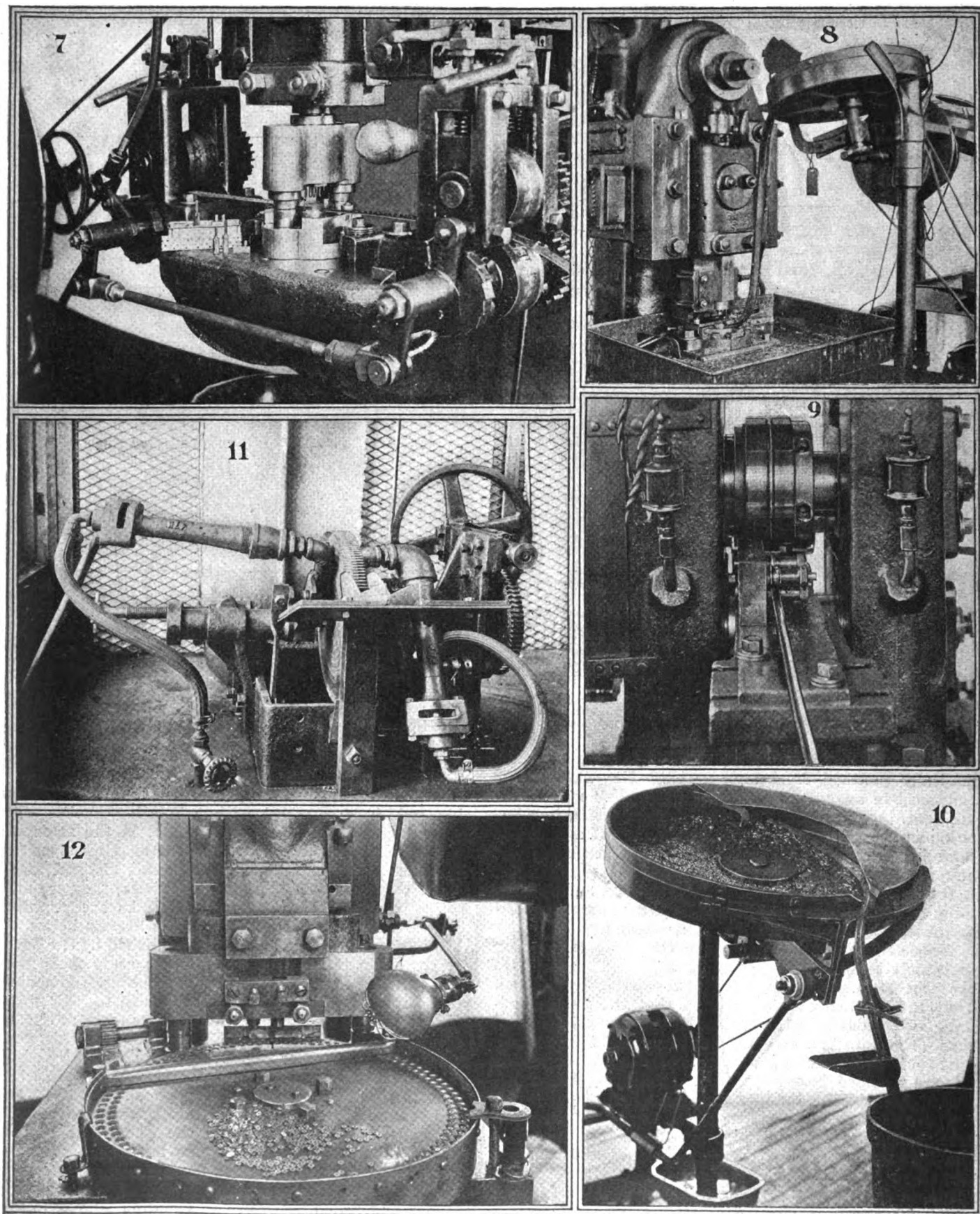
detecting any lack of straightness in the parts and know just where to strike the part to straighten it out.

The links are given an automatic inspection in a machine which is provided with a rotating hopper which throws the links into a feed channel in the same way as was previously described for the shaving operation. The links then pass down through this channel and if they are not exact in straightness or size, they are automatically discarded. Only perfect links are permitted to pass through the machine into the barrels below.

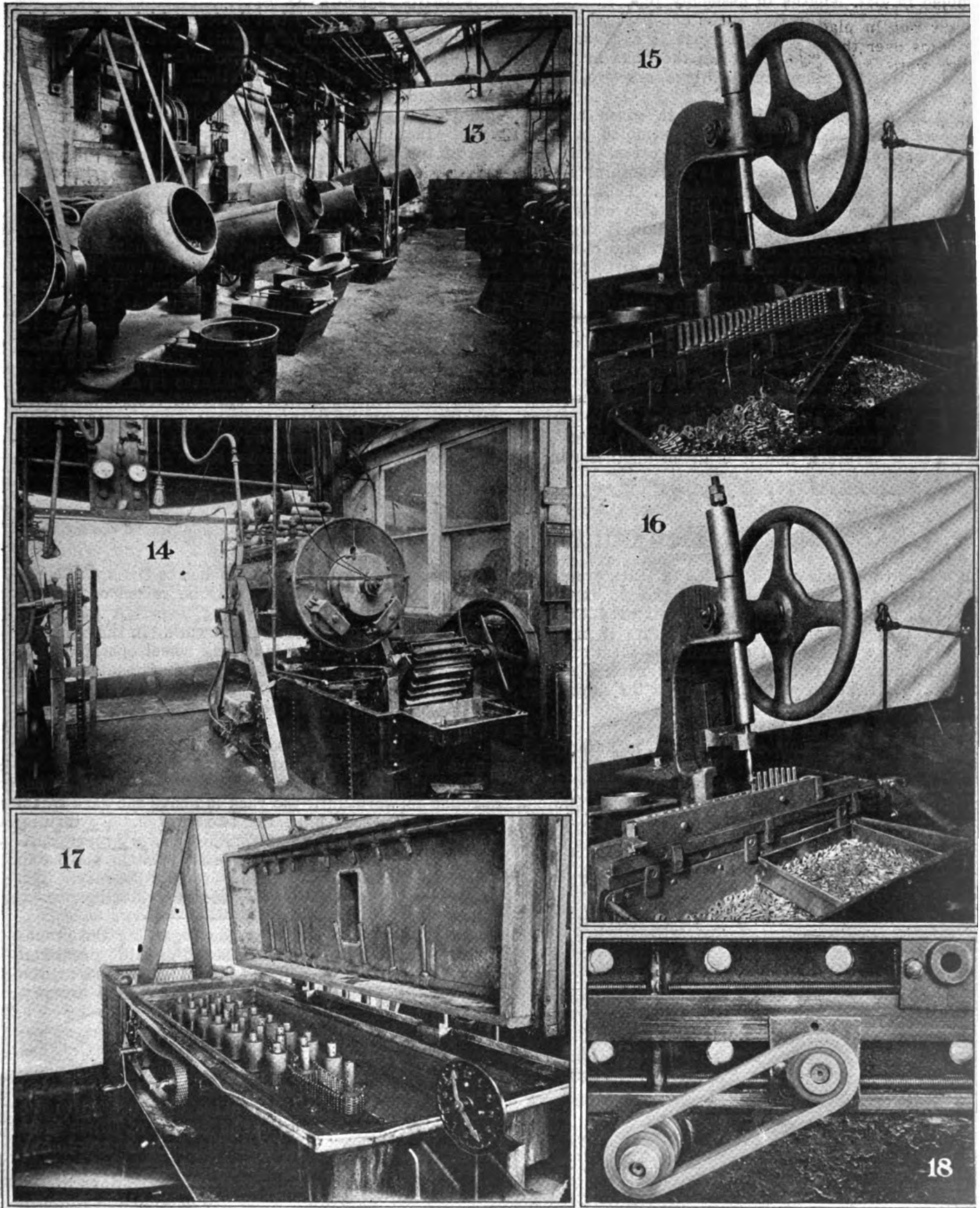
One ingenious operation is accomplished by the device for softening the ends of the pins so as to make them easily riveted over in the assembled chains. A machine with a rotating wheel of sufficient width to pick up the pins in a sort of sprocket tooth arrangement on the periphery is employed. The pins are fed into this wheel and guided so they project over on each side a definite amount. A gas flame plays on the part of the pin which projects over the outside of the wheel. As the wheel goes around, the pins drop off into the water, the rotative speed and the diameter of the wheel being so calculated that the ends of the pins have been subjected to the temperature of the gas flame for just the proper length of time. The pins are then placed in a centerless grinder and rolled between two grinding wheels to give them the exact finish size. This is a specially designed machine made at the Link-Belt plant.

This completes the manufacturing operations and brings the various units of the chain up to the point where they are ready for assembly. The pins, links, bushings and washers are all in pans, accurately checked





7—First three operations. Perforating, broaching and blanking. The same tool equipment is used for all three operations, the only details that differ being in the punches and dies. The operation illustrated is broaching. The operator's inspection gages are shown. 8—Shaving operation with centrifugal feed hopper. Shaving removes the break-out from the periphery of the links, making the edges square with the flat side. 9—Cold rolling the bushings for the liner type Link-Belt chain to size. 10—Automatic link inspection machine which only allows perfect links to enter barrel. Rejects are caught in small scoops shown at sides. 11—Annealing the edges of the pins to make riveting possible. Note how ends of pins extend over side of wheels so that gas flame comes in contact with proper links. 12—Automatic machine for embossing the washers



13—Tumbling barrels for cleaning parts before assembly. 14—Heat treating links in automatic furnace. Note pyrometer indicator for operator. Operation of furnace is continuous, the only function of operator being to fill the feeding hopper and adjust burners. 15—The link assembly is built up in links of 1 ft. in the jigs shown herewith. 16—Inserting pins and bushings in liner type Link-Belt chain after cover has been put on jig. 17—One foot lengths as assembled in jigs are connected with 10 ft. lengths which are placed in articulators and are run-in to take up the initial elongation. 18—Final inspection of chain. This photograph was taken with the chains running



with the number of pounds in each pan. The chain is assembled in 1-ft. lengths in assembly jigs.

The assembly jig is in two parts, one part where the links are put in place and the other is a cover plate which slips over the jigs and holds the links in proper position while the pins and bushings are pressed in place.

The 1-ft. lengths of chain are then given a careful inspection and the chain is then assembled in 10-ft. lengths and subjected to a running-in process. The machine on which the 10-ft. lengths is run contains a soda tank and the chain is run in the solution. This machine is so designed as to provide an adjustable center distance for the 10-ft. lengths, and the chain is first run slack and then gradually brought closer and closer to pitch. The soda solution takes all of the dirt from the chain, while the adjustable center distance brings the chain up to its final size, giving the chain its initial stretch, due to taking up the slack parts.

After the 10-ft. length has been run in on this articulator, the chain is given an inspection measurement and must check up accurately to gage. The chain is allowed to run from 35 to 40 min. on the 10-ft. lengths. After inspection it is torn apart and assembled to its proper length. It is inspected for tight joints, the rivets are all gone over carefully and it is given another run in

its finished length at the proper center distances before it is finally tagged as O. K.

One of the laboratory test devices which is located in a silence room consists of a frame with slots running at all angles, making it possible to make any type set-up and run the chain at all inclinations and angles. It has been found that chains may be silent in one position and after slightly rotating the test block, noises may develop. Inasmuch as in motor car service the inequalities of the ground cause the chain to be operating at various angles of inclination, this is an important point.

In connection with the chain plant, there is a laboratory in which it is possible to run the chains under very severe conditions, submitting them to endurance tests under stresses which are far higher than anything that would be encountered in actual service. This has resulted in break-down figures for a number of types of chains which give an accurate clue to causes of chain failures. One of the most interesting points which has been brought out by photo-micrographic study and other methods is that the line of weakness in a chain under static conditions is entirely different from that which develops under dynamic conditions. The point of failure under dynamic conditions does not at all correspond with the point of failure under static conditions.

## A Demountable Body Carriage

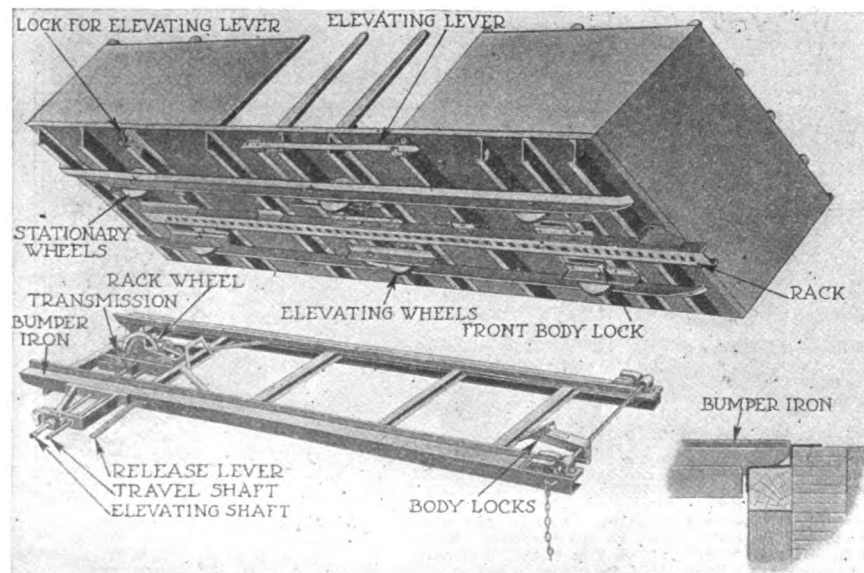
AS a labor and time-saving device in truck transportation the demountable body has been used successfully in many instances. While their production is not general by motor truck manufacturers it is quite likely that more buyers will demand this form of body within the near future. In some cases several operations can be carried on with one truck at the same time when two or more demountable bodies are employed.

One man can load or unload a body carrying from a 2½ to 8-ton load by means of equipment, manufactured by the Ideal Truck Equipment Company.

The carriage for the removable body comprises a steel framework attached to the chassis and a similar framework attached to the bottom of the body. These frames consist of two channels each, supported by cross

members. Small wheels are attached to the upper channels on the body, and these may be raised or lowered at will by means of an elevating lever. A rack runs down the center of the body framework. In the rear center of the chassis frame is a rack wheel operated by a crank. There is also an elevating shaft that makes it possible to raise or lower the framework to the level of the surface upon which the body is placed before loading. Bumper irons at the rear ride over a stringer attached to the loading platform, thus maintaining the tracks flush with the platform.

When the truck is backed to the loading point the body is rolled forward until the rack is above the rack wheel when it is lowered until the two engage. By turning the crank body is brought forward to its proper position, the locks are snapped in place and the load is ready for its journey. The same method is used in unloading.



Ideal Truck Equipment Company's demountable body carriage

AN investigation regarding the preparation and uses of metallic zirconium and its salts has been conducted by the Bureau of Mines and the results are just now made public.

Coherent white zirconium metal, on account of its acid-resisting properties, has been suggested as a substitute for platinum in certain cases. Crucibles prepared from zirconium oxide were proved in the experiments of the Bureau of Mines to be superior for high temperature work to any crucibles procured on the market.

The results of the investigations of the Bureau of Mines are available in Bulletin 186, "Investigations of zirconium with especial reference to the metal and oxide," by J. W. Marden and M. N. Rich, which is distributed by the Superintendent of Documents, Washington.

# Government Aid Necessary to Foreign Commercial Flying

British and French aerial navigation companies find present costs of operation far above revenues from passenger rates. Four types of machines considered best for various services in France.

**E**XISTENCE of companies operating passenger and freight airplanes in France and England is largely dependent upon government subsidies. Present operating costs are so high that were these navigation concerns to depend solely upon revenues received in passenger and freight rates they would be forced to discontinue business or else increase their prices to a prohibitive figure.

Official figures show that the present cost of operation on regular passenger carrying services is about 10 francs per kilometer for single-engine planes of 300 hp., and 15 to 16 francs per kilometer for twin-engine planes having two motors of 260 hp. each. Taking as an example the Paris-London service, distance 250 miles, operating to 80 per cent of schedule in summer and 70 per cent in winter, the receipts per kilometer are made up as follows:

*Twin-Engine Type Machine, Farman Goliath, with Two 260-H.p. Salmon Engine, Carrying Two-Thirds of the Maximum Load, or Six Passengers and 440 Lb. of Goods*

For passengers and freight, per kilometer....	Fr. C.	
Flying subsidy .....	8	00
Efficiency subsidy .....	5	50
	14	00
	22	00

*Single-Engine Type Machine, Breguet, with 300-H.p. Renault Engine, Carrying Two-Thirds of the Maximum Load, or Three Passengers and 66 Lb. of Freight*

For passengers and freight, per kilometer....	Fr. C.	
Flying subsidy .....	3	00
Efficiency subsidy .....	4	50
	7	00
	10	00

Experience shows that all the advantages lie with the big multi-engine plane, the mileage earnings of which are sufficiently high to assure the success of the operating company, on condition that passengers are always available and that weather conditions permit of a regular service. The subsidies available under the French scheme are equal to two-thirds of the total earnings, and with these subsidies it ought to be possible to reduce present passenger fares and freight charges by 25 per cent.

## Results of French Experience

The lessons learned from commercial airplane service in France are that the following special kinds of machines should be developed:

**Passenger carrying plane:** Multi-engine plane with at least three engines, capable of flying with one engine shut down, landing easily and taking off quickly, a wide range of speed, coefficient 6, engines easily accessible while in flight, engines capable of 120 hours' flight without overhauling, mechanical starting, ability to fly under full load for five hours, equipped with a cabin for the crew, wireless cabin, passenger cabin 78 x 70 in. Ceiling, 13,000 ft.; speed at an altitude of 6500 metres, 125 miles an hour; total tonnage, 1½ tons, and radius of action, 560 miles.

**Postal Plane.**—Single-engine machine with a wide range of speed, coefficient of security 8, mechanical engine starting, ability to fly four hours under full load; pilot's cabin, mail-hold to receive 5 mailbags weighing 90 pounds each; practical ceiling, 13,000 ft.; speed at 6500 ft., 155 miles an hour; fuel for four hours' flight; useful load, 450 pounds; radius of action, 500 miles.

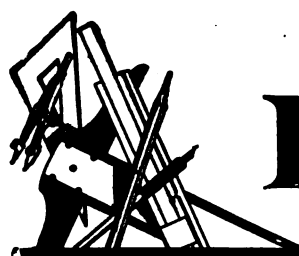
**Touring Plane.**—Single-engine plane carrying two passengers and 200 pounds of baggage. This plane should be easy to pilot, of all-metal construction, having a coefficient of security of 5, and an engine capable of operating 150 hours without overhaul. Fuel consumption less than 6 gal. per hour's flight at full power; five hours' fuel supply; practical ceiling, 10,000 ft.; speed at 6500 ft., 125 miles an hour; useful load 330 pounds; radius of action, 450 miles.

**Commercial Flying Boat.**—Multi-engine plane capable of flying with one of its engines stopped at a height of 1500 ft. for two hours with its full useful load and two hours' gasoline. Ability to navigate on the water until the entire gasoline supply is exhausted; useful load, 1 ton; cruising speed, 80 miles an hour; maximum speed, 100 miles an hour. Gasoline supply for five hours' flight at full speed; cabin for eight passengers separated from the baggage-hold; gasoline tanks separate from the hull; engines readily accessible when in flight; mechanical engine starting; wireless transmitting and receiving set capable of carrying 180 miles; coefficient of security 6; radius of action, 500 miles.

## Military Types Predominated

Practically all the French commercial planes in service during the past year were military types or modifications of military types, the only important exception being the Farman twin-engine Goliath, which is now being replaced by a rather bigger type with three engines. The new big capacity commercial planes under construction and likely to go into service at an early date are the Bleriot Mammoth with four Hispano-Suiza engines of 300 hp. each, total weight, 7½ tons; speed, 93 miles an hour, and the Breguet Levathan, with four Bugatti engines of 250 hp. each; total weight, 6¼ tons.

**A**CCORDING to *Der Rationelle Werkbetrieb*, the well-known German light alloy, duralumin, which is much used in aircraft construction, can be refined and toughened by quenching as well as by cooling in the air. Strange to say, however, it must be allowed to season for four days after the heat treatment is completed. An approved quenching bath for duralumin consists of a 10 per cent solution of sodium hydrate at 30 deg. Cent., in which the metal is allowed to remain for five minutes. This is followed by a bath consisting of three parts of nitric acid, one part of sulphuric acid and twelve parts of water. The parts must be well rinsed.



# The FORUM



## Grinding Splined Shafts

Editor, AUTOMOTIVE INDUSTRIES:

Referring to the article in the Sept. 15 issue with reference to "Tolerance Allowed in Grinding Splined Shafts," I wish to take issue with the author thereof in regard to some of the statements made.

The article states: "It will be noted that the bearing is solely on the ground surface of the inner diameter of the fitting." True. But the said "ground surface" is commercially obtained only by a process claimed to be covered by patents.

It also states that: "It is an easy operation to grind the bore of the spline fitting." True, if the hole happens to be a comparatively short one as in a gear. But how would you grind on a commercial basis a hole  $4\frac{1}{2}$  to 5 in. long, and from 1 to  $1\frac{1}{4}$  in. in diameter as required in the propeller shafts? Of course, such grinding can be done if you wish to pay the price, but it is not necessary in order to get a satisfactory spline fitting, and if adopted would add an unnecessary additional cost burden.

Regarding life of broach with .001 in. tolerance on the O. D. if a good finish with accurate width of spline is to be maintained, a rebroaching or "finishing" cut will in most cases be required. If the limits of the width of the splines, parallelism, and finish are to be maintained comparable with .001 in. tolerance on the O. D., the latter will not cause serious additional trouble or expense. The rebroaching may be done with either a special finishing broach or with a standard broach which is later used for roughing, after it becomes dull enough to require re-sharpening.

Regarding the advantage claimed for lubrication, a clearance on the small diameter is of even greater value from a lubrication point of view than is a clearance on the large diameter.

If the methods and suggested tables of fits suggested were to be adopted as standards by the Society of Automotive Engineers, much unnecessary expense and patented methods would be thrust upon the makers of automobiles without any commensurate return, and the implication the article carries that the Society of Automotive Engineers or other organizations have been derelict in adopting these or other similar shaft dimensions, I believe to be not warranted by the facts.

The idea of such shaft standards is not new, such suggestions having been made and discussed on several occasions in S. A. E. meetings. Every time, however, that this subject has been brought up for discussion in the meetings of the Standards Committee or of the Society, leading and well known engineers have stood against such attempt of standardization for the reason that a spline fitting contains many surfaces which are sure to change their relations to greater or less extent with heat treatment. The question has been raised as to whether the close fit should be on the large diameter or on the smaller diameter. The actual determination of this question must depend upon individual requirements and shop equipment and will depend upon what surfaces, if any, are to be ground after hardening, whether the fit on the sides of the splines

should be free as in transmission gears or very close as in propeller shafts, whether one or both parts are to be heat-treated after machining and whether one or both parts are to be ground after heat treatment. From this it will be seen that if standards for the shaft ends were to be adopted, it would be necessary to very greatly extend the scope of the standards proposed by the article referring to the Gear Grinding Machinery Company's practice, as many spline parts are heat-treated before machining and, therefore, require no grinding, while many other spline parts are used where the conditions do not require the refinement of grinding. In many instances, also, one part of the spline fitting is hardened after splining, while the other part is left comparatively soft. Therefore, when the subject has come up for general discussion, the action after discussion has always been unanimous or nearly so, to the effect that all that can be accomplished in the way of standards is the standardization of the broaches, and, consequently, of the soft broached holes, but that material to be allowed for the grinding processes employed and character of the fit required must necessarily leave the other limits and tolerances to the judgment of the individual designing engineer.

C. W. SPICER, Vice-President,  
Spicer Mfg. Corporation.

## Fan Dynamometers

Editor, AUTOMOTIVE INDUSTRIES:

Your editorial in the September 15 issue on the use of cradle type fan dynamometers directs attention to an extremely important phase of modern engine production in the automotive field. The fan dynamometer must have its chief usefulness as a production device, which is to say that the testing under load of every engine produced is of such importance as to warrant a thorough study of proper testing means.

A weakness in our passenger car industry to-day is the lack of proper tests of completed engines and cars. In many instances reliance is placed merely on careful inspection during manufacture. Many dealers have stories to tell of cars delivered from the factory which require expenditure of a considerable sum to put right, because they were not made right before they were shipped.

This is notably the case with cars in the medium-priced field. A carefully considered testing schedule which positively detects defects before cars get in the hands of users is bound to react to the standing of the manufacturer in the eyes of his dealers and his public, and is as well worth the cost in the medium- and low-priced field as in the high-priced field, where such tests are now regularly employed.

When it comes to considering the method of testing for production purposes, however, it is not clear that a fan dynamometer of the cradle type is the solution. Already a large number of plants have installed the simplified "electric block test" system. The result is a working schedule which provides not only for the loading of the engines but for the adjustment of this load

through a wide range while the engine is in test in order to meet the requirements of a progressively increasing load as the engine works in. Measurement of friction horsepower is provided for, which is a very important factor in building new engines, as it sets a definite standard of assembly; friction being held to a definite minimum on test. There is also, with the

electric method, a large saving by the utilization of electric energy in the shop. The importance of this last factor has been emphasized during some winters which are fresh in our memory, when coal was hard to obtain and the plants which had the electric block test system could keep running.

SPRAGUE ELECTRIC WORKS,  
C. F. Scott, Manager, Apparatus Sales.

## The Automobile in Peru

OF the 3000 automobiles and trucks in Peru, perhaps 2000 are in Lima, the capital. The majority of the streets of the city are in poor condition, being paved with round pebbles, gathered up along the seashore. The public square, however, has recently been paved with asphalt. The main business street and one of the leading avenues is also asphalt. Through these two streets the automobiles pass out to a drive along the seashore between Lima, the capital, and the suburbs, Miraflores and Callao. This drive, called the Miramar, is in fair condition, partly paved with pebbles, but if not continually repaired, will soon become unsuitable for automobiles. The automobiles outside of the capital, as far as roads are concerned, do not fare much better than those in it.

It is impossible to give the exact distribution of the automobiles and trucks outside of Lima, but, in the main, they are situated in, and in the vicinity of the following cities:

Chiclayo .....	175.
Trujillo .....	125
Tarma .....	30
Cañete .....	146
Arequipa .....	99
Ica .....	199
Chincha .....	190
Scattering .....	36
Total .....	1000

The "scattering" will be found in Huacho, Supe, Pacasmayo, Cerro de Pasco, etc. In these cities themselves, except those situated near the oil belt to the north, where petroleum has been used to improve the roads, very little has been done for the streets. The roads around these cities, where not impassably rough, are mere stretches of sand.

The automobiles now in Peru, as they have mostly come in during war time and immediately since the war, are largely of American make. There are present a surprisingly large number of the higher grade American cars. Travelers who have visited Lima state that, in proportion to the total number of cars in Lima, there is no other city that has so large a number of high grade cars. Indeed, it is only recently that the popular-priced American car has come to its own in Peru.

The European car is present also and its numbers will doubtless increase as the factories in Europe recover from the effects of the war. The principal English, French, Italian and German cars are now represented.

With the truck, the European manufacturers are making more headway than with the automobile. Many big European trucks have been put in service within the last year and may be seen on the streets of Lima. Two large trucks of a well-known French make with passenger bodies have just been put on a direct route over a new macadam road between Lima and Miraflores, a dis-

tance of some nine miles. Miraflores is one of the bathing resorts of the capital and the suburb where reside most of the foreign residents of Lima. These two passenger buses will have to compete with the interurban electric line, to some extent, although they traverse slightly different districts.

Owing to the unfavorable exchange rates, the Peruvian pound having lost one-third of its purchasing power due to the fall in the price of sugar, wool, cotton and copper and the consequential lack of exportation of these products, few automobiles and trucks have been imported from the United States this year. When exports pick up and exchange improves, there should be a market here.

Although Peru is suffering along with the other countries of South America and the world from financial depression, the month of July in Peru has been a glorious one for the automobile dealer. The reason for this is that during July was celebrated the 100th year of the Independence of Peru and every one who could purchased an automobile as the best possible way in which to signalize an event of such far reaching importance.

## Protests in French Fuel Economy Contest

IN a letter addressed to *La Vie Automobile*, Goudard & Mennesson, manufacturers of the Solex carburetor, complain of some of the practices pursued in the recent French fuel economy contest. It appears that one of the contestants asked the management six weeks before the contest whether it would be permissible to draw the air for the carburetor through the crank chamber containing the lubricating oil. It was decided by the management to modify the regulations so as to permit of this, and all contestants were notified ten days in advance of the contest of this change in the rules. The following day the Solex firm sent a written protest against what they are pleased to call "this tomfoolery," of carbureting the crankcase oil, which is maintained in a state of ebullition by means of an electric current, the cost of which is not taken into account in the classification. The amended rules, they say, even provided for a reserve oil tank on the footboard for use in case the contents of the crankcase should not suffice.

They refuse to admit the argument that in two-stroke engines the combustible charge, carrying a certain amount of oil, is drawn through the crankcase, as in this class of engine the oil is mixed with the fuel in advance and is therefore measured with the fuel. They do not care, they say, what kind of fuel is used as long as it is measured, but they ridicule the plan of burning lubricating oil at 4 francs per 5000 calories instead of benzol at 2 francs per 10,000 calories. Automobile manufacturers have remained entirely ignorant of this practice, which was instigated by a carburetor firm looking after the technical adaptation of the vehicles.

# Choosing Men Through Employment Departments

Larger organizations find specially trained men for employment managers valuable, but the necessity of close contact with supervisors within the plant is pointed out. Present status of employment departments is more or less unsatisfactory but proper development would increase efficiency.

By Harry Tipper

**T**HE analyses of labor turnover which have been made from time to time have indicated the necessity for some means of selecting employees, so that the expense of hiring and firing could be reduced and the stability of the organization personnel increased accordingly.

In large companies the employment department is very actively engaged in making records of the various applicants, keeping close to the developments, and endeavoring to sort out in a preliminary way, at least, those who are more efficient and more desirable. In fact, this work has gone forward to such an extent that a bibliography of a number of books has grown up dealing with the employment, the management of employment bureaus and the general method of selecting employees. Tests have been prepared intended to indicate the alertness, the potential value and the other characteristics of the worker outside of those involved in his skill.

Where thousands of employees are being handled with the usual percentage of turnover per month, the possibilities of selection are correspondingly reduced. Such a section of the skilled and unskilled occupations makes it impossible to reach a high average of efficiency by selecting from the general number of applicants those who are more capable. In the ranks of twenty or twenty-five thousand employees, the general differences in skill and potential capacity will be about in the same proportion as those obtaining throughout the number engaged in such occupations.

In the case of each individual concern, however, the attempt is made to select employees to represent as large a proportion of the more efficient and capable as it is possible to secure, and this is the main purpose of the employment bureau with its systems of examination and its continuance of record.

In the larger organizations it has been felt that selection of employees by a department specially trained for that purpose and carrying the responsibility for the selection results in a better general type than where the selection of the employees is left to the individual supervisor.

The results have not been entirely satisfactory, however, and the turnover has not responded to these methods of selection in any notable way. Of course, many of these employment bureaus have been successful to a degree in improving the situation that obtained previous to their establishment, but this fact is not sufficient to justify the endorsement of the method nor to illustrate the value of the various systems now in use by these bureaus.

One of the difficulties in connection with this development is the tendency for the work of selection to become extremely technical and mechanical in its application so that the tests and examinations become sufficient in themselves and not merely indications.

Obviously, the applicants for work at a large factory represent a sufficient number at any time to make the work of personal interviewing difficult, if not impossible, and the only method at present available is the method of record and examination by standards, written tests and questions.

Able men have been successful in the use of these systems and in drawing from them a great many of the factors required to determine the relative value of the different applicants.

The tendency to accord to the system the success of the development has been great and this tendency has emphasized the system beyond the actual facts and led to its adoption where the conditions would not warrant its development.

In the selection of employees it is desirable to consider, from a human standpoint, the factors that make up the efficiency of a department and the stability of employment therein.

Previous to the development of employment bureaus, the work of hiring was left as a rule to the supervisors in each different department of the organization with the result that there were as many methods of hiring as there were supervisors. There was no co-ordination and the man who was proved unsatisfactory by one supervisor was found to be satisfactory under another.

Under these circumstances men were hired and discharged from one department without having any opportunity to get into work in any other section of the company and with a considerable loss to the company for the time spent in adjusting the employee to the organization. Cases of injustice were more or less frequent and personal grievance of the employee toward the supervisor was a cause of trouble at all times.

These conditions led to the establishment of the employment departments with their regular methods of selection and in some cases with the records and considerations of promotion. A great deal has been gained by this change and a certain amount has been lost.

The factors required in the selection of employees for a particular department are:

1. The requisite skill in the work.
2. The desire for permanent employment in one place.



3. A sufficient measure of adaptability.
4. Possibility for harmonious contact with the supervisor.
5. The ability to work co-operatively with other men.

The proper adjustment of these values in the selection of the employees depends upon the supervisor as much as upon the employee selected.

#### The Supervisor As Employer

Where the selection is undertaken by a different man from the supervisor, the sympathy with the employee is not quite as definite as it should be. Furthermore, the sense of responsibility is not as definitely placed upon the supervisor, and the patience which must be exercised in adjusting new employees to the organization so that the greatest efficiency can be secured is not always visible under these conditions.

In some cases this objection has been met by the employment bureau acting to select the workers for the approval of the supervisor after the preliminary selection has been made.

The advantages secured through the establishment of employment bureaus have been secured in the face of almost a total lack of education of supervisors in the problem of securing a sound co-operative organization among the workers. Until the last two or three years practically nothing was done to educate the foremen and other supervisors in the factory, while in the commercial end of business nothing of importance has been done up to the present, except in a few individual cases.

So long as the supervisors are not educated in the fundamentals of good organization and the methods of handling employees, the specialized department devoted to the selection of employees is a necessary matter in the large plant and cannot be dispensed with very well. It will not entirely solve the problem, however.

The selection of employees is limited to the available material, so that it will vary according to the extent of employment through those occupations, and a selection in this manner does very little to provide the preliminary possibilities of permanency and efficiency in the organization condition.

Most of the plants in the United States in point of number do not have a sufficiently large payroll to require an employment bureau exclusively for the purpose of selecting the employees. In these cases, however, the matter is not handled more efficiently as the usual procedure is to designate some one or two persons to interview the applicants, take such records and tests as have been decided upon, and submit these to the su-

pervisors or notify the supervisors that such workers are available.

There are notable exceptions to these conditions in the different branches of the metal trades industry, but the methods of selecting employees have not received the study given to the selection of machinery or other mechanical appliances, nor have they affected the efficiency of the employees or the permanence of employment in any considerable degree. Here, as in other cases in connection with the human relations problem in production, the systems and mechanics of organization have been permitted to stand in the place of judgment and understanding to a considerable extent.

No method of selecting employees can take the place of the personal interview where the interviewer is sufficiently able to put the applicant at his ease, to draw him into conversation and secure from the casual reactions the actual tendency of his interest and capacity. The mechanical skill required of the individual can be determined with comparative ease. The other qualities cannot be so readily discerned. They can be discovered only through the exercise of considerable judgment on the part of the interviewer with a careful understanding of the conditions of the interview.

Employment bureaus in the larger establishments and the employment officials in the smaller establishments cost a great deal too much if their value is confined to the routine of recording expenses and securing answers to test questions. On the other hand, employment bureaus that function with understanding, knowing the supervisors, their methods of operation and their personal idiosyncrasies, would be worth a great deal more than is now expended upon the employment bureau, because of their ability to increase the permanence and efficiency of the general organization.

#### A Matter of Guesswork

The selection of employees is largely a matter of guesswork even with the best of the present systems and with all the ability to be secured under normal conditions. This guesswork should be recognized and the speculative factors understood in dealing with the situation, so that the systems of selection are not called upon to perform functions that they are not capable of fulfilling.

They are useful in their way. They are a great deal more useful for what they prevent than for what they secure, but they are by no means justified in their present condition by the general situations, and further analysis is necessary to produce the kind of employment selection that will make for effective organization.

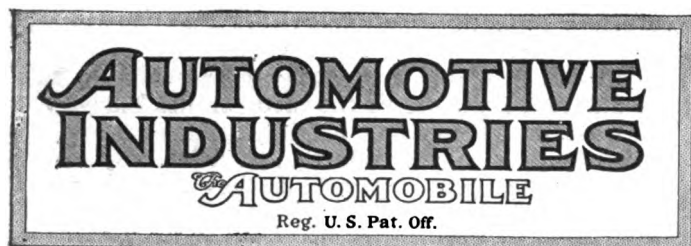
## Convenience in Car Bodies

BRITISH manufacturers, as well as those in other countries, are scored by a correspondent of the *London Times* for their failure to supply owner-driven cars with adequate body equipment and conveniences. Adjustable pedals, means for carrying the jack, tire pump, oil can, spare wheel, tools and other articles are things the owner driver wants, the correspondent declares. Adjustable individual footrests for rear passengers would add largely to their comfort.

Complaint is registered in the matter of floor boards made in such a way that grit and dust work through into the mechanism below and lack of handles of sensible design to remove them for oiling chassis parts. Floor boards that are screwed down afford little opportunity to

follow the instructions given to oil the clutch withdrawing mechanism and spigot bearing daily. Pocket, shelf and drawer accommodations are also pointed out as being lacking so far as convenience is concerned.

"Finally," writes the correspondent, "the craze which body builders have for constructing a car with a sporting line heads in most cases directly away from comfort. Seat backs are made too low for shoulder support, and although a semi-recumbent position can be comfortable for the driver, who is practically held in place by pedals and steering wheel, it is, in my opinion, more fatiguing for a passenger than the less sporting and more sitting posture. Appearance counts for a good deal but should be of secondary importance."



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## The Railroad Strike and the Automotive Industry

**T**HE automotive industry will face a great responsibility and a great opportunity if the proposed rail strike takes place. It is sincerely to be hoped that some means will be found of averting a tie-up of railroad transportation. But if such means are not found, the responsibility for keeping open the main avenues of transportation, of supplying the public with necessities, and of keeping business from stagnation will rest largely upon the automotive industry.

The industry has emphasized the utility functions of automotive vehicles for some years past. If the railroad strike actually takes place, an opportunity will be given to prove these utility claims in a most practical manner. The problem will be chiefly one of organization and cooperation. There is no doubt of the ability of the nine million vehicles in this country to perform an effective service in this emergency. Every individual and every association of individuals

within the industry, however, will have to cooperate in organization and service if a first-class job is to be done.

The N. A. C. C. has already wired President Harding, offering the services of the automobile industry in the mobilization of motor transport if needed. Manufacturers, dealers, and owners operating together can perform an immense public service in this emergency—and incidentally give an intensely practical demonstration of the possibilities of motor transport.

## Profiting by Experience

**I**T would seem to be the most obvious action for every automotive manufacturer to take to make it a point to see that each series of vehicles turned out is free from difficulties which had developed in earlier models, at least so far as this is possible through care in design and manufacture. He has, or certainly should have and make available to his engineering and production departments, service records which show wherein faults or failures have developed. Yet it is not an uncommon thing for a car to display the same failings year after year. Even major faults are not always remedied, but minor troubles, due very often more to carelessness in production or assembly than to inherently faulty design, are frequently allowed to persist, with the result that sales resistance to that particular make of car increases. Much money must then be spent in overcoming this resistance which might far better have been spent in remedying the fault in the first instance.

A condition of this sort is due primarily either to indifference or more likely to failure to study the performance of the car at first hand and the conditions which the purchaser meets in its use. The engineering department frequently tests the cars which it designs, but too frequently these tests are made under more or less ideal conditions, over good roads and with a mechanic, who knows the car thoroughly, at hand to make any necessary adjustments, with the result that the engineer fails to experience personally the difficulties which the man who purchases the car later and has little knowledge of mechanical matters is sure to encounter. Some of these troubles are taken care of by the service station and should be regularly reported back to the engineering and production departments, but some of the less serious ones, which do not prevent operation of the car, are allowed to continue, in spite of the annoyance they cause the operator.

It would pay every car manufacturer to oblige his designing engineers as well as some responsible men in his production and assembly force to take new cars in precisely the same condition in which they are turned over to purchasers, and drive them for several thousand miles under rather severe road conditions, making sure that the men who drive the car effect all required repairs and adjustments themselves, preferably using for road repairs only those tools furnished with the car. First-hand experience of this kind is the best eye-opener known. It will

teach the engineer lessons in respect to accessibility and dependability, or the lack of these qualities, which are seldom appreciated until they have annoyed the purchaser to the point of exasperation, and it will instruct men responsible for production and assembly in the need for care and thoroughness as no talks by the executive or complaints from the service department can ever do.

The men on the factory staff too frequently lack perspective, are too close to their own job to appreciate the viewpoint of the consumer of their product.

## Exporting Possibilities

FROM the newspaper columns the information has been gleaned that an Irishman named William Fitzgerald, described as a literary man who has spent much time in America, has obtained a ten-year monopoly to run motor buses in Spain. Another news item chronicles the fact that the French are planning to establish an automobile route across the Sahara Desert and that experiments looking toward this end were about to be started with cars of the caterpillar type with a rubber band, invented by the engineer Hinsten.

Regarding the Spanish project. Just now there is no such motor bus transportation in Spain; in fact, local transportation there is almost non-existent. Mr. Fitzgerald has formed a company with a capital of about \$5,600,000 in which a large London engineering firm and the London Motor Bus Company are interested.

What is true in Spain is true in other countries regarding the lack of local transportation facilities. Those who deplore the lack of an export market at the present time might do well to look into this phase of the situation. These casual news items indicate that automotive products are being sold in foreign countries. Buses will be imported in Spain and they will probably be of British design. Sooner or later other countries will begin to import buses.

The Sahara Desert project, aside from offering an exporting opportunity, will open up an important avenue of trade. It will mean the establishment of traffic throughout the entire French African empire and this will be enormously important for the future development of that area.

## Applying "Pure" Science

ENGINEERING is sometimes said to consist in the practical application of "pure" science, but engineers are not always well-grounded in their knowledge of the fundamental laws of science, nor do they always make use of this knowledge when they are well informed regarding it. Cases in which certain scientific information has been put to good use are not hard to find, and one such application, involving the use of neon, one of the rarer gases in the earth's atmosphere, was described in the last issue of AUTOMOTIVE INDUSTRIES.

Another property of neon which we believe is not generally known has been used in certain research work and can, no doubt, be applied in the automotive

industry. A discharge between the electrodes of a tube filled with neon takes place with great rapidity, requiring, it is said, but a few millionths of a second. This fact can be made use of by employing such a tube in place of and more conveniently than a stroboscope to secure successive instantaneous views of an object, such as a valve, in motion too rapid to be followed by the eye. To make such observations of the parts of an engine, for example, the tube is set up in a darkened room in which the engine is to be run and is connected in a high-tension circuit in series with a commutator driven in timed relation to the engine and so arranged that contact can be made, by varying the timing lever position, at any desired point in the cycle of the engine. A flash of light will be given at this point, and the parts of the engine illuminated by this flash of light alone during this very short interval will appear to the eye of the observer to be at rest. It is thus possible to detect valve chatter, observe the position of rapidly moving chain links in reference to sprocket teeth, note the position of springs in relation to positively moved parts, etc.

Engineers can often make use of a knowledge of facts of this character gained in a study of physics, chemistry and other of the pure sciences, and should, so far as possible, make it a point to follow developments in these fields.

## Find Out First

SOMETIMES a manufacturer spends several thousand dollars in perfecting an idea in his own factory that has already worked out successfully in some other plant. If the results of the other man's experience had been known, those several thousand dollars, as well as a great deal of his employees' time, would have been saved. Worse still, the idea may have been found unsuccessful in the other factory and consequently it will prove so in his own.

Andrew Carnegie once said, "Never undertake anything new until your managers have had an opportunity to examine everything that has been done throughout the world in that department."

It is for just such purposes that the various Government bureaus are established in Washington, and more advantages can be gained from them than is commonly recognized. For example, the newly organized automotive section of the Bureau of Foreign and Domestic Commerce bids fair to give some very practical aid to the industry. Export statistics will be improved as to accuracy and detail, while practical aid will be given in solving specific business problems.

This and other Government bureaus stand ready to furnish reliable information concerning many things. The manufacturer can help himself and others by furnishing these bureaus with statistics and by making them real "idea exchanges." Such a policy would pay in the long run. The manufacturer who profits by another's experience saves time and money. Experience is a great teacher, but oftentimes the tuition is high. Before attempting a new experiment it is usually a good idea to determine whether or not it has been tried elsewhere.

# Few Cities Lose in October Sales

## Likely to Maintain September Showing

Reports from All Chief Distributing Points Reflect Better Business Conditions

NEW YORK, Oct. 17.—Notwithstanding general predictions that automotive sales for October would show a decided slump, business thus far this month has held up remarkably well and in the aggregate promises to equal the record for September. In some sections the total sales will exceed last month's, and in only a few districts has there been a decline thus far. In most distribution centers business is on about the same level as for the past six months. The variation up and down has been unprecedentedly slight.

A survey of actual selling conditions made by correspondents of AUTOMOTIVE INDUSTRIES in the leading distribution centers shows that the only cities in which sales for the first half of October have fallen below September are Des Moines, Los Angeles, Buffalo, Columbus, Atlanta, Youngstown and New Orleans. In none of them has there been a serious drop.

### Enclosed Cars Help

Even in Des Moines, where the falling off has been most severe, enclosed-car business in sight is expected to bolster up the month's record of sales. The decrease in business in Los Angeles is attributed to expectation of prospective purchasers that there will be additional price cuts early in the year.

Distribution centers which report a better business for October than September are Detroit, Denver, San Francisco, Dallas and Birmingham. A gratifying feature of the gain in San Francisco is that trucks are leading passenger cars in both the city and country districts. Truck sales up to Oct. 12 equalled those for all of the month of September.

Better business in the Dallas territory is attributed to higher prices for farm commodities. The same is true in the Birmingham section.

Cities in which sales are holding their own as compared with September include New York, Milwaukee, Indianapolis, Minneapolis, Chicago, St. Louis and Topeka.

Reports from all districts reflect improvement in the general business conditions.

## HOW RETAIL SALES RUN IN CENTERS OF TRADE

The following table shows at a glance how retail sales of automobiles are running in the chief distribution centers this month as compared with September:

They are better in Detroit, San Francisco, Denver, Dallas, Kansas City and Birmingham.

They are running even in New York, Milwaukee, Indianapolis, Minneapolis, Chicago, St. Louis and Topeka.

They have fallen off slightly in Des Moines, Los Angeles, New Orleans, Columbus, Buffalo, Atlanta and Youngstown.

The market almost everywhere is glutted with used cars and this has a tendency to slow up sales of new vehicles. The consequence may be a curtailment of factory production later in the year.

The outlook for sales in enclosed cars is decidedly gratifying and deliveries in some lines may be delayed because of inability of car manufacturers to obtain bodies.

### Used Cars Felt in New York

NEW YORK, Oct. 17.—The metropolitan territory is just about holding its own in October sales, as compared with the September record. Lines which have new models to offer have had a noticeable spurt in orders, although few deliveries are yet on the books. Some other lines are running a little below September so far this month, in the city, while in the outlying counties the general trend is ahead of last month.

The hysterical situation as regards used car values, caused by recent declines in new car prices and by sacrifice offerings of dealers who have made long trades, is having a retarding effect on new car sales.

### Falling Off in Portland

PORTLAND, ORE., Oct. 17.—Retail sales of automobiles throughout the Portland district thus far in October have shown a falling off of approximately 25 per cent over the similar period in September. Ford, Chevrolet, Dodge and Buick continue a fair business, but other lines are quite inactive. During the first several days of October there was a flurry of buying due to the fact that purchasers got another split in license fee at that time. Many late September buyers held off until Oct. 1 to get advantage of this lower license rate. This spurt did not last, however.

## Trucks Lead Cars in San Francisco

Large Industrial Companies Are Making Purchases for Their Own Use

SAN FRANCISCO, Oct. 17.—October retail automotive business shows a slight but steady increase over September with trucks leading passenger cars in both city and country. Truck sales in this district up to Oct. 12 equalled those for all of September. Country business in passenger cars is improving because of the strengthening of prices the farmers and jobbers are getting for fruit and the sudden great increase in sales of grain to European buyers.

In the cities, cars with new models and substantial price cuts show a stimulated business and standard makes, especially of popular priced cars, are doing what the dealers consider a nice business. Old models are stagnant owing to the anticipation on the part of the public that all lines will present new models at the New York show.

Trucks are making so much better a showing because of the purchase by large industrial companies of fleets for their own use rather than for contract hauling or for regular freight schedules. People and firms who need trucks seem to be realizing that the journey to normalcy is nearly over and that they might as well buy now and get to work with the trucks as delay buying and so hinder the return of business to normal conditions.

### Kansas City Goes Ahead

KANSAS CITY, Oct. 17.—October sales of new cars are running ahead of September sales. If the present rate keeps up, October will show a gain of about 20 per cent over September. The sales of new cars are running more than this proportion ahead of last month, but the movement of used cars has declined. This refers to local retail trade; the wholesale distribution is slowing. Sales are keeping up with the volume of October of 1920.

### Dallas Improves

DALLAS, Oct. 17.—Retail sales of automobiles, tires and accessories for the first half of October exceeded those for the first half of September. Dealers say this is due to reduction in the prices of cars and an increase in the price of farm commodities. The increase in the Dallas territory is about 10 per cent and in the Houston territory about 15 per cent. The outlook for the remainder of the year is bright, retailers declare.

(Continued on page 792)

# Nation Turns Eyes to Motor Trucks

## Vehicles Would Meet Looming R. R. Strike

Entire Automotive Industry Offers Its Services Through N. A. C. C.

NEW YORK, Oct. 18—Menace of a general railroad strike which threatens practical paralysis of rail transportation, has centered the attention of the nation upon motor vehicles.

Motor trucks never have failed in an emergency. They saved France in the great war; they kept business moving during the "outlaw" railroad strike. They will be mobilized to feed the nation if the railroads cease to function.

In the last great railroad strike the country was helpless for motor transport was unknown. It is significant that when announcement of the general strike call was made by the Brotherhood leaders Sunday, there were few gasps of apprehension.

Mayors of cities from one end of the country to the other countered immediately with the statement that their people would be fed by the mobilization of huge fleets of trucks to bring in and distribute food.

If no trains are run the mails will be transported by motor trucks and airplane.

Industrial paralysis will not follow a general strike because many factories can be kept in operation by the use of trucks to haul supplies and finished products.

Motor trucks figure prominently in the plans of the administration for meeting a strike. The War, Navy and Agriculture Departments are surveying the field to determine the number of trucks which can be mobilized. The same procedure is being followed by many states and by countless cities.

### 57,000 Trucks in New York

More than 57,000 motor trucks are available in the five boroughs of New York to transport food and other necessities in the event of a strike. It is estimated they could transport 28,000,000 lbs. of food a day if it could be obtained within a day's journey of the city.

The United States Army has about 200 3½-ton trucks in the city and the Navy about half that number. Only about half these trucks are being used by the Government and the others will be available in an emergency.

## READY FOR EMERGENCY, REEVES TELLS HARDING

NEW YORK, Oct. 17—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, sent the following telegram to President Harding at the White House to-day.

"Cars and trucks totalling 9,200,000 can protect public in event of rail strike.

"We offer service of automobile industry in mobilizing of motor transport if needed.

"Local automobile owner and dealer associations have the organization, man-power and vision for emergency."

A special meeting of the Motor Truck Association has been called to gather data necessary for the immediate mobilization of motor equipment. Similar information is being collected by Health Commissioner Copeland, who will have charge of the rationing of the city in an emergency.

### Arranging Food Transportation

If there is danger of an actual food shortage it is probable officers of the Motor Transport Service of the Army may be asked to take charge of the service under plans which were worked out in 1919. The distribution of food by the Motor Corps, which will be mobilized, will be under the direction of the Health Department.

No decision has been reached by the American Railway Express Co. and other owners of large fleets of trucks as to what disposition they will make of their vehicles if the railroads cease to function.

Motion picture interests are making arrangements to distribute films by truck if it becomes impossible to move them by express.

### Could Meet Emergency

The 990,000 motor trucks in use in the United States hauled 1,200,000 tons of freight in 1920, or half as much as the railroads carried. These vehicles can readily handle the more essential products in case of a strike.

There are 3,000,000 motor vehicles in use on the farms of the country, including 139,000 trucks. If the motor vehicles in any large community were mobilized for the emergency, they could readily handle the suburban and inter-urban passenger traffic which ordinarily goes to the railroads. This is true even in great centers like New York and Chicago.

## Government Makes Mobilization Survey

Proposed Method: Would Force Allocation to All Centers of Population

WASHINGTON, Oct. 18—Mobilization of motor vehicles under governmental auspices has again established the essentiality of motor trucks. Government officials frankly admit their dependence upon this mode of transportation to stave off the effects of a railroad strike which is regarded as almost a certainty.

Survey of motorized equipment owned or controlled by the Government has been ordered by the Secretary of War. Plans drafted by the Council of National Defense to meet transportation emergencies are being studied with a view to revision to meet changed conditions.

### Ascertaining Location

As the crisis develops all agencies, private and governmental, are inquiring into the number of trucks and other motor vehicles available and their location. There has been some talk of creating as an emergency position a Director of Traffic who would co-operate with various governmental agencies in getting motor vehicles to strategic points.

This method would force allocation of trucks to centers of population. However, no definite plans have been made up to this time as governmental agencies are using all influence to bring about an amicable adjustment of the differences between the railroad operators and workers.

### Army Has 31,529

Statistics furnished AUTOMOTIVE INDUSTRIES to-day show that the War Department has available 31,529 motor vehicles of all sorts which are serviceable. These machines are located at army depots, posts and warehouses throughout the country and could be sent to various cities whenever desired. These machines would be operated by the army personnel and it is possible that some would be turned over to the Post Office Department for transportation of mails and foodstuffs.

Inquiry shows that the Bureau of Public Roads has 1197 trucks, 215 automobiles and 27 ambulances in service throughout the country. Other statistics show that 21,124 trucks have been delivered to various State highway organizations out of a total allotment of 27,983 vehicles.

The Bureau of Public Roads says that highway transport was never in better position to meet demands for transport-

(Continued on page 797)



## Peerless Anticipates Capacity Production

Goal Set by Collins Would Mean Output of 10,000 Cars Yearly

CLEVELAND, Oct. 17—Capacity production for the Peerless Motor Car Co. within a comparatively short time is the goal set by R. H. Collins, new president and general manager.

This means the turning out of cars at the rate of 10,000 per year. At the present time the output is about 10 cars a day or at the rate of about 3500 cars a year. Last year the plant turned out 6000 cars.

These figures indicate that Collins has a man's sized job on his hands. But there have been developments which have caused men in the financial district here to believe that the goal will be reached and at no distant period.

With the vigor and intelligence that marked his connection with Cadillac, Collins has gone about his task as president and general manager of Peerless. While the ink on the contract for the sale of the plant was wet, he had plans already under way for the development and expansion of the business.

Some of his confidential advisers have been on the job at Peerless for some time. These experts have been in conference with W. H. Staring, production manager, and other officials of Peerless. B. H. Anibal, former chief engineer of the Cadillac company, and a body engineer who is nationally known are two men who have been representing Collins in what has been going on at the Peerless plant since the purchase of the controlling interest.

Collins would not discuss his plans before he left the city for a short trip to the West. It is said, however, changes will be made in methods in the company's sales organization, and that gaps in the organization will be filled. No changes in the personnel are contemplated at present.

The old officials left Collins a rich heritage in the form of financial stability. Cash and securities on hand aggregate a value of \$4,000,000, while the quick assets total \$8,000,000. The outstanding bills amount to but \$400,000.

## Body Builder Buys Moore Motors Plant

DANVILLE, ILL., Oct. 17—Idle since the failure of two years ago, the plant of the Moore Motor Co. here has been purchased by the L. C. Graves Co., a corporation of Springboro, Pa., manufacturer of commercial car and truck bodies, and will be operated under the name of the United Automotive Body Co., employing approximately 500 men. The new company will be capitalized for \$1,250,000.

The United Automotive Body Co. of Cleveland was recently absorbed by the

## KEEP DOORS CLOSED ON JACKSON MERGER

NEW YORK, Oct. 19—Close secrecy still shrouds the proposed merger of 14 automotive companies in which the Jackson Motors Corp. and the Traffic Truck Co. will be included. It is believed, however, that the various companies will be taken over by the Associated Motor Industries, which has been incorporated in Delaware with a capital of \$80,000,000.

Every effort has been made to prevent information concerning this corporation from becoming public. The papers were filed by the Corporation Trust Co. of America, which is located in Wilmington. The incorporators of record are attachés of the trust company.

No clues are contained in the incorporation papers and the Wilmington company declines to reveal even the name of the attorney or where the offices outside of Delaware are located.

L. C. Graves Corp. The latter was organized in 1870 for the manufacture of horse propelled vehicles. F. O. Darling is general manager and R. M. Hawn chief engineer of the Graves company. The former will make his headquarters here.

The Cleveland office is to be closed, but branches at Detroit, Lansing, Toledo and Youngstown will be continued.

## Associate President of Lafayette Resigns

INDIANAPOLIS, Oct. 17—Charles W. Nash, president of the Lafayette Motors Co., announces that he has accepted the resignation of D. McCall White as associate president of the Lafayette company. White feels that the corporation has reached a point in its development of the Lafayette car where his services as a designing engineer are no longer required. Management of the company will not be affected in any way and no successor to White will be appointed.

## Dunlop Stock Falls with Dividend Passing

LONDON, Oct. 15 (By Cable)—The Dunlop Rubber Co., Ltd., has passed its dividend on £5,000,000 of preference stock because of the depreciated value of rubber and cotton supplies on hand. This decision seriously affects the prospects for a dividend on the parent tire stock.

The announcement resulted in further depreciation of all classes of Dunlop stock. Some critics regard the passing of the dividends as a conservative policy but others recall that the company issued 3,000,000 pounds sterling of 8 per cent debenture stock to straighten out its financial difficulties only a few months ago.

## Ford May Purchase Another Railroad

Secures Option on Line Which Will Give D. T. I. Entrance to Cincinnati

CINCINNATI, Oct. 17—The following copyrighted dispatch bearing a Cincinnati date line has been sent out by the United Press:

Possibility of a Henry Ford railroad extending from Detroit to Cincinnati was intimated in Ford's exclusive statement to the United Press that he had secured an option on the Cincinnati, Milford & Blanchester, which gives his Detroit, Toledo & Ironton an entrance to Cincinnati.

B. H. Kroger, one of the principal owners of the C. M. & B. traction line, announced that Ford held an option on the road.

Although his party is not concerning itself with negotiations for purchase of other lines, Ford announced that his secretary was to consult with officials of the Cincinnati, Milford & Blanchester Traction Line.

"If the figure is right I have told my secretary to notify officials of the road that I would be interested," he said. The road would be converted into a branch of the Detroit, Toledo & Ironton Railroad.

"If the Government will let me have Muscle Shoals I'll teach it something about solving unemployment problems," he stated further.

Ford would not go into details about his plan.

"There are jobs in this country for every man who wants to work," he said. "The solution of all this trouble is simple after it has been explained, but it is too long a story to tell now. We have shown this country something about employing men, but that is only a start to what we can do if we get Muscle Shoals."

The Muscle Shoals plant was established by the Government during the war for manufacture of nitrates. Ford offered to take over the establishment to manufacture fertilizer, but his offer has not been accepted.

## Kansas City Bringing Delinquents to Court

KANSAS CITY, Oct. 18—The number of suits on account being filed in the county circuit courts, indicates that merchants are going after delinquent customers most aggressively. Among the suits are numerous ones for the recovery of motor cars or trucks, sold on time, or on which petitioners hold notes.

It is evident, without the direct testimony of merchants, that "patience has ceased to be a virtue," and that they have carried the delinquents as long as they care to.

Among the suits are noted several against garages.

## Business Reviving, Truck Sales Show

### Better Country-Wide Conditions Indicated by Increasing Need for Transportation

NEW YORK, Oct. 17—Steadily increasing sales of motor trucks of all capacities have tended to arouse an even greater feeling of confidence in the automotive industry than the surprising way in which passenger car sales have held up. The demand for motor trucks fell off in direct proportion to the general business depression and the fact that many more trucks are being purchased demonstrates conclusively that business as a whole is coming back.

#### Freight Cars Move

When there were no goods to be moved there was no need for trucks but with the general expansion in manufacturing and the increasing need for transportation, trucks have come into their own again as the best means of handling short haul business. Truck sales have risen steadily as the number of idle freight cars on the railroads has decreased, showing the close relation between rail and highway freight traffic.

Sales by approximately 60 of the leading truck companies for the second quarter show an increase over the first quarter of more than 5000 or nearly 40 per cent. In many cases companies reported an increase of 100 per cent in sales. This was particularly true in the case of those specializing in heavier vehicles. The Dodge truck business for the second quarter increased 500 per cent over the first quarter. When production figures for the third quarter are available they will show, in general, fully as great a gain over the second quarter.

#### Heavier Types in Demand

Among manufacturers of the heavier types of truck International Motors and the White Co. are leading their competitors by a considerable margin. The former, which has been doing a satisfactory business all through the year, delivered more trucks in September than in any month since June and for the first 10 days of October took twice as many orders as for the same period in September. The White company has shown a steadily increasing business each month since May. The Packard company reports deliveries of commercial vehicles in the Metropolitan district 50 per cent larger in September than in August and that the present month promises to be equally good.

Pierce-Arrow also is doing a much better truck business. The Autocar Co., which had an increase of 100 per cent in the second quarter over the first quarter, reports that while July and August were comparatively dull there was a marked increase in demand in September and that October promises to be the best month of the year.

While there almost always is a sea-

### TWO TIRE PRICES CUT; MAY BE GENERAL MOVE

AKRON, Oct. 18—The Miller Rubber Co. announces to-day a 15 per cent reduction in price on the two most popular sizes of its fabric non-skid automobile tires. This is accepted in Akron as the beginning of another general tire price cut, although no other Akron company will admit that it contemplates reductions. The Miller reductions cover the 30 x 3½ and the 30 x 3 sizes.

KENT, OHIO, Oct. 18—D. M. Mason, general manager of the Mason Rubber Co., announces a 15 per cent price reduction on cord tires, effective at once. He states that the cut is made possible by capacity production and "absolute freedom from high cost inventories."

sonal slump in the sale of passenger cars in the winter months, truck business does not fall off to such a great extent and it is probable that manufacturers of commercial vehicles will be able to make a very satisfactory showing on the year's business.

### Forming Shaw Motors to Produce \$700 Car

DETROIT, Oct. 17—Shaw Bros. Motor Car Co. is being organized in this city for the manufacture of a four-cylinder car which will sell for between \$700 and \$800. The car will be conventional in its type, but will embody several new construction features which will be patented and limited to exclusive Shaw use.

The car will be known as the Shaw Bros. or Shaw, the name not being fully determined. It has been designed by E. R. De Luiz, formerly an engineer on the Ford staff, and experimental models are nearing completion. E. P. Telotte, former Buick representative in this city, has been named sales manager of the company.

The Shaw brothers, William and Roy G., who are heading the new company, are well known in Detroit automotive and financial circles. Roy G. Shaw was formerly a factory executive at the Ford plant, while William Shaw has been connected with Buick in sales capacities. The company will be capitalized at about \$3,000,000. The first cars will be exhibited at show time.

### Set Definite Dates for Argentine Show

BUENOS AIRES, Sept. 19 (By Mail)—The dates of the fourth automobile exposition of the Automovil Club Argentino, in the Pabellon de las Rosas, have been fixed as Nov. 12 to 27.

## Straight Side Tire Campaign Started

### Rubber Association Will Distribute Booklets Extolling Advantages Over Clincher Type

WASHINGTON, Oct. 17—More than 50,000 booklets extolling the advantages of the straight side over the clincher type of tires will be distributed in various countries by the Rubber Association of America in its work of developing world sales on American-made tires. This booklet is now being put on the press, its translation into several languages having been finished. An effort will be made to circulate the first copies in England before the close of the Olympia show in November.

The straight side campaign is the work of P. L. Palmerton, who recently resigned as foreign trade secretary for the association to become chief of the rubber division of the Bureau of Foreign and Domestic Commerce. Palmerton is the author of the booklet now coming off the press and its distribution will be under his supervision, this work having been retained by him when he left the association.

The records in Palmerton's office show that the straight side is continuing to gain popularity throughout the automotive markets of the world. This also is true of cord tires larger than Ford sizes. Practically 25 per cent of all tires exported in August were of cord construction, and nearly four-fifths when the Ford sizes are eliminated. Sales of cords in the Ford sizes are growing in the foreign field, but the percentage is still small, fabrics dominating this branch of the business.

### Favor Reorganization of Texas Motor Car

FORT WORTH, Oct. 17—Group meetings are being held wherever in the Southwest enough stockholders live to vote on assessing shares for reopening the Texas Motor Car Association. Thus far, the meetings have resulted in approval of the assessment. Two hundred stockholders have given their assent to the plan.

It was announced accordingly by Chairman L. W. Hilbrun of the assessment committee that reorganization would be started immediately in the affairs of the company and the factories in South Fort Worth will resume operation. At present, the company is in the hands of two receivers who are operating only the body works and repair shops. Production was discontinued last fall.

The group meetings will continue all this month, or until every stockholder has been given an opportunity to vote for or against the assessment. The stockholders are being assessed 25 per cent of their original stock in the company. Many have paid in the actual cash.

## Ricardo Will Read Paper Before S. A. E.

Program of Society for Winter  
Season Will Include Three  
Meetings

NEW YORK, Oct. 18—The winter meetings of the Society of Automotive Engineers will include the annual meeting in New York, Jan. 11-14; a meeting in Chicago on Feb. 1 and a tractor meeting in Minneapolis, Feb. 8.

Harry R. Ricardo of London has accepted the society's invitation to present one of the principal papers for the annual meeting. This will deal with his automotive research work, some records of which have appeared from time to time in AUTOMOTIVE INDUSTRIES.

Among the reports to be submitted to the standards committee is that of the Iron and Steel Division, revising and bringing up to date the present S. A. E. steel specifications. H. M. Crane, chairman of the research committee, and Dr. H. C. Dickinson, manager of the new research department, will also submit reports.

Among other papers to be read at the annual meeting are the following:

Air-cooled Engines, by Charles Lawrence; Car Upholstery, by R. F. Quaintance; Body Seating Dimensions, by George E. Goddard; Manufacture and Application of Paints and Varnishes, by L. V. Pulsifer; California Tops, by Paul W. Steinbeck. Papers on lubrication will be presented by Dr. Herschel of the Bureau of Standards, Prof. R. E. Wilson of Massachusetts Institute of Technology and Nell MacCull of the Texas Co. The Fuel Session will include papers on Spectroscopic Studies of Combustion by Thomas Midgely, Jr., and W. K. Gilkie; Evaporation of Engine Fuels by O. C. Berry and Measuring detonation by T. A. Boyd. The Bureau of Standards will co-operate in providing material for this session.

The Material Session will include papers on Aluminum Alloys by Zay Jeffries, Malleable Iron by Enrique Touceda, Rolled Forgings by G. R. Norton. Papers on drop forging practice and alloy steels are expected.

The Passenger Car Session will be devoted largely to discussion of brakes, with a paper on this subject by J. Edward Schipper, and one by S. Von Ammon on Brake Lining Tests at the Bureau of Standards.

The meetings in New York, Chicago and Minneapolis will include the usual dinners.

## Motor Vehicle Value Told to Hardware Men

ATLANTIC CITY, Oct. 20—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, in an address to-day before the annual convention of the National Hardware Association declared that "a few years more will see America on wheels, with millions of motor cars and trucks co-ordinating their service with the railways, waterways and trolleys."

## MEN REPLACE WOMEN AT REMY FACTORY

ANDERSON, IND., Oct. 18—Announcement has been officially made at the Remy Electric Co. plant that its contribution to the nation-wide effort to relieve unemployment would be the placing of men in positions now held by women, particularly in the cases where married women are concerned.

Five women in one department also have husbands employed by the factory. It is understood that these will be the first women to go. World War veterans, it is planned, will be given preference in filling places of women, although the announced policy of the company is that married men first will be employed.

"Our people demand the best form of transportation, and the motor vehicle, whether for merchandise, for bus lines or for individual service, will on meritorious performance secure its share of patronage, with the proper share going to the railroads, trolleys and waterways," Reeves said. "Each has its place and each can be helpful by increasing the efficiency of the nation."

## Mitchell Producing New 6-Cylinder Engine

CHICAGO, Oct. 17—W. L. Jacoby, president of Mitchell Motors Co., Inc., entertained 75 of his distributors at a dinner at the Blackstone Hotel here to announce to them the production of a new six cylinder engine. The following day the whole party was taken to the factory at Racine, Wis., to see demonstrations of the new product.

Speed and hill climbing tests were given and it is said that the characteristics of the new engine stood out prominently in these tests. The engine is known as the F-50 and the features of it, as claimed by the Mitchell engineers, are greater fuel economy and flexibility. The distributors were enthusiastic over the performance of the new product and reciprocated with orders that will enable the Mitchell plant to increase its production schedule for some months ahead.

## Goodyear Sales Exceed Business of Year Ago

AKRON, Oct. 17—As a striking instance of the distance the rubber industry had swung back toward normal, Edward G. Wilmer, president of the Goodyear Tire & Rubber Co., states that notwithstanding the fact that sales during the first six months of 1920 had exceeded those of any period in the company's history, more tires had been sold during the 10 months up to Oct. 1, 1921, than in the same period a year ago. In September the company sold 69,000 more tires than in September a year ago, Wilmer says.

## Runabout Brings Rover Big Profit

British Company Is Proposing to  
Distribute Dividend of  
10 Per Cent

LONDON, Sept. 30 (By Mail)—Profit of the Rover Co., Coventry, for the year was \$511,595 compared with \$655,000 in 1919-20 and \$720,340 in 1918-19. It is proposed to pay a dividend of 10 per cent, put \$50,000 to the reserve, write \$50,000 off the cost of the employees' canteen and sports club and carry forward \$168,740 as against \$132,140 brought in.

This company has paid several very large dividends in the past but in October, 1919, the shares were doubled by a bonus distribution, and the dividend, which just before had been 25 per cent was reduced last year to 10 per cent free of tax.

Most of the year's success is attributed to the air-cooled two cylinder light runabout which has had an output nearing 200 a week for some time. The company's other model, a "12" of conventional type, has suffered by this change in demand, but it is fairly certain that as soon as manufacturing costs fall enough to cut the sales price discrepancy, which is about 100 per cent between the two cars, the more expensive model will regain its pre-war favor.

The likely advent of similar light cars announced by the Wolseley, Belsize and others indicates that competition will be intensive in this class of car which must militate against the Rover company's chances of earning the big profit just announced. The Rover company, however, is more fortunate than some of its competitors in the line in having the capital to finance the purchase of material at lowest rates, and in having but one stable type, as compared with the three or even five models of some other companies entering the air-cooled light car market.

## Madison Tire Adopts Expansion Program

BUFFALO, Oct. 17—A general expansion program has just been inaugurated by the Madison Tire & Rubber Co. of Buffalo.

The officials state that their finances are in excellent shape and that the expansion of their distributors' organization is based on the substantial financial condition of the company.

J. M. Dine, general sales manager, recently with the Oldfield company, has been elected vice-president in charge of sales. Frank H. Brewster, who has been with the company as superintendent for 20 years, has been elected vice-president in charge of production. Charles B. Brewster, whose services with Madison date back to 1913, has been elected assistant treasurer. Fred Griscomb is the chief engineer.

## 3,000,000 Tires Liquidated in Year

**More Than \$50,000,000 Has Been  
Released by Akron  
Manufacturers**

AKRON, Oct. 17.—The extent to which Akron rubber tire manufacturing companies have readjusted inventories and have re-established themselves on a substantially sound basis of operation both from the standpoint of available working capital and from the viewpoint of potential sales, is revealed by announcement of the fact that since Jan. 1 approximately 3,000,000 tires have been liquidated out of finished goods inventories.

This estimate is conservative according to officials of the B. F. Goodrich Co., who state that an actual survey of inventory readjustments of Akron companies, both in Akron and in warehouses scattered throughout the country, no doubt would show a much heavier tire liquidation. Goodrich alone since Jan. 1 has reduced its finished goods inventory by more than one million tire units.

### More Capital Available

This heavy liquidation of tires has meant the release of between \$50,000,000 and \$75,000,000 in working capital with which to re-establish the tire industry on a sound basis, according to W. A. Johnson, Goodrich automobile tire sales manager.

This fact is significant from several viewpoints.

First, the release of more than \$50,000,000 in working capital makes available finances with which to now expand finished goods inventories and also provides working capital with which to lay plans for a substantial spurt in the tire industry next year.

Second, the heavy liquidation of tires means not alone increased production, but the re-employment of perhaps thousands of men before Jan. 1 in Akron tire factories.

### No Low Ebb Production

So far this year, for every tire built from two to three tires have been sold. With inventories down to a basis of rock bottom and as low as they perhaps ever will be in the history of the industry, all major tire companies are in a position to expand inventories. From now on until such time as inventory expansion is definitely undertaken, the present status of the industry in Akron means that for every tire sold a tire must be built.

Johnson emphatically disputes the generally accepted belief that Akron and the tire industry face another disastrous winter of low-ebb production, straitened financial circumstances for the major companies, and heavy unemployment of men. He cites the present status of the tire industry on a basis of inventory liquidation, to corroborate his contention that by Jan. 1 the tire industry will be back to normal and that soon

## 1251 SUGGESTIONS MADE IN FRANKLIN CONTEST

SYRACUSE, Oct. 17.—The Franklin Automobile Co. has distributed \$3,600 in prizes among its employees as a result of the "suggestion system" put into effect last March. The plan was adopted to cut down the cost of production without lowering the quality of the car. In all, 1251 suggestions were submitted during the first six months and of this number 503 were adopted. There were two first prizes of \$400, two of \$300, three of \$200 and two of \$100. The rest graded down to \$10 each.

after the first of the year the industry will be normal with a plus sign after the word.

One tremendously significant point brought out by Johnson is the fact that the number of tires now constituting finished goods inventories is less to-day than the number of tires Akron companies were forced to keep in transit a year and two years ago.

Another significant statement made by him is to the effect that even in the face of one of the worst industrial depressions recorded in the history of America, the automotive industry, of which the tire industry is part, has made progress.

## Changes in Directorate Made by Fisk Rubber

NEW YORK, Oct. 18.—The Fisk Rubber Co. has made changes in the personnel of its directorate following the financing recently arranged by local bankers. The board has been increased from seven to nine members. The new directors are William F. Cutler, James Dean, Richard S. Russell and Ralph H. Bollard. The resignation of J. D. Anderson, F. T. Ley and G. A. Ludington were accepted. H. G. Fisk, formerly treasurer, has resigned to become vice president.

The treasury department will be centered in New York as a result of the change in policy of transferring the executive departments of the Fisk, Federal and Ninigret companies, under the recent readjustment, to this city.

## 97,651 Cars and Trucks, Ford September Output

DETROIT, Oct. 18.—Ford Motor Co. announces final compilations for September production of domestic and foreign plants was 97,651 passenger cars and trucks. Of this 2,937 were made in Canada and 4,525 at other foreign plants. In addition, 827 tractors were turned out.

All Ford assembling plants are in operation. September output at Detroit of 7,408 vehicles was highest. Kearny was second with 7,036, followed by Chicago with 6,000 and St. Louis with 5,525. October schedules call for total output of 90,000 cars.

## Makers Announce New British Cars

**Armstrong Siddeley, Wolseley and  
Austin Among Firms Describ-  
ing Late Models**

LONDON, Oct. 3 (*By Mail*)—A number of British manufacturers are permitting announcements concerning their new models and programs to appear much more in advance of the Olympia show than has hitherto been the case.

The new 18 hp. six-cylinder Armstrong Siddeley (2½ x 4½ in.) proves to be merely a smaller rendering of the 30 hp. six-cylinder chassis, which it will supplement and not displace. Another and still smaller new model is also in preparation by the same maker, but this will be on quite different lines.

### Armstrong Siddeley

The 18 hp. has valves in the integral heads of the cast iron cylinders (the latter formed in threes), push-rod operation and full pressure lubrication. Magneto ignition is continued and also the other main features of the "thirty," that is, dry multi-plate clutch, gearset as unit with front end of torque tube, helical bevel drive, disk wheels, with steering pivots vertical and central, and Marmon type frame and footboards. It will sell at £795 with four-passenger body.

The new light Wolseley, a 7 hp. two-cylinder, water-cooled runabout, will supplement the three existing models, viz. 10 hp. and 15 hp. fours and 20 hp. six. It will be more expensive, though probably better finished externally, than the 8 hp. aircooled Rover, which will be one of its chief competitors, for the selling price will probably be £300.

### Austin's Late Model

Austin's new model is a 12 hp., four-cylinder (2½ x 4 in.), and this also is much on the same lines as the 20 hp. four, which is to be continued. It has a detachable L head engine, magneto ignition, single plate clutch, four-speed gearset and spiral bevel drive, and with a small four-passenger body will be sold at about £550, which compares with £695 for the "twenty."

Although several firms, Rover, Hummer, Daimler and others, have recently made definite announcements as to reductions and prices for the whole of 1922, it appears to be not at all unlikely that they may after all be modified again before the show. The price of the Armstrong Siddeley is causing a flutter and there are other firms still to make their 1922 figures known.

### DRIGGS STARTS PRODUCTION

NEW HAVEN, Oct. 15.—The Driggs Mfg. Co., which was formed some time ago to build a line of passenger cars, has completed the test car and a first lot of twenty-five cars is being put through for production.

## CITIES MAINTAIN SALES PACE IN OCTOBER

### Drives Help Chicago

CHICAGO, Oct. 17—Under strong sales drives, Chicago business so far in October compares favorably with September, except for Buick's report of a 25 per cent decrease. Dodge is exactly even, Studebaker even, Nash shows a slight decrease, Mitchell a decrease in the country, Cadillac is even, Pierce-Arrow below normal but equal to September. Other lines place business on the September level.

### No Gain in Minneapolis

MINNEAPOLIS, Oct. 17—Broadly speaking, the retail situation shows no gain over September. However, the Ninth Federal Reserve Bank here now owes no outside banks as against \$24,000,000 in November last year. The re-discount rate has just dropped a half cent, the last of the reserve banks to come down. This liquidation and lower rate is expected to be reflected in the motor trade but perhaps not this fall. There is a feeling that price reductions are not over and, therefore, that this is no time to buy. Outside dealers have not been able to borrow adequately on car shipments.

### Good Columbus Demand

COLUMBUS, Oct. 17—Despite the fact that the season for the sale of passenger cars is waning, Columbus dealers have been having a fairly good demand. This is especially true of the lower and medium priced lines. Cars averaging between \$800 and \$2,200 have been selling rather briskly when industrial conditions are taken into consideration. The tone of the trade shows a distinct improvement and more optimism has developed among the dealers.

### New Orleans Behind

NEW ORLEANS, Oct. 17—New Orleans automobile dealers report business for the first part of October, while holding up fairly well, is somewhat slack as compared with September. This applies more particularly to used cars, which problem the local dealers have so far failed to solve. Part of the slowing up is attributed to the general moving which occurs about this time of year.

### Slowing Down in Buffalo

BUFFALO, Oct. 17—Sales of new cars here have slowed down considerably since the beginning of September, although there are a few exceptions among the dealers who report that business is good. All the dealers believe, however, that by next spring conditions will be entirely satisfactory.

It is the used car problem which is giving the Buffalo dealers the greatest concern, for this market has become very sluggish although all sorts of expedients have been adopted to increase sales. The Buffalo Automobile Dealers' Association

has decided to hold its annual show in January instead of in March as has been the custom, in the hope of stimulating sales.

### Slackening in Des Moines

DES MOINES, IOWA, Oct. 17—With one or two exceptions, the leading dealers of Des Moines report a material falling off in October retail business as compared with September. Percentages of decreases vary from 30 to 50. One dealer reports a slight improvement and another no change. Ford business is 10 per cent under September. Some good enclosed car business is in sight and is expected to bolster up business the latter part of the month.

### Increase in Birmingham

BIRMINGHAM, Oct. 17—With more money in circulation and the Alabama State Fair ushering in October, retail automobile sales for the first half of the month are about 10 per cent higher than for the same period in September. The semi-centennial celebration and the automobile show are expected by conservative dealers to bring them 25 per cent over last month's sales. Fords continue to lead with an average of 15 cars daily compared with 11 in September. Other makes show about the same proportionate gain.

### Decline in Atlanta

ATLANTA, Oct. 17—Retail automobile sales in Georgia for the first half of October are estimated at about 50 per cent of sales for the first half of September. License receipts to Sept. 15 will more than double receipts to Oct. 15.

### Los Angeles Expects Cuts

LOS ANGELES, Oct. 17—October retail sales are running behind those of the corresponding period in September. The reason assigned by dealers is an anticipated price decline early in the year. The public responded strongly to early announcements of lower prices and subsequent advertising that cuts meant stabilization of the industry and that a further decline could not be expected. The most recent reductions apparently have destroyed buying confidence. There is practically no demand for used cars priced above \$1,000.

### Decrease in Youngstown

YOUNGSTOWN, Oct. 17—Sales of high priced cars have increased 10 per cent for the first half of October as compared with the first half of September. Sales of Fords and Dodges decreased 20 per cent. Cars in the intermediate class showed a decrease of 10 per cent and the general average was a decrease of 18 per cent in retail sales with little money available for down payments.

### Increase in Denver

DENVER, Oct. 17—Reports from leading dealers show October sales ranging from 65 per cent to 125 per cent of the first half of September. One dealer, whose sales were slightly below September, explains that the difference is due to a temporary shortage of enclosed models and expects the October total to be ahead while some predict the month will show a little less and others that it will prove equal or better.

### Indiana Spotty

INDIANAPOLIS, Oct. 17—Retail sales of automobiles continues even with September in the southern counties of Indiana. Northern counties generally are not so good while counties in the central part of the State are doing about the same amount of business in October as in September, with isolated spots showing an increase reflecting local industrial and business conditions. Indianapolis business is little changed from the latter part of September.

### Car Week Helps Detroit

DETROIT, Oct. 17—October business in Detroit will exceed September in all classes of cars. The increase has been helped along materially by the enclosed car week under the auspices of the dealers' association. The majority of dealers declare October already is surpassing September. The used car situation is the most serious deterrent to sales.

### Cuts Not Felt in St. Louis

ST. LOUIS, Oct. 17—October sales are on a par with September. Publicity on the show which opened Saturday has had a tendency to slacken sales for the past few days with the exception of a few popular makes. The used car market is flooded and the situation is getting serious. Price reductions are not increasing sales to any great extent.

### Running Even in Topeka

TOPEKA, Oct. 17—According to retailers, sales for the first half of October have been up to September's high record for the lower priced cars. In the class above \$1,000, however, a much slower pace is being maintained. The used car market has been fair, the output going mainly to farmers. Bankers of the State are assuming a more liberal policy toward automotive paper.

### Weather Affects Milwaukee

MILWAUKEE, Oct. 17—October retail sales generally are reported to be holding their own with September although some dealers find that the interest aroused by early September price reductions gradually disappeared in the last two or three weeks. The used car market is glutted. Sales have been slowed up by cold weather.



## Truck Operators Form Association

### Industries in Indiana Organize to Hold Conferences for Dis- cussing Needs

INDIANAPOLIS, Oct. 17—Believed to be the first organization of its kind, the Allied Motor Commerce, Inc., of Indiana, became a permanent organization here this week. Its constitution dedicates it to pursuits that can have an immensely valuable influence on the development of motor vehicle commerce.

The organization is not to replace any now in existence nor does it contemplate taking over the work of any of them. Its purpose is to provide a State conference of all industries using motor vehicles. Legislation, taxation, licensing and all regulatory matters will be primary interests. Through the central organization the full power of the motor commerce of the State can be brought to bear on every problem.

Membership in the conference must be by association, each group getting one delegate for every 100 trucks represented in the group membership. Each association must pay into the A. M. C. treasury \$1 per year per truck.

Interests represented in the permanent organization meeting were the Master Plumbers Association, Indianapolis Transfer Association, Indiana Transfer & Warehousemen's Association, Indiana Automotive Trade Association, Indiana Association of Electrical Contractors, Indianapolis Commercial Warehousemen, Indiana Highway Transport & Terminal Association, Indianapolis Coal Dealers Association, the Associated Cleaners & Dyers of Indiana, and the Indianapolis Sand & Gravel Association.

It is anticipated that by Jan. 1, 1922, the organization will have 17 Indiana State bodies affiliated, representing some 20,000 of the 45,000 motor trucks operating in Indiana.

### Complains Against Use of Franklin Tire Name

WASHINGTON, Oct. 18—Formal complaint by the Federal Trade Commission has been issued against A. S. Fox, trading under the name and style of Franklin Tire & Rubber Co., and L. Goodman. Fox, who has his headquarters at Chicago and a branch at Oklahoma City, Okla., is charged with simulating the name of a competitor, the Franklin Tire & Rubber Co. of Kent, Ohio, which is an Ohio corporation and a subsidiary of the Mason Tire & Rubber Co.

The complaint alleges that the Ohio firm through extensive advertising and quality of its products has become widely known to the trade, and that the use by A. S. Fox, as principal, and L. Goodman, as sales manager, in charge of a branch establishment, of the true corporate name has caused confusion in the trade and injury to the Ohio company.

## Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for September and Eight Previous Months

	Month of Sept.				9 Months Ending Sept.			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes .....	5	\$17,370	8	\$31,000	46	\$398,574	43	\$271,940
Airplane parts .....		9,331		3,956		516,689		132,534
Commercial cars .....	1,747	3,035,028	472	481,664	22,114	34,592,857	5,945	8,714,623
Motorcycles .....	1,841	566,217	627	151,380	26,579	7,272,387	9,240	3,011,286
Passenger cars .....	10,432	12,550,796	2,197	1,870,770	110,226	124,399,542	23,900	26,378,612
Parts, not including en- gines and tires .....		7,311,951		8,570,860		62,426,871		31,126,453
<b>ENGINES</b>								
	Month of Sept.				9 Months Ending Sept.			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas .....	2,477	\$397,929	539	\$133,229	29,530	\$4,776,381	6,577	\$1,390,148
Marine, gas .....	539	201,586	197	69,440	7,510	2,408,028	3,591	1,283,891
Stationary, gas .....	2,833	445,363	402	75,307	22,537	3,998,216	7,931	1,901,406
Tractor, gas .....	2,303	2,137,703	72	24,557	17,634	16,834,453	2,697	3,314,473
<b>Total .....</b>	<b>8,152</b>	<b>\$3,182,581</b>	<b>1,210</b>	<b>\$302,533</b>	<b>77,211</b>	<b>\$28,017,078</b>	<b>20,796</b>	<b>\$7,889,918</b>

### New York Registered 4301 Cars Last Month

NEW YORK, Oct. 17—Registrations of new cars of '88 makes in 10 counties in and around New York City in September numbered 4301 as compared with 4575 in August and 7012 in June, the high month of the year.

The figures, compiled by Sherlock & Arnold, publishers of the Automobile Sales Analysis, show a drop of only 274 in September from the August total, which is less than a normal decline, as August usually has a spurt due to pre-Labor Day sales, while September ordinarily has a "dead" week immediately following this holiday, which brings so many people in from vacations and is given up to getting settled and back to work.

Registrations, which are equivalent to deliveries, in the 10 counties follow for the months of the year up to date:

	Approximately below \$2,500	Approximately above \$2,500	Total
January .....	483	146	629
February ....	1,409	210	1,619
March .....	3,396	488	3,884
April .....	4,811	575	5,382
May .....	5,468	584	6,052
June .....	6,522	490	7,012
July .....	5,457	386	5,843
August .....	4,216	350	4,566
September ..	3,986	315	4,301
<b>Total to date.</b>	<b>35,755</b>	<b>3,546</b>	<b>39,301</b>

### MAKING BUSES FOR AKRON

AKRON, OHIO, Oct. 17—The Northern Ohio Traction & Light Co. is constructing three 25 passenger buses, finished in style similar to the standard make of street car and shod with pneumatic tires and is planning to put them in operation at once on Akron streets not now traveled by street cars.

### Automotive Exports Show Distinct Gain

#### Striking Improvement Noted in Overseas Shipments of Parts and Trucks

WASHINGTON, Oct. 19—Automotive exports of passenger cars, motor trucks and parts, not including engines and tires, showed a distinct gain, when considered as a whole, during the month of September as compared with August. The monthly figures covering the foreign trade in these products, as announced to-day by the Bureau of Foreign and Domestic Commerce, showed a striking gain in the overseas shipments of parts and trucks whereas the passengers were practically at the same level as in the preceding month.

The comparative figures are as follows:

	Trucks		Cars		Parts
	No.	Value	No.	Value	Value
Sept. ..	472	\$481,664	2,197	\$1,870,770	\$2,570,860
Aug. ..	381	454,052	2,237	2,265,328	1,786,886

Other figures given in the monthly report showed that 627 motorcycles valued at \$151,380 were exported during the month as well as eight airplanes valued at \$31,000. To this should be added airplane parts worth an additional \$3,956. The total number of engines shipped during the month was 1210, with a value of \$302,533. Nearly one-half of these, or 539, were automobile engines, the majority of which, presumably, are for assembly into cars in other countries.

The report also shows that the sale of parts is continuing through this year at practically 50 per cent of last year's figures. For the first nine months of 1921, the value of parts shipped overseas was \$31,126,453. For the similar period of 1920, the value was \$62,426,871, tires not being included in either case.

## New Haven Railroad Orders Three Macks

### Rail Cars Will Be Used for Short Haul Passenger Traffic on Branches

NEW YORK, Oct. 18—The New York, New Haven & Hartford Railroad has placed an order with the International Motor Co. for three Model AC Mack rail cars which will be used to handle short haul passenger traffic on branch lines. This is taken as an indication of the interest being manifested by even the large trunk lines in automotive transportation as applied to railroad use.

The much greater economy of operation of motor-driven rail cars as compared to conventional rail equipment promises to be the salvation of many branch lines, many of which have had to discontinue service or will soon be compelled to do so because the expense of operating steam equipment exceeds the revenues obtainable for the service. Many of the smaller railroads have been using motor equipment for some time with such success that the larger railroads are now planning to use it on branch lines.

#### New Cars Larger

Several Mack rail cars using for the most part components employed in the Mack AB model truck have been in use by some short line roads for some months, but the cars ordered by the New Haven will be much larger and make a higher speed than those now in use. They will seat 36 as against 31 passengers, and will, in addition, have a baggage room 6 x 9 ft. at the rear. The engine and several other component parts are the same as are used in the Mack AC truck, but the leading four-wheel truck, rear axle and wheels, and the high speed reverse transmission which permits of operation in either direction at about the same speed, are special.

The major specifications of the new Model AC rail car are as follows: Four-cylinder engine, 5 x 6 in. with magneto ignition. Transmission, 4 speeds forward and 4 reverse. Final drive, shaft to bevel gear axle without differential, geared 4.53 or 5.36 to 1 and giving maximum speeds of 35 or 29 m.p.h. respectively. Wheels, forged steel, 20 in. front, cast steel 40 in. rear with locomotive steel tires shrunk on. Brakes on all six wheels, operated manually or by air. Springs, semi-elliptic front and rear with rubber shock insulators. Wheelbase, from center of leading truck to center or rear wheel 22 ft. Body, wood and steel, or all steel construction, inside dimensions 27 ft. 3½ in. by 9 ft. Electric starting and lighting and exhaust heating are provided for.

#### HAYNES BEFORE SENATE

WASHINGTON, Oct. 17—Elwood Haynes, president of the Haynes Automobile Co., appeared before the Senate

Committee on Manufactures to advocate the adoption of a metric system in this country. He explained the formula of the plan in detail in an effort to denote its simplicity and then compared it with the English system which was declared to be cumbersome and lacking in definiteness in terms used.

He was not speaking for adoption of the metric system particularly as an automobile manufacturer, but urged a change to this plan for general use and as the most efficient method.

### Durant May Establish Canadian Export Plant

MONTREAL, Oct. 18—Announcement is made by A. L. Caron of Caron Bros., after a conference in Toronto with W. C. Durant, president of Durant Motors of Canada, Ltd., that the new corporation is considering the establishment of a factory here which will give employment to approximately 2,000 men.

NEW YORK, Oct. 18—It was stated to-day at headquarters of Durant Motors, Inc., that consideration is being given the plan of establishing a factory in Montreal to manufacture cars for export. Nothing definite has been determined but a decision is expected within the next 30 days. If the plan is adopted it is probable the factory of Caron Bros. will be purchased. Caron may be associated with the Durant interests if his plant is taken over.

### Authorizes 100 Ford Tractors for Germany

DETROIT, Oct. 17—The Ford Motor Co. reports that foreign trade conditions are constantly improving. The Highland Park plant is making knock-down shipments to Buenos Aires and Copenhagen by way of New York. Sales in England are as good as they ever have been and the Ford business there is one of the sensations of the business world. Production at the Manchester plant is being maintained at 1000 a week.

The Inter-Allied Commission has authorized the shipment of 100 tractors to Germany. The machines will be made at the Ford plant in Cork, Ireland.

### Orders Portage Plant Sold to Seiberling

AKRON, Oct. 17—The Portage Rubber Co. has been ordered sold to F. A. Seiberling, formerly president of Goodyear Tire & Rubber Co., unless a new petition of demurrer is filed in 10 days by Harry L. Snyder, referee in bankruptcy. Creditors will receive between 75 cents and 80 cents on the dollar.

Liquidated claims amount to \$1,800,000; cash and accounts receivable, less reserve for doubtful accounts, amount to \$600,000. Inventory, which was figured at \$840,000, has appreciated to approximately \$1,000,000 since the receivership was inaugurated.

## Outlines Position of Stewart-Warner

### President Smith Says System Will Be Little Affected If In- junction Stands

CHICAGO, Oct. 17—C. B. Smith, president of the Stewart-Warner Speedometer Corp. of this city, in a formal statement points out the company's position with reference to the unfavorable decision of Judge Carpenter in the United States District Court in the litigation relating to patents on its vacuum feed tanks and explains that the company's manufacturing operations cannot be disturbed by the final outcome of the suit. President Smith says:

"In the recent decision by Judge Carpenter in the United States District Court in the case of Seager & Harrington vs. Stewart-Warner Speedometer Corp., concerning the vacuum tank manufactured by the Stewart-Warner corporation, it seems to be understood by the public that the Stewart-Warner corporation will no longer be in a position to manufacture what is known as the 'Stewart-Warner Vacuum System.'"

"The following are the real facts as issued by our patent attorneys:

"First—The decision does not open the way for the owners of the said patent to enter into the manufacture of vacuum feed devices which it enjoins us from making.

"Second—The recent decision of the United States Circuit Court of Appeals in the Sixth Circuit, in the case of Stewart-Warner Speedometer Corp. vs. Sparks-Withington Co., strongly sustaining the patent claims under which the Stewart vacuum system is made, has effectually prevented and will prevent either the Seager-Harrington patent owners or their licensees from entering upon the manufacture of the Stewart vacuum system.

"Third—Even in the highly improbable event that the United States Court of Appeals of the Seventh Circuit should confirm the decision of the District Court on the Seager-Harrington patents, so that the injunction (now pending appeal) should come into effect, preventing the continuation of the present installation, the Stewart vacuum system would have to be changed only in a minor feature not at all vital to its efficiency in order to be entirely clear of the Seager-Harrington patents as most broadly construed by the recent decision of the District Court.

"Fourth—Car builders who have been dependent on the Stewart vacuum system for their equipment have therefore no occasion to be disturbed by this decision, as the Stewart-Warner Speedometer Corp. will be in a position to continue manufacture of vacuum feed devices of the same dependability as the present device and installation."

#### J. KARL BAIN DIES

INDIANAPOLIS, Oct. 17—J. Karl Bain, president of the Motor Appliance Co. of Detroit, was found dead in his room in a Fort Wayne hotel last night. He left Indianapolis Saturday afternoon for Detroit. He was secretary to Charles M. Fairbanks while the latter was vice-president from 1897 to 1905.

## Steam Cars Making New Popularity Bid

Two Will Appear in Market Near  
Show Time—Others in  
1922

DETROIT, Oct. 17—Steam cars are to make a new bid for popularity in the near future. At least two will make their appearance some time close to the regular show season and two others are expected on the market some time in the early spring or summer of 1922.

The most advanced of the new crop of steamers is the Coats, several announcements on which have already been made and for which its producers, Coats Steamers, Inc., of Indianapolis, hope to establish a strong demand early in 1922.

Scott Newcomb Motor Car Co. of St. Louis has a new steam car which its engineers proclaim to be correct in design from mechanical and economic viewpoints. Its steam producing principle is said to have overcome the faults commonly experienced in steamers and to present a thoroughly workable application.

Like the Coats, the Scott-Newcomb car has passed beyond the experimental stage and is rapidly nearing the market.

Other steamers known to be in the experimental stages are one to be produced by the Barlow Steam Engine Syndicate, this city, and another the conception of O. C. Trask of Trask-Kennedy Co., this city, automobile dealers. Of the latter too little is known except that they will be steam cars along new lines.

## Chassis Components Are Olympia Feature

LONDON, Oct. 15 (*By Cable*)—The truck show at Olympia opened yesterday with a big display of gasoline vehicles as well as a fair showing of steam and electric trucks. A feature of the show was the number of chassis components.

There was a large display of municipal trucks and covered coaches which promise to supplant the open type. Few novelties were to be found.

The general tendency of prices is downward.

While the attendance was not large, the opening speeches indicated a fairly optimistic outlook. The textile trade is improving and a sharp cut in the price of steel has just been announced.

There was a fair representation by American makers, most of whom displayed small vans. The show included 80 vehicles besides 122 displays of component parts and tires.

## AUDITING PAN-AMERICAN

DECATUR, ILL., Oct. 18—Auditors now working upon the books of the Pan-American Motors Corp., producers of motor cars and motor trucks, believe that there is a shortage of \$20,000 to

## BUS MORE ECONOMICAL THAN RAIL, TEST PROVES

NEW YORK, Oct. 19—A test conducted by the Society of Automotive Engineers to determine the relative cost of railroad and motor bus transportation over long distances proved the motor vehicle to be distinctly more economical. The test was a trip from New York to Aberdeen, Md., and return, a distance of 352 miles. The total running time for the motor bus was 18 hours, making an average speed of 19 miles an hour.

The entire cost of the trip for gasoline, oil, wear on tires, depreciation on the bus, driver's wages and expenses, with 22 of the 25 seats occupied, was less than 1.25 cents per passenger mile. The railroad coach fare is 3.6 cents a mile. The passengers on the trip were members of the Society of Automotive Engineers.

\$40,000, nearer the latter figure, according to a statement from President Edward Danner. The auditors were placed upon the books when the disappearance of W. A. Phares, secretary-treasurer, became known.

## New Level of Prices Established by Essex

DETROIT, Oct. 20—The Essex Motor Car Co. has announced further price reductions as follows:

	Old Price	New Price
2-passenger .....	\$1,375	\$1,195
5-passenger .....	1,375	1,195
Coupe .....	1,880	1,395
Sedan .....	2,230	1,995

The reductions, it is stated, are made on anticipated market conditions in 1922. Open models are now \$180 lower than ever before. The reduction on enclosed models represents \$600 since September, 1920.

## DIXIE FLYER LOWER

LOUISVILLE, KY., Oct. 17—The Kentucky Wagon Mfg. Co., manufacturer of the Dixie Flyer, has made the following price reductions:

	Old Price	New Price
5-Touring .....	\$1,445	\$1,345
Sport touring .....	1,945	1,545
Roadster .....	1,445	1,345
Coupe .....	2,295	1,995
Sedan .....	2,345	1,995

These prices are f.o.b. factory and are subject to the war tax.

## OGREN INCREASES PRICES

MILWAUKEE, Oct. 17—The Ogren Motor Car Co. has made the following upward revision in its prices:

	Old Price	New Price
4-passenger .....	\$3,850	\$4,350
5-passenger .....	3,750	4,250
7-passenger .....	3,900	4,375
Coupe .....	5,000	5,200
Sedan .....	5,400	5,500

The company has changed to a Continental 6-T De Luxe engine.

## Dealers Opposing Tire Adjustments

National Association Will Also  
Take Up Question of Faulty  
Construction

CLEVELAND, Oct. 17—Delegates to the first convention of the National Tire Dealers Association, which convenes here tomorrow, will take action on a resolution which will be offered to put the association on record in favor of the elimination of all adjustments on tires. Representative dealers, who are backing the resolution, take the position that the adjustment is something that flares back on both the dealer and the manufacturer. The consumer passes it on to the dealer and the latter to the manufacturer.

The convention will be asked to go on record in favor of the manufacturer's replacing without charge, a tire that breaks down through faulty construction. If it is the consumer's fault he should be forced to buy a new tire, according to the terms of the resolution.

Another resolution will provide that the association shall propose and back legislation that will compel all dealers to tell patrons whether they are purchasing first or used tires.

F. A. Seiberling, former president of the Goodyear company at Akron, who is now building up a chain of tire companies, is on the program for an address on "The Future of the Rubber Industry." C. L. Nevin, assistant governor of the Federal Reserve Bank, will deliver a talk on the business outlook and E. S. Babcox, vice-president of the India Rubber Co., on "A Review on the Value of Co-operative Organization," at a banquet held at the close of the convention. A trip to Akron and Kent for a view of some of the largest plants in the industry and an exhibit of tires and accessories will be among the features of the meeting.

## No 3300 Truck Order for China, Hoover Says

NEW YORK, Oct. 17—Current reports that the Chinese Government was in the market for 3300 trucks and had closed a deal with a Canadian firm were denied by the Automotive Division of the Department of Commerce in a communication to the National Automobile Chamber of Commerce.

Merchants and officials in Shanghai were specially interviewed on this subject by the United States Commercial Attaché at the cabled request of this newly created division. They were of the opinion that the number of trucks reported sold to Shanghai Motor Co. was entirely out of proportion to the present market demand and furthermore that the Chinese Government has no funds available for subsidies to encourage motor truck transportation.

## Considering Future of Scripps-Booth

May Be Sold as Going Concern—  
Liquidation of Affairs  
Possible

DETROIT, Oct. 20—Officials of the General Motors Corp. are meeting here to-day to formulate definite plans for the future of the Scripps-Booth Corp. There is a strong probability that it may be sold as a going concern, but it is possible that its affairs may be liquidated.

Present plans call for an announcement that manufacture of the cars will be discontinued. This probably will be followed by a reduction in prices on those still on the market to insure immediate sale.

It has been proposed to move the present factory equipment from Detroit to another of the General Motors plants, whose organization would take over the servicing of Scripps-Booth cars now in the hands of owners and those which will be sold.

### Sarver to Be Transferred

Tentative plans call for utilization of the Scripps-Booth plant as a factory for the manufacture of Buick bodies. It is expected that A. H. Sarver, president and general manager of Scripps-Booth, will be transferred to another place in the General Motors organization. An effort will be made to supply Scripps-Booth distributors and dealers with some other General Motors line if they care to take it on.

The Scripps-Booth Co. was organized in 1916 to manufacture a light moderate price car. It was successful for some time, but its business eventually fell off and it was taken into the General Motors organization by W. C. Durant.

The General Motors Corp. owns 55,204 shares of the 60,275 shares of Scripps-Booth stock outstanding. The public holds 5071 shares.

### Corporation Formed in 1916

The Scripps-Booth Corp. was incorporated July 28, 1916, in New York, and acquired all the outstanding capital stock of the Scripps-Booth Co., manufacturer of Scripps-Booth cars, and the Sterling Motor Co., manufacturer of motors. The plants of both were in Detroit. The corporation issued in exchange for the stock of the companies it took over, 32,290 shares of its own capital stock which had no par value.

The corporation offered 25,000 shares for public subscription at \$50 a share in July, 1916, and 62,710 shares were offered to stockholders for subscription at \$8 per share on or before Nov. 1, 1917, to the extent of 1 1/10 times their holdings. At the time it was absorbed by General Motors no dividends had been paid.

When it was taken over by General Motors, A. H. Sarver was president of the corporation and W. H. Little was vice-president. Both retained their positions under General Motors management, but

## N. A. C. C. ACTS TO CURB HOTEL RATES AT SHOWS

NEW YORK, Oct. 20—The National Automobile Chamber of Commerce already has taken steps to prevent profiteering by New York and Chicago hotels during the automobile shows. A questionnaire has been sent to all hotel managers asking for their regular rates and other information.

They are asked to go on record as to whether they would require that a room be taken for a week regardless of the number of days it is used during the show and whether there will be any increases in rates because of the probable demand for accommodations.

Little has been in poor health for a long time. Directors of the corporation when it was purchased by General Motors included three men who later became prominent in the General Motors organization. They were W. C. Sills, F. W. Warner and Edward Ver Linden. Warner and Ver Linden have joined forces with W. C. Durant.

## Dodge Makes Ready for Canadian Plant

DETROIT, Oct. 17—Arrangements have been practically completed by Dodge Brothers for the manufacture of cars in Canada. A Canadian company with the same owners and officers as the American company has been formed and negotiations for a factory site in Ojibway, one of the border cities, are near the closing point.

An executive at the Dodge factory said they were prepared to go in for manufacture in Canada on a large scale as soon as they consider conditions right. This is not likely, however, to be for some time to come.

The Ojibway site, of 24 acres, on which the options are held adjoins the plant of the Canadian Steel Corp., Ltd. Funds have been placed in Canadian depositories coincident with the forming of the company, so that all preliminaries have been complied with pending the decision to proceed with construction.

Up to this time the Dodge business in Canada has been handled through a dock leased from the Canadian-Pacific Railroad, on which Dodge cars built in the United States were stripped of tires, windshield, lamps and batteries, and Canadian products substituted. The cars were run over to Canada under their own power.

### SAVAGE BUYS CANADIAN SITE

DETROIT, Oct. 17—The Savage Automotive Co., incorporated in Toronto as the Canadian branch of the English company, has purchased a site at Sandwich, Ont., for a factory and it is expected it will build a light car along the lines of the British product.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

The local money market last week displayed a firmer tone than in the previous week. Call money ranged from 5 per cent to 6 per cent during the week, with most of the business done at the latter figure. The range for the previous week was 4½ per cent to 5½ per cent. The stiffening of rates was attributed in part to Government withdrawals on Saturday from local banks of \$117,000,000 in preparation for maturing certificates of indebtedness and interest payments.

On Monday of the present week, following Government disbursements in excess of the withdrawals, call money renewed at 5 per cent with a low of 4 per cent, while on the "outside" market funds were available at 3½ per cent. Time money showed a firmer tone toward the end of last week when rates advanced to 5½ per cent for 60 and 90 days' paper, as against 5¼ per cent to 5½ per cent in the previous week. The longer maturities up to six months were unchanged at 5½ to 5¾ per cent. The commercial paper market remained unchanged, with few transactions.

The statement of the Federal Reserve System as of Oct. 11 showed a decline in the reserve ratio from 69 per cent to 68.5 per cent. This was a consequence of decreased gold reserves of \$3,667,000, increased bills on hand of \$23,608,000 and \$28,533,000 in deposits. Federal Reserve note circulation declined \$6,002,000. The statement of the New York Federal Reserve Bank, showing a decline of \$22,098,000 in total gold reserves, reflects the movement of funds to the interior to satisfy seasonable crop demands.

Gold imports for the month totaled \$66,515,000, as against \$39,110,000 in the corresponding month of 1920, while exports were \$2,448,000 as against \$17,129,000 in September of last year. As a result, the net excess of imports amounted to \$64,067,000 as compared with \$85,540,000 in August. The excess of gold imports for the nine months' period amounted to \$54,422,000, as against an excess of gold exports for the corresponding period of 1920 of \$60,443,000.

There have been further evidences of improvement in the industrial situation, especially as regards steel, copper and oil, although the horizon is at present clouded by the possibility of a general railroad strike by the members of the Four Brotherhoods on Oct. 30.

### CORRECTION

CLEVELAND, Oct. 18—The statement was made by AUTOMOTIVE INDUSTRIES of Oct. 13 in its announcement of the National Association of Automotive Bankers that the headquarters would be located in the Gotham National Bank building "in this city." The headquarters will not be located in Cleveland but in the Gotham National Bank building, New York.

## Willys to Establish Indianapolis Branch

**Distributors Whose Services Are  
Discontinued Will Remain  
as Dealers**

INDIANAPOLIS, Oct. 17—The Gibson Co. within the near future will discontinue its retail and wholesale distribution of Overland and Willys-Knight motor cars, which will be assumed by a new Indianapolis Willys-Overland branch, and will henceforth devote its entire organization and energy to its automotive accessory and equipment business.

The Gibson company is one of the oldest automobile and accessory concerns in the country. It began the distribution of Overland automobiles and of automotive equipment in the early days of the industry, 23 years ago. Its Overland territory has been the largest of any distributor.

In taking over the motor car distributing departments the Willys-Overland Co. will pay cash to the Gibson company for its automobile and parts departments, and will conduct the Indianapolis branch in the same building where the business has been located. The Gibson company will retain part of its present headquarters. R. E. Butler will be the branch manager.

### Distributors to Be Dealers

TOLEDO, Oct. 18—Many of the Overland distributors who have been eliminated from the Willys-Overland organization under the plan which will become effective Nov. 1, will remain as individual dealers. Dealers who formerly sold cars under distributors will deal direct with the factory distributing organization, which is Willys-Overland, Inc.

A considerable increase in export demand for Overland cars has been noted in the past few days. More than 1,000 orders for foreign shipments were received last week.

After payment by the company of another 10 per cent on its bank loans on Nov. 1, reducing them to \$16,000,000 from the peak of \$43,000,000 only a few months ago, the company will still have about \$6,000,000 in cash.

### Harper Joins Brother

PHILADELPHIA, Oct. 17—John N. Willys, head of the Willys-Overland Co., and Walter P. Chrysler, executive vice president and general manager, made addresses at a get-together meeting of 600 dealers in Overland and Willys-Knight cars, at which Harry B. Harper, retiring head of the Overland-Harper Co., was toastmaster.

Following the speeches, the dealers, who were from Eastern Pennsylvania, Southern New Jersey, Delaware, Maryland, Eastern West Virginia and portions of North Carolina, were introduced to the new house organization of Willys-

Overland, Inc., which succeeds the Overland-Harper Co.

Harper is now associated with his brother, Paul I. Harper, in the firm of Harper & Harper, handling Handley-Knight and Willys-Knight cars. Paul I. Harper for eight years served under Henry Ford. In 1910 he organized, with another brother, the Harper-Overland Co., in Washington. At the outbreak of the war he sold out his interest and went to France. After being mustered out of service in 1919, he joined the Overland-Harper Co., of Philadelphia, as secretary and treasurer.

### Drops Springfield Branch

SPRINGFIELD, MASS., Oct. 17—The Willys-Overland Co. is to discontinue its Springfield branch Nov. 1, and the distribution of its cars in this territory will be placed in the hands of some reliable dealer. This is in conformance with the company's policy of reducing costs and getting in closer relations with the dealers.

The Willys-Overland Building will be sold. This building was erected five years ago, and is one of the best-appointed sales and service establishments in New England. It is understood that William G. Northrup, the present manager of the Springfield branch, is to take charge of the Boston branch, which will be the distributing medium for this district.

### No Change in Republic

ALMA, MICH., Oct. 18—Colonel Frank E. Smith, first vice-president and general manager of the Republic Sales Corp., denies the rumor that the establishment of factory branches in Boston, New York, Baltimore, Pittsburgh, Detroit and Chicago foreshadows the replacing of the company's present system of distribution.

## Government Prepares Mobilization Survey

(Continued from page 787)

tation. Figures compiled by this agency indicate that all records for highway construction have been shattered this season and as a consequence thousands of miles of roads are open as safe and dependable arteries of commerce.

Post Office officials are speeding up repair work in garages and getting airplanes ready for service. The department has about 250 serviceable aircraft and this figure is greatly augmented by War and Government flying machines. It is believed that reserve aviators will be called into service if it is necessary to operate these planes for transportation of mails.

This department for a time operated a motor truck service to Washington, furnishing transportation for farm products. This system of truck to market may be revived. Government officials have stated that motor vehicles will be operated if necessary under Government supervision and with armed guards to prevent interference.

## Strike Will Find Plants Prepared

**Factories Are Well Stocked for  
November Business—Have  
Coal Supplies**

DETROIT, Oct. 18—Leaders in the automotive industry, though agreeing that the railroad strike would be a catastrophe to the business life of the country, are of the opinion that so far as the industry is concerned, it could not come at a more opportune time.

So far as shipping of finished cars is concerned, roads all over the country are open in November and driveways would not be impeded in any way by snow or weather conditions. No one wants to go back to driveways, but no transportation tie-up will stop deliveries except to far distant points.

### Driveways Unhampered

Unimpeded roads will also permit factories to use their trucks to bring in supplies where needed, although most factories find themselves fairly well stocked for taking care of November business. Factories with their own power plants are well stocked with coal in most instances, and the Detroit Edison Co., with its lesson of the last tie-up still fresh, has ample stocks for the winter months.

The cost of bringing in material by truck, where it will have to be resorted to—and the industry is resolved that no rail tie-up shall interfere with its sales—will mean an extra burden in costs, but all costs will be absorbed to keep trade channels open.

If the strike is long lived it is thought that another strong argument will be provided for utilizing motor trucks for all short haul work and that many industrial houses will become permanent users of truck transportation in intercity deliveries.

## C. A. Benjamin Becomes Marmon Representative

INDIANAPOLIS, Oct. 18—C. Arthur Benjamin, one of the most widely known men in the automobile field, has become associated with Nordyke & Marmon Co. as a district representative. Benjamin's activities will center in the East, his territory including New York, Philadelphia, Boston, New Haven, Poughkeepsie, Providence, Springfield, Portland, and other cities in that vicinity.

When Benjamin left the bicycle business some years ago he became associated with the Franklin Motor Car Co. He was sales manager from the time the first car was sold until 1906. Since that time he has been in the automobile division of the American Locomotive Co. until that division was discontinued, and as C. Arthur Benjamin, Inc., held the Packard agency in Syracuse. He was in the service of the Government during the war.



## MEN OF THE INDUSTRY

**William Beckman**, for many years assistant to Fred S. Duesenberg and prior to that chief engineer of the Loew-Victor Engine Co. of Chicago, is now vice president in charge of engineering of the newly formed Richelieu Motor Car Corp. of Asbury Park. The company is assembling chassis in a temporary plant while the bodies are being fitted at the plant of the Fleetwood Metal Body Co. The directors of the Richelieu corporation are interlocking with those of the Rochester Motors Corp. and the car will be powered with a four cylinder Rochester-Duesenberg engine.

**H. R. Sturgeon** has become associated with the John O. Munn Co. Sturgeon was formerly connected with the advertising activities of the Willys-Overland company, first at the Toledo headquarters and later as advertising manager of the John N. Willys Export Corp. at New York. Before that he was assistant advertising manager of the F. B. Stearns Co. at Cleveland. C. E. Duncan, formerly connected with the Willys-Overland company and the White Co., has been elected a director in the Munn concern.

**William S. Knudsen**, associated with the Ford Motor Co. for the last ten years, has resigned from that organization to become general manager of the Ireland & Matthews Mfg. Co. Before joining the Ford company Knudsen served as general superintendent of the John R. Keim Mills, Inc., Buffalo.

**Henry Thomas Platz** has resigned as chief engineer of the Alvo Co., automobile headlight division, at Ashland, Ohio, to become engineer of design for the Gray & Davis Lamp Corp. at Amesbury, Mass. He formerly was chief engineer of the C. M. Hall Lamp Co., Detroit.

**H. H. Doehler** of the Doehler Die Castings Co., Brooklyn, is one of the speakers booked for the factory management class of the University of the City of Toledo this winter. Many officials of the Willys-Overland and allied automotive plants in Toledo are enrolled in the class.

**William A. Bechberger** has severed his connection with the New York office of the Fisk Rubber Co., where he had charge of fabric purchasing. He was for ten years the company's purchasing agent at the plant in Chicopee Falls, Mass., before removing to New York.

**White Co.**, Cleveland, has established a factory branch in Louisville for the selling and servicing of White motor trucks. Charles M. Moon has been appointed branch manager. The branch has taken over the business of the White Truck Co. of Louisville.

**Homer McKee**, formerly in charge of Cole Motor Car Co. sales and advertising, has been appointed advertising counsel to the Cole organization. **Charles S. Crawford**, formerly chief engineer of the Cole company, has been named engineering consultant.

**W. A. Sullivan**, formerly sales representative for Oldsmobile in Pennsylvania territory and before that advertising manager of Oakland Motor Car Co., Pontiac, has joined the staff of the Automobile Trade Directory in Detroit and Michigan territory.

**George L. Sawyer**, formerly sales manager of material handling machinery for Barber-Greene Co. of Aurora, Ill., has been appointed New York representative of the Universal Crane Co. of Elyria, Ohio. His headquarters will be in New York City.

**Frank H. Gibbes**, who has been vice-president of the Gibbes Machinery Co., distributor

of Packard, Paige and Durant cars in South Carolina, has been elected president to succeed his brother, A. M. Gibbes, who died a few weeks ago.

**W. T. McHatton**, formerly of the Republic Motor Truck Co., has been appointed southwestern district representative of Ruggles Motor Truck Co., with headquarters at Denver.

**E. E. Wentz**, for five years in the Maxwell-Chalmers advertising department, has resigned to go into business under the name of Cady & Wentz with offices in Detroit.

**E. C. Hugh** of The Hugh Co., Buffalo, has returned from a short visit to Europe, taken for the purpose of disposing of surplus stocks of American-made millimeter size tires.

**E. T. Herbig**, sales manager of Service Motor Truck Co., Wabash, Ind., has resigned to become associated with General Motors in the sales organization.

**Frank G. Vanderhoff** has been appointed sales manager of the Ray Battery Co. of Ypsilanti, succeeding Wallace B. Blood, who has resigned.

**J. T. Aubrey**, advertising manager of the Packard Motor Car Co., has resigned to become advertising manager of Hearst's International.

**Henry Farrington** has been appointed sales manager of the Antigo (Wis.) Tractor Corp., which is now in production and making deliveries.

**Milton R. Standish** has been appointed vice-president, in charge of promotion of the Gill Storage Battery Co., San Bernardino, Cal.

**Dever Waters** has been appointed sales manager of the Schwarz Wheel Co., Philadelphia.

Use of Parenti Plans  
Restrained by Court

**BUFFALO, Oct. 17**—Three former members of the Parenti Motor Corp. are restrained in an injunction, issued by Justice Pooley in the Supreme Court, from using or imparting to anyone plans, ideas and features, said to have been developed by the president of the corporation, Joseph S. Parenti.

Those included in the restraining order are Louis F. Vremsak, Willard C. Wheeler and John W. Lease.

Parenti alleges unlawful use has been made of certain drawings and plans, covering exclusive and patented features of the automobile, bearing his name, by the Adria Motor Car Corp. of Batavia, N. Y., of which Vremsak, Wheeler and Lease are officials. He charges that these men obtained secret possession of blue prints and patents in the Parenti plant in this city, while they were assisting him in experimental work. They are now using these, he alleges, in advertising that they intend to build a car, which will include all the alleged exclusive features of the Parenti car.

## FORM ADANAC MOTORS

**MONTREAL, Oct. 18**—The Adanac Motor Corp., Ltd., Lachine, Que., has been organized with a capital of \$50,000 to manufacture a chassis converter for use in connection with a standard Ford chassis. The capacity of the vehicle will be two tons. The final drive is of worm type.

## FINANCIAL NOTES

**Stromberg Carburetor Co. of America, Inc.**, for the six months ended June 30, 1921, reports surplus after charges and Federal taxes as \$51,544, equivalent to 68 cents a share earned on the 75,000 shares of capital stock of no par value. Earnings for this period were \$278,237; other income, \$10,005; administration and general expenses, \$221,698; Federal taxes 1921, \$15,000; surplus, \$51,544; previous surplus adjusted, \$2,352,669; total surplus, \$2,404,213. The consolidated balance sheet as of the above date shows the assets to be \$3,242,823, with cash placed at \$188,978; notes and accounts payable, \$304,609, and inventories, \$699,330. The liabilities include notes payable, \$100,000; accounts payable and accrued accounts, \$51,840; reserve for depreciation, \$363,133; reserve for Federal taxes, \$48,637.

**Fisk Rubber Co.** has filed a mortgage for \$10,000,000 to the Chase National Bank of New York at the registry of deeds in Springfield, Mass. This is in accord with action recently taken by the stockholders in connection with the absorption of the Federal Rubber Co. and the Nineget Co. The mortgage is to secure an issue of 20-year, 8 per cent sinking fund gold bonds in denominations of \$500 and \$1,000, payable in 1941.

**Hendee Mfg. Co.'s** annual report for the year ended Aug. 31, 1921, shows a net loss after charges and reserve for adjustment of inventories, etc., of \$912,078, as compared with net profits of \$759,914 in the preceding year. The sales for the year were \$4,139,445, as against \$9,055,357 in 1920, and the costs and expenses in 1921 were \$3,979,057, compared with \$8,301,238 last year.

**Elgin Motor Car Corp.** through the Argo, Ill., State Bank is offering \$500,000 8 per cent notes at par, dated June 1, 1921; due each June 15, \$100,000 1922, \$150,000 1923 and \$250,000 1924; convertible into common stock at par at any time before maturity. The purpose of the issue is to retire bank loans and enlarge working capital.

**Kelly-Springfield Tire Co.'s** 10-year 8 per cent sinking fund gold notes are now ready for delivery in engraved form, with coupons attached, in exchange for and upon surrender of the temporary notes at the office of the Central Union Trust Co., New York City.

**Kess-Line Motor** has obtained the approval of the Michigan Securities Commission for the issuance of \$500,000 in preferred stock, and 25,000 shares of non-par common stock has been validated.

**Victor Rubber Co.** will pay on Oct. 25 to holders of record Oct. 15 the 1½ per cent preferred dividend which should have been paid in August of this year.

**H. H. Franklin Mfg. Co.** has declared the regular quarterly dividend of 1½ per cent on the preferred stock, payable Nov. 1 to stock of record Oct. 20.

**Winther Motor Truck Co.**, Kenosha, Wis., has increased its capital stock from \$22,000,000 to \$61,000,000.

## ORDERS TRUCK DIVIDEND

**DETROIT, Oct. 17**—Creditors of the Famous Motor Truck Co., St. Joseph, Mich., will receive a 15 per cent dividend under the terms of an order entered at the final hearing before the bankruptcy referee. Claims totaling \$92,000 were presented, the largest for \$15,650 being from Frank L. Wilkinson, president of the company.

## INDUSTRIAL NOTES

**Biever Casting Co.**, Slinger (formerly Schlesingerville), Wis., has taken over and will place into operation at once the Slinger gray iron foundry. The Biever company has been incorporated with \$25,000 capital by John H. and Edmund J. Biever. The plant has been idle for nearly a year. John Biever was for many years connected with the Gilson Mfg. Co., founder and machinist, Port Washington, Wis., and Edmund Biever with the Montana Tractor Co. of Oconto, Wis. They will specialize in light and medium weight gray iron castings for the automotive and agricultural implement industries.

**American Motor Parts Co.** of Indianapolis, manufacturer of gas engine, automobile and tractor parts and operating a branch at East Moline, Ill., has been incorporated in Illinois with capital stock of \$200,000, of which \$52,820 is to be employed to do business in that state. The president is William Goldstein and the secretary Harry Goldstein, both of Philadelphia. The East Moline branch has moved from the R & V Engineering Co. plants to the Ideal Milling Co. building. James L. Westphall is general manager of the East Moline annex.

**Auto-Motor Corp.** of Charleston, W. Va., which manufactures automobile and mining car motors at Dunbar, near that city, will transfer its general offices and plant to Point Pleasant, W. Va., within four months. L. C. Pritchard, vice-president and general manager, states that ground will be broken within three weeks for the first unit. The total cost of the plant will be \$250,000. It is expected actual operation will be started by February. In the meantime the plant at Dunbar will continue operations.

**Northwest Engineering Works**, Green Bay, Wis., manufacturing cranes and hoists and specializing in a yard crane mounted on a crawler type tractor chassis similar to war-time tanks, has been reorganized as the Northwest Engineering Corp., with \$400,000 preferred stock and 1000 shares of non-par valued common stock. The officers are: President, F. W. Hurlbut; vice-president, W. T. Schmitt; secretary and treasurer, W. W. Mutter; general manager, H. G. Barkhausen.

**Andrew Nelson and Christian Hansen** have established a new plant at Racine, Wis., for the manufacture of passenger car and motor truck bodies, cabs, etc. Nelson formerly was superintendent of the body department of the Mitchell Motors Co. and Hansen for years conducted a trimming and painting shop in Racine.

**Kelly-Springfield Tire Co.** is about fifteen days behind in orders, notwithstanding that it is turning out 4300 tires a day, of which 2000 are being made at the Cumberland plant. Sales for September were \$2,423,000, as compared with \$1,862,000 for the same month last year.

**Moline Plow Co.** tractor plant at Rock Island, Ill., will start making motor engines for the Stephens automobiles Dec. 1. Equipment and machinery of various kinds have been purchased from the Root & Vandervoort Motors Co. and the work of transferring and installing the new plant is now under way.

**Midwestern Tractor Wheel Co.** of Detroit, manufacturing a patented tractor wheel with adjustable cleats, has purchased a site at Amherstburg, Ont., where it will erect a factory. Modern equipment will be installed at a cost of \$250,000. The company is capitalized at \$1,000,000.

**New Britain Machine Co.** will temporarily suspend the manufacture of the N. B. trac-

tors because of the buyers' strike. The closing down of the plant will affect about 50 men. A small force will be retained to assemble those tractors which have already been ordered.

**Harrison Radiator Corp.**, Lockport, N. Y., has bought property in that city at a cost of \$30,000 for an addition to its plant. The corporation is owned by General Motors and at present is operating at about 50 per cent. When normal the present plant employs 1200 men.

**Stanley Welded Wheel Co.**, North Tonawanda, N. Y., which is erecting a plant in that city, is expecting to be operating at an early date. The company will manufacture wheels for automobiles and will employ about 200 men at the beginning of operations.

**Parish & Bingham**, Cleveland, report that October sales and production are running ahead of September and anticipate that November and December output will maintain a good average.

**Adams Axle Co.** of Findlay has closed a contract with Durant Motors, Inc., to manufacture all axles and brake bands for the new Durant cars. The plant has 180 men at work now and expects to double this force soon.

**King Trailer Co.**'s entire assets at Ann Arbor, Mich., brought \$40,550 at public auction. W. L. Walz of that city was the purchaser.

**Lakewood Engineering Co.** of Cleveland has moved its Philadelphia office from the Widener Building to the Franklin Trust Building.

## Pierce-Arrow Nears Normal Conditions

**BUFFALO, Oct. 17**—Colonel Charles Clifton, chairman of the board of directors of the Pierce-Arrow Motor Car Co., has issued a statement in which he says that production and sales activities, which have been increasing gradually for the last three months, now have reached proportions rapidly approaching normal. The factory, he states, is running full time with a force of 4230 workers. He expects this force to be maintained, if not increased, during the next six months.

"Insofar as the automobile industry reflects general conditions throughout the country, our situation indicates a decided improvement in business," said Clifton. "Analyzing the business of the entire automobile industry we find we are getting more than our proportionate share. The unfilled orders we have on hand will keep the plant operating at its regular output until Dec. 1.

"The truck business shows a similar stimulation. In September we shipped twice as many trucks as for any other one month of the year. On Oct. 1 we had more orders on hand than on the first of any month this year."

## PICARD QUILTS AS JOBBER

**NEW YORK, Oct. 17**—A. J. Picard & Co., general automotive equipment jobber with headquarters here, has discontinued its jobbing business and will devote its energies hereafter to distribution of a number of products, including Stromberg carburetors and Gabriel snubbers, which the company has been handling for some time in addition to its jobbing lines.

## METAL MARKETS

**T**HERE is no mistaking the overplaying of their hands by those producing interests who announced a second \$5 per ton advance in their sheet prices, effective Oct. 15. In spite of undoubtedly inspired reports that announcement of the impending advance brought out large orders at the old price, the majority opinion in the trade is that the bait failed to work this time. Even those "independents" who constantly bewail present market prices which, they claim, do not permit them to make both ends meet, question the wisdom of resorting to so sharp an advance as \$5 per ton as a lure for attracting orders at the old price. It is fairly possible, however, that there was another motive connected with announcement of this advance. It is conceded that over the remainder of the year little aside from routine business will be placed. These orders will come through at any price and the thought underlying announcement of the advance might have been that it may bring out some orders at the old price and, in addition, increase the revenue from the slight amount of routine business to be expected in the coming two months. Obviously the \$5 per ton advance in prices for hot-rolled strip steel announced by a Sharon interest is based on the theory that what business in that commodity will come through in the immediate future will be of a strictly routine character and will be placed whether \$5 a ton is tacked on to the price or not.

It is only natural that in the foreground of discussion in trade circles early this week was the effect which the threatened railroad strike would have on the steel market. Aside from the modest number of telegrams with which producers were inundated, all asking that shipments of steel needed to comply with production schedules over the next few weeks be rushed forward with as little delay as possible, there has been no effect market-wise. It is recognized that while a tie-up of the railroads would curtail steel shipments there would be a corresponding curtailment in the shipments of the products into which the steel centers.

**Pig Iron.**—The reduction in iron ore freight rates of 28 per cent which pig iron producers contend can have no effect on the market for their product, until their present ore stocks have been consumed, has led to the uncovering of the fact that it does not take "a little more than two tons of iron ore to make one ton of pig iron," as frequently stated in the last few days, but only 1½ ton of ore. This figure is on the authority of the American Iron and Steel Institute.

**Steel.**—Buying by automotive consumers is sporadic. Youngstown reports state that the largest low-priced passenger car builder has ordered suspension of deliveries against certain hot-rolled strip contracts. The same interest, however, recently placed a good-sized order for sheet material to be converted into running boards. Another passenger car interest placed fresh orders for strip steel. But, although Ford, Dodge, Chevrolet and Oakland figure as buyers in the market, specifications for automotive steels have tapered off. Full-finished body sheets are in light inquiry. On the whole, it may be said that automotive consumers are marking time.

**Aluminum.**—All sorts of bargains continue to be offered, but automotive demand remains in abeyance.

**Copper.**—The market presents a steady appearance, but if there is any fresh consuming interest it is not visible to the naked eye.

# Calendar

## SHOWS

Nov. 14-15—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association. Fourth Regiment Armory.

Nov. 27-Dec. 2—New York, Automobile Salon, Hotel Commodore.

January—Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Central Palace. Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

Nov. 4-12—Car Show. Nov. 28-Dec. 3—Motorcycle Show.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

Nov. 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

Nov. 12-27—Buenos Aires, Annual Motor Show, La Pabellon de las Sosas, Automovil Club Argentino.

Nov. 26-Dec. 3—Shanghai, China, Automobile Show.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibit in connection with the Brazilian Centenary Association Automobilsta Brasileira.

## CONVENTIONS

Oct. 28—New York, American Iron and Steel Institute.

Nov. 1-4—New York, Industrial Relations Association of America.

Nov. 3—Indianapolis, Meeting of Friction Drive Engineering Society.

Nov. 14-19—Chicago, Annual Meeting and Business Exhibit of Automotive Equipment Association.

Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Nov. 21-23—Atlanta, Third Annual Convention of American Farm Bureau Federation.

Dec. 6-8—Chicago, Second Annual Meeting of American Petroleum Institute.

Dec. 10—New York, American Institute of Mining and Metallurgical Engineers.

Dec. 20—Philadelphia, American Society of Mechanical Engineers.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 17-20, 1922—Chicago, American Road Builders Association.

## S. A. E. MEETINGS

Detroit, Oct. 21, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.

New York, Jan. 11-14, 1922—Annual Meeting.

Chicago, Feb. 1  
Minneapolis, Feb. 8—Tractor Meeting.

## To Pay All Standard Creditors Pro Rata

### Receiver Withdraws Request to Meet Claims of \$100 or Less in Full

CLEVELAND, Oct. 18—A million dollars in checks will be mailed on Nov. 1 from the general offices of the Standard Parts Co., in this city, to creditors of the company.

The distribution will be made under an order granted by Federal Judge D. C. Westenhaver upon the application of the receiver, Frank A. Scott.

The request of Scott for authority to pay in full the smaller creditors, whose claims are \$100 or under, was withdrawn and the disbursement will be pro-rated among them.

The condition of the Standard Parts Co., which has been in the hands of a receiver for more than a year, is generally accepted as evidence that business is on the upgrade here.

Another indication was given when creditors of the McGraw Tire & Rubber Co. were paid 10 per cent on their claims. Some time ago the creditors of the company agreed to extend the time for payment and the business has been such that the first dividend was paid on time. It is officially reported that the net profits of the company was \$85,000 in September, which is a substantial increase over July, but it is a decline from the peak earnings of \$109,000 in August. This company at present is making 2000 casings and 2000 tubes a day, and officials expect to continue that rate for the rest of the year.

There are still other evidences which point the same way. Business at the plant of the Jordan Motor Co. is running on a capacity basis, according to a statement of President Edward S. Jordan. He says the corporation is em-

ploying 30 per cent more men now than last month and that it is turning out about 400 cars a month. One day last week the company shipped 29 cars, but the average is around 24.

Under the leadership of certain industrial stocks, automobile among them, the stock market here showed considerable strength last week. White Motor moved up to 35, a substantial gain. Production at this plant has been increased 20 per cent.

## Paris Car Show Closes; 60,000 Attended Daily

PARIS, Oct. 15 (By Cable)—The Paris automobile show closed Sunday evening after being open 12 days. It was a complete success with the attendance averaging 60,000 daily. The amount of business done was satisfactory, particularly in the small and medium cars. Manufacturers believe that the depression is now over and that the coming year will be good. Sales were helped by the Government announcement this week of an immediate repeal of two cents a litre on gasoline tax. Further cut of one cent will be made Jan. 1. It is proposed to make the show annual.

## Plan Closes Market for Government Sales

WASHINGTON, Oct. 17—Co-ordination of motor transport facilities now owned by the various departments and bureaus of the Federal Government in this city will result in a saving of approximately \$20,000 per week. Col. Clarence O. Sherrill, Superintendent of Public Buildings and Grounds and co-ordinating officer for the District of Columbia under Director of the Budget Dawes, has devised a plan which he expects will prove efficient enough to keep the Government from the open market for some time.

## Conferees Report Road Legislation

### Few Changes Made in Highway Bill as It Was Passed by Senate

WASHINGTON, Oct. 18—Agreement has been reached in the conference of the Senate and House regarding the highway bill and the conference report will be submitted to Congress. The Senate provisions were in the main accepted by the House managers and the appropriation of \$75,000,000 for Federal aid was approved. The 60-40 plan of distribution of funds was likewise retained.

The changes made in conference were of a minor character. The conference increased the percentage for administrative purpose from 1½ to 2½ per cent. This percentage becomes available first and it is to be devoted to expenses incident to the administration of the act and to scientific research into highway problems. An effort was made to have the appropriations available immediately but the conferees decided to make it effective Jan. 1, 1922.

The passage of this bill will do much toward stimulating highway construction in 13 States where this activity has been held up indirectly, at least, for lack of funds and in seven States where Federal aid was essential to road development. The conference report apparently satisfies the agricultural bloc in the Senate and House. It was this coterie which assumed the responsibility for the defeat of the original Townsend bill.

## HATHAWAY HANDLING DURANT

KANSAS CITY, Oct. 17—The Hathaway Motor Co. has been appointed distributor for Kansas and western Missouri by Durant Motors of Michigan. The contract calls for 5,000 cars a year.

# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

Vol. XLV  
Number 17

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, OCTOBER 27, 1921

Thirty-five cents a copy  
Three dollars a year

### Why the "Four"

#### Will Be the "Best Seller" in the Automobile Market Just Ahead

The car manufacturer who makes a fine "Four" to sell in the price range representing the big, broad market, can build into his car *all* of the essentials found in any automobile and at the same time he will have a wider margin to devote to those features which increase riding comfort, economy of operation and maintenance.

This car will be simple so that the average man who has to take care of his own car will encounter no excessive maintenance charges.

It will be lighter; it will deliver an average mileage of from twenty to twenty-four miles per gallon of gasoline; it will consume less lubricating oils and will give greater tire mileage.

Under such conditions, it is evident that the manufacturer with a limited engine allowance can build a fine four-cylinder car at a price that would skip more cylinders.

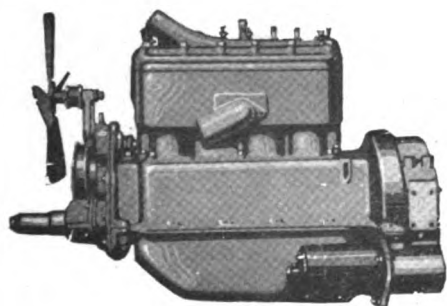
These conditions only increase the long established value of the Lycoming Motor to the car manufacturer.

The simplicity, strength and economy of the Lycoming Motor support the car manufacturer's product with his buyers and dealers by balancing good body value with good engine value.

*Write for test records and specifications.*

LYCOMING MOTORS CORPORATION

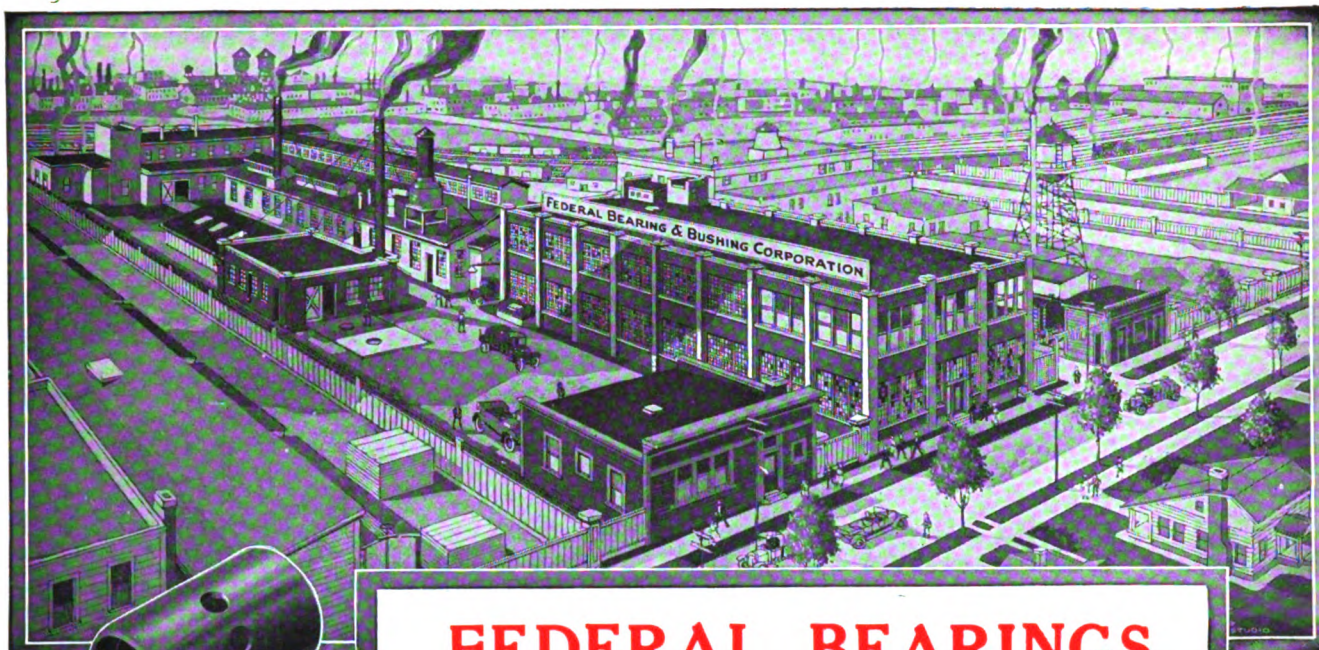
Williamsport, Pa.



- A—1920 Sales of 4-Cylinder Cars  
B—1920 Sales of 6-Cylinder Cars  
C—1920 Sales of 8-Cylinder Cars  
D—1920 Sales of 12-Cylinder Cars







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### UNIFORMITY

The Babbitt lining in every Federal Bearing shows the same tough, fine-grained, homogeneous structure because every Bearing is chilled immediately after it is lined.

### SOLIDITY

Every Federal Bearing is guaranteed absolutely free from porosity, because the process of manufacturing makes it impossible for the Babbitt to contain air while cooling.

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### EXCELLENCE

Every Federal Bearing is manufactured from the highest grade materials, machined accurately and subjected to the most rigid inspection, because "FEDERAL, DETROIT" must be stamped on the back.

EVERY FEDERAL BEARING IS LINED BY  
**CENTRIFUGAL FORCE**

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BABBITT-LINED BRONZE-BACK BEARINGS - BRONZE BUSHINGS - BRONZE CASTINGS  
DETROIT - MICHIGAN



# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, OCTOBER 27, 1921

No. 17

## Marketing Problems of the Automotive Industry

Decreased unit production costs have absorbed constantly increasing marketing costs for many years. A limit will be reached. Investigation, analysis and definition are needed in automotive marketing. The beginning of a series of discussions on this subject.

By Harry Tipper

**H**OW to get the goods from the factory to the user, with the least possible expenditure of time and money and in sufficient quantities to keep the factory running at full load, is rapidly becoming the great problem of industry.

Up to the war the manufacturing capacity of the United States was not quite large enough to equal the consumers' capacity to use the manufactured products. Except in raw materials, the United States was an importing country. Its excess of manufactured imports over exports was sufficiently large to intimate the absence of any surplus capacity to produce.

During the war the manufacturing capacity of the United States grew very rapidly, so rapidly that it increased something over 100 per cent. The present capacity is between two and two and one-half times the capacity of 1913.

There has been no such increase in the markets and, as a consequence, the competition in the near future will operate along different lines from the past.

In the automotive business the present capacity for production of vehicles is larger than the probable consumption for the next year or two. Prices have been reduced without much relation to the cost of

production. It is not likely that the cost of production will be reduced sufficiently to secure all the economies that are necessary. Meantime, the costs of distribution and marketing have increased very materially, including the physical costs of transportation, the cost of selling, advertising, the capital required for products in the course of distribution. They are not likely to decrease without changes in the methods, because the intensity of competition will make it necessary to spend more time and effort in securing the unit of sale.

Up to the present the expenditure for selling, advertising and distributing the product has not been analyzed very carefully. Experiments in merchandising, in advertising, and in the distribution of the product have been undertaken without much knowledge as to the probability of their success.

For a number of years production costs have been represented by a decreasing percentage of the sale price, while commercial costs have been represented by an increasing percentage of that price.

It has been possible in the automotive field for the manufacturer to add up his total costs and a percentage for his profit and to sell his product at the resulting price.

It is unlikely that this can be continued. It is more than probable that the manufacturer will have to determine the price at which he can sell his output and arrange to make his costs suit this price, or else eliminate a part of his profit. In other words, until the war, the seller in the United States usually governed the price; whereas, the situation in the immediate future means that the buyer will govern the price, and the seller's profit will depend upon his ability to arrange his costs within that price.

For a good many years it has been the custom to put the problem of cost reduction up to the production department. In the eyes of the manufacturer almost any expense has been justified in the selling or commercial end of the business. Little or no attempt has been made to analyze the expenditures of the commercial departments and the relation between these expenditures and their value to the organization. Very little has been done to analyze the field and channels of distribution, to determine the type of distributor and dealer necessary to the business and to determine cost of the various elements concerned in the handling and distribution of the products.

The cost of producing the automobile or truck has been less than 50 per cent of the price which the user was called upon to pay, and in the case of parts and accessories, it was frequently less than 30 per cent. All the rest of the cost arises out of the marketing or commercial necessities and inefficiencies.

Economic surveys show that the efficiency of production has been increased in the last twenty years, and the efficiency of distribution has been decreased, so that it takes more people to distribute a thousand dollars' worth of goods to the user than it did 20 years ago. A great deal of the sales and marketing effort has been based upon guesswork, impression and the fragmentary experience of individuals, without the checks established on the production side. Many of the costs of these marketing efforts have been overlooked, because the systems of cost accounting in commercial business have not been analytically arranged to indicate the relative costs of various sales and marketing operations.

Although it is obvious that the buying power of dealers varies greatly and that they are not all worth the same time and effort to secure their business, most manufacturers have conducted their marketing business as though all distributors and dealers were equally important. The sales, advertising and merchandising work has been conducted with almost equal attention to all types. Only comparatively few of the individuals in any community are either interested or capable of being interested in an individual product. Yet manufacturers have conducted their advertising work as though all individuals were equally important as possible buyers of the product and merited an equal amount of time and effort in the endeavor to induce them to buy.

Branches have been established with little relation to their necessity and value. Extra services have been added without any proper consideration of their influence.

The motions that are made in marketing and the department created for the purpose of assisting the sale, have been conducted with very little analysis of the relation between their value and their cost. Because these departments were concerned with getting orders and the orders were looked upon as the most important part of the business, expenditures were permitted that would have been immediately curtailed in any other branch of the establishment.

The marketing problem of the manufacturer to-day is the problem of investigation, analysis and definition. The commercial operations in his business, their relation to the sale of the product, their cost and their value in connection with the sale must be determined. Consideration must be given to the methods and channels of distribution, their relative importance, their grouping and the necessary values they exert in connection with his business.

The examination should include the habits of the user, his problems and ideas, his resistance to sale and matters concerned with how he can be influenced and interested.

Competition must be estimated and considered not with the emphasis usually placed upon it, but with some consideration of its intensity in different localities, its territorial influence, and its effect upon the necessities and costs of selling in those particular sections.

Unfortunately, there are no standard methods and there are no fundamental bases laid out for this consideration.

One manufacturer of automobiles has succeeded in making a very good business without using distributors, without a large sales force and branch offices, and without the usual amount of merchandising and advertising effort.

Another concern operating in about the same price class has succeeded with methods diametrically opposed to the first. Out of such apparent contradictions it is difficult to determine the elements of value. Experience does not teach very much under such circumstances. In any case, the teaching of experience is much more largely concerned with showing what to avoid, rather than what to do.

The great strides which have been made in the production of automobiles, trucks and other automotive products are due to the constant and continual investigation and analysis of the engineering and production factors. The most constructive thought, the most careful research and the most definite study have gone into the production of the vehicle, so that this production represents a very large and efficient service of unusual value to the user.

On the other hand, sales executives have been recruited from successful salesmen, forceful and alert men of the speculative type, efficient publicity men and individuals from many other lines. These men have not associated themselves together in the interests of more efficient methods and their practice has been widely different, sometimes contradictory and frequently entirely experimental.

It is not sufficient, therefore, to consider the marketing problem in the automotive field entirely from the practice which obtains in the field at present, nor from

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**P**ROBLEMS of marketing are absorbing much of the time of manufacturing executives. To decrease the cost of selling a given unit is an important industrial problem. This article marks the beginning of a series of discussions of marketing fundamentals which will appear every other week in AUTOMOTIVE INDUSTRIES. Mr. Tipper's broad, practical experience and his faculty of keen analysis will be brought into these discussions and applied directly to the automotive industry. This first article outlines the present situation and defines the problem.

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the apparent success of that practice. Without a knowledge of the factors which have made the practice valuable for one organization, such practice would be of little value to some other organization with a different personnel, a different product and a different sales necessity.

These practical methods are interesting and carry valuable suggestions to the man who examines them. A very large part of their value will be lost, however, unless they are analyzed in the light of fundamental marketing necessities and the elements of the sales problem applicable to the particular organization. The failure of the work in merchandising, selling and advertising so far has been due to the lack of fundamental consideration and our ignorance about the relative value of the different factors entering into the problem.

That is why most of the literature on selling, advertising and merchandising is uninteresting and academic.

For some considerable time AUTOMOTIVE INDUSTRIES has been considering this question of dealing with the marketing.

A great deal of work has been done in the consideration of methods of working with the dealer, the distributor and the arrangements for contracting with the various establishments concerned in the distribution of cars and trucks. A good deal has been said about merchandising statistics, and so forth. However, all these things do not touch the root of the matter and they do not illuminate the severe problem facing the manufacturer to-day.

The tendency is for marketing costs, the costs of selling and distribution, to increase with the area covered and the intensity of competition. These costs already absorb too large a percentage of the total price and they tend to absorb a still larger proportion. They must be cut by making the efforts more efficient, so that less expenditure of time and money is required for the unit of sale.

It is appropriate, therefore, to discuss the elements entering into the marketing problem as related to the merchandising of automobiles, trucks, tractors, parts and accessories, to consider the factors entering into the costs, and to suggest the fundamental tendencies governing these factors. By this means the practical applications recorded in this publication will be made of more value and the examinations of practice more definitely serviceable to the manufacturer.

The only purpose of experimentation is to determine the best method of operation. Where experimentation provides nothing more than the basis for further experiment, it is not justified, and its cost is much greater than it should be. A considerable part of the cost of merchandising and selling arises out of the experimental character of the work and the amount of guess work involved. This is not justified, except as we can discover the best methods by the analysis of the experimental practice.

An article that costs \$2 to manufacture must be priced at about \$8 to \$10 to the user in order that the dealer, wholesaler and sales agent, the transportation company, the warehouse, the rehandler and all the other intervening people can be accounted for and the various profits realized along the line.

The manufacturer is intensely interested in the efficiency of the dealer. This is as important to him as the efficiency of his own sales organization.

Every element of marketing which absorbs too much cost increases the sales resistance and limits the purchase of the product. All these elements are worthy of examination and consideration, in the endeavor to determine the process and methods of most value and the fundamentals governing the cost of the merchandising and marketing operations.

In fact, economies must be made along these lines if the market is to be kept to the highest point of activity. Efficiency must be improved. The improvement of efficiency comes about through the increase of knowledge, and that increase is important to the automotive manufacturer at this time.

## Fundamental Photometric Quantities Defined

ENGINEERS connected with the manufacture of vehicle lighting apparatus may be interested in the following definitions of photometric units adopted by the International Commission on Illumination which met in Paris some time ago. The original definitions were in French, and those here given are translations of the French definitions made by the American delegate to the convention. It has been agreed that the final or official English translation shall be one which bears the approval of both the English and American delegates, and it is, therefore, possible that slight changes in wording will be made. The provisional definitions are as follows:

**Luminous flux** is the rate of flow of radiant energy evaluated with reference to visual sensation. Although luminous flux must strictly be defined as above, it may be regarded for practical photometric purposes as an entity, since the rate of flow is for such purposes invariable.

The unit of luminous flux is the lumen. It is equal to the flux emitted in a unit solid angle, by a uniform point source of one international candle.

**Illumination** at any point of a surface is the luminous

flux density at that point, or, when the illumination is uniform, the flux per unit of intercepting area.

The practical unit of illumination is the lux. It is equal to one lumen per square meter, or it is the illumination at the surface of a sphere of one meter radius due to a uniform point source of one international candle placed at its center.

As a consequence of certain recognized usages, the illumination can also be expressed by means of the following units:

Using the centimeter as the unit of length, the unit of illumination is one lumen per square centimeter, and is called the phot. Using the foot as the unit of length, the unit of illumination is one lumen per square foot, and is called the foot-candle.

**The luminous intensity (power) or candle-power** of a point source in any direction is the flux per unit solid angle emitted by the source in that direction. (The flux from any source of dimensions which are negligibly small by comparison with the distance at which it is observed may be treated as if it were emitted from a point.)

The unit of luminous power (intensity) is the international candle, such as has resulted from international agreement between the three national standardizing laboratories\* of France, Great Britain and the United States of America in 1909.

\*These laboratories are the Laboratoire Central d'Electricité, Paris, the National Physical Laboratory, Teddington, and the Bureau of Standards, Washington.

# European Engineering Trends Shown at Paris Show

Overhead valve and detachable cylinder heads seem to be gaining favor among French manufacturers. Unit power plants are also in evidence on most models. Left hand steering taken up slowly, but a few have adopted the American standard. Many other new features were exhibited

By W. F. Bradley

**B**Y reason of the big number of small and medium cars which have been produced this year, the four-cylinder engine is in a greater majority than ever before. Considering Continental makers only, it can be declared that for the normal type of car four cylinders are believed sufficient, and six cylinders meet all requirements when a luxury type is desired. There are a few exceptions. Thus Voisin and Fiat have put on the market twelve-cylinder automobiles. The first of these two represents a personal ideal of Gabriel Voisin, and only in a secondary way reflects the state of the market. Fiat appears to have been guided toward a twelve-cylinder car because the firm has a world-wide market and with its reputation can always sell a limited number of cars built irrespective of price. It is certain, however, that Fiat does not count on this type to keep its big factory occupied.

Talbot-Darracq, De Dion-Bouton and Bellanger retain their eight-cylinder V engines, but these are by no means the most important types in their respective programs. Lancia has added a small angle eight to his line, after having experimented for a long time with a twelve-cylinder of the same general design. A certain amount of interest is being shown in the eight-in-line, for four of these have made their appearance this year, built by Bugatti, Panhard-Levassor, Imperia and Isotta Fraschini. The first named is a special sporting model very closely approaching the pure racing type of car, while the straight eight appears to have been adopted by Panhard as a more satisfactory job from an engineering standpoint than the straight six sleeve valve engine. With these exceptions the "four" dominates for the normal type of car and the "six" holds the high-grade field.

It is worth noting that there is a tendency on the Continent to abandon singles and twins for cycle cars and other very small machines. This is contrary to the English practice, where the two-cylinder opposed engine still has a following for small machines built down to the lowest possible price. The French public asks for a straight four, no matter how small it may be.

## Aluminum Engines Losing in Favor

Aluminum cylinders with steel liners have lost in popularity, the only engine of this type now built in France being the Hispano-Suiza, and Spa the only one made in Italy. Another aviation practice of using forged steel cylinders with sheet steel water jackets has failed to make progress, for this construction is confined to the high-grade six-cylinder Farman. Even on the cheaper makes the preference is for cast iron cylinders on an aluminum crankcase. As an example, Citroen, who makes one of the cheapest cars in the show, has separate castings for cylin-

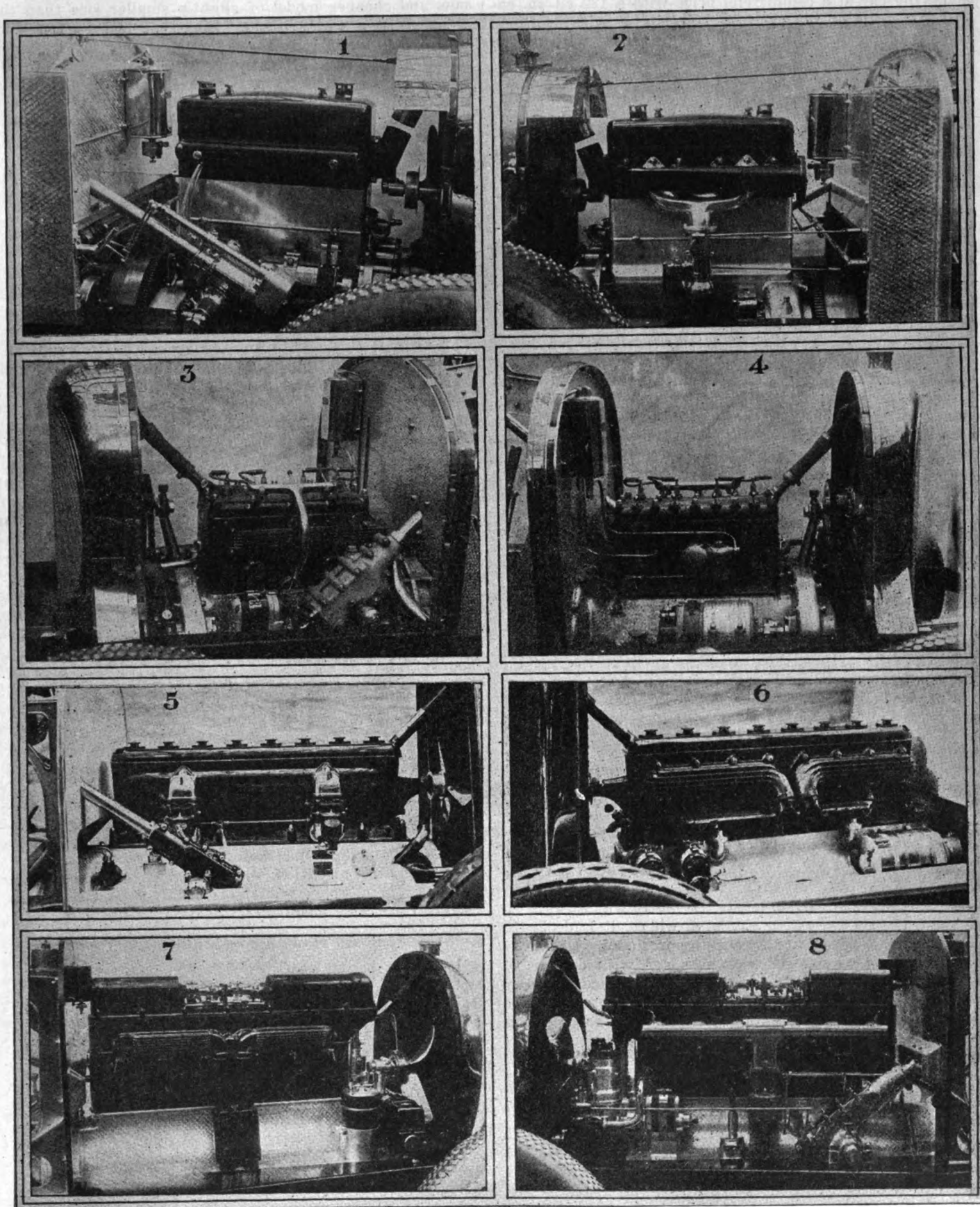
der block and engine crankcase. The new sleeve valve Voisin has cylinders, crankcase and gearbox in a single iron casting with the shaft carried in two plain bearings. Talbot-Darracq, on their 10 hp. cheap production job, have cast the cylinders and crankcase together, with clutch and gearbox bolted up to it, as in American practice. The same design has been adopted by the Italian Ansaldo Company, on a cheap production job, by Gregoire, Aries and Alva. These are about the only firms of importance, however, having followed this method of construction.

## Overhead Valves More Popular

Overhead valve engines have made progress, the feature in this connection being their adoption by old-established and somewhat conservative firms. Delaunay-Belleville has an entirely new overhead valve six, with operation by pushrods and overhead rockers, the valves being mounted vertically in a detachable head. This firm's system of forced feed lubrication has been extended to the valve gear, the pushrods being hollow, and the oil passing through them to the overhead rockers. Talbot-Darracq has a commercial overhead valve job for the first time; all Hotchkiss models are now made with overhead valves; Lancia has a sporting type overhead valve four, and his eight-cylinder small angle V-engine is also an overhead valve design; Delage is making his sporting six with overhead valves; the Fiat "twelve" has overhead valves with pushrods; the same valve location is used by Lorraine-Dietrich; by Vinot-Deguingand on an engine having the valves in cages and enclosed pushrods; by Leon Bollée, Imperia-Abadal, and Aries with overhead camshaft, by Gregoire, Delaunay-Belleville, Alva and Salmson, with pushrods, and also by a few lesser-known firms, particularly when they specialize on sporting type cars. Even for high class jobs the tendency now is to use a detachable head with a camshaft in the base chamber and pushrods which pass through the cylinder block. The overhead gear being covered by an aluminum housing, everything is inclosed, and it is frequently difficult to tell, from an external examination, whether the camshaft is located in the base chamber or overhead.

An original type of valve operating gear is used on the new six-cylinder Hotchkiss. Instead of a camshaft of the ordinary design, this engine has an overhead eccentric shaft, with short connecting rods having split bearings, which operate forked plates pivoted on a second shaft immediately below the eccentric shaft. The forks are in contact with a steel disc on the extremity of the valve stem. The advantages claimed for this are a greater degree of silence than is possible with the ordinary type of rocker.





1 and 2—A new overhead valve Chenard-Walcker 183 cu. in. engine. 3 and 4—Delaunay-Belleville 10 hp., four cylinder unit power plant with detachable cylinder head and all control parts mounted on engine. 5 and 6 Panhard & Levassor straight eight Knight engine with continuous webs and steering gear mounted on engine. 7 and 8—Hotchkiss six-cylinder engine with detachable head and overhead eccentric shaft, with both magneto and battery ignition



Ballot announced during the show that he would produce a touring car at a commercial price with a 122 cu. in. engine. This is of the overhead valve type, with overhead camshaft and direct operation of the valves, without the use of followers, by a system which, it is declared, avoids side thrust on the valve stem guides.

#### Battery Ignition on New Models

Battery ignition has gained at the expense of the magneto. In the great majority of cases where a new model has been brought out, battery has been preferred, whether the car was a cheap production job or one of the most expensive. Thus Citroen uses Delco ignition, starting and lighting on his new 5 hp. cheap car; Voisin has Delco on the high-grade "twelve"; Fiat has battery ignition of the firm's own design on the most expensive chassis in the show; Itala has adopted an Italian make of generator-battery ignition on a new sleeve valve six it has produced, and the high-class Hotchkiss six has a combination of magneto and Delco, with the Delco distributor used for the magneto. The high-grade six-cylinder Spa has both battery ignition and a Bosch magneto, the two systems being quite distinct. Paulet, with a good class six, designed by M. Michelat, formerly chief engineer to Delage, uses Delco ignition. Ballot is using Delco on his new car with 122 cu. in. engine. On the other hand, Panhard-Levassor, Lancia and Bugatti have adopted the magneto for their new types. Speaking generally, when new models are laid out battery is used in about 80 per cent of these cases. On an existing model the magneto is never dropped in favor of battery ignition. There is a good example of the current tendency in the Talbot-Darracq models. An eight-cylinder produced since the war, and a 10 hp. built this year, have Delco ignition; a four-cylinder continued from pre-war days has magneto ignition. The fact, too, that many of the French factories placed contracts a year and a half to two years ago with magneto companies and did not take deliveries because of inability to live up to the production programs, has helped in a certain measure to arrest the change toward battery ignition.

#### Detachable Cylinder Heads Gaining

The change from fixed to detachable cylinder head is continuing, among the firms taking to this being Delaunay-Belleville, Hotchkiss, Léon Bollée, Fiat twelve-cylinder, Delaunay Clayette. There are two cases of the abandonment of the detachable for the fixed head, these being the Delahaye models and a 16 hp. Talbot-Darracq. At the same time the new overhead valve engine built by this latter firm has detachable head; the model which has been changed is largely sold in England, where, it is declared, the detachable head is not greatly appreciated. Delahaye, after building all models two years ago with detachable heads, in which the valve caps had been retained, in order to facilitate the dismounting of valves, has entirely changed design, and is again using a fixed head. Léon Bollée recesses the head 5 mm. into the cylinder barrels so as to protect the gasket.

#### Cooling Practice

Water circulation by means of pump continues to hold a majority which is very high in the big car class and moderate among the small cars. Apart from Renault, to whom thermo-syphon water circulation is a fundamental principle of car design, the pump is used on about 95 per cent of the cars above 120 cu. in. piston displacement. Below this size, in which class all the cheaper cars are included, thermo-syphon has a strong following. Pressure from clients and dealers in mountainous regions generally enforces the fitting of a pump. Among the conspicuous examples of the abandonment of the water pump on a good

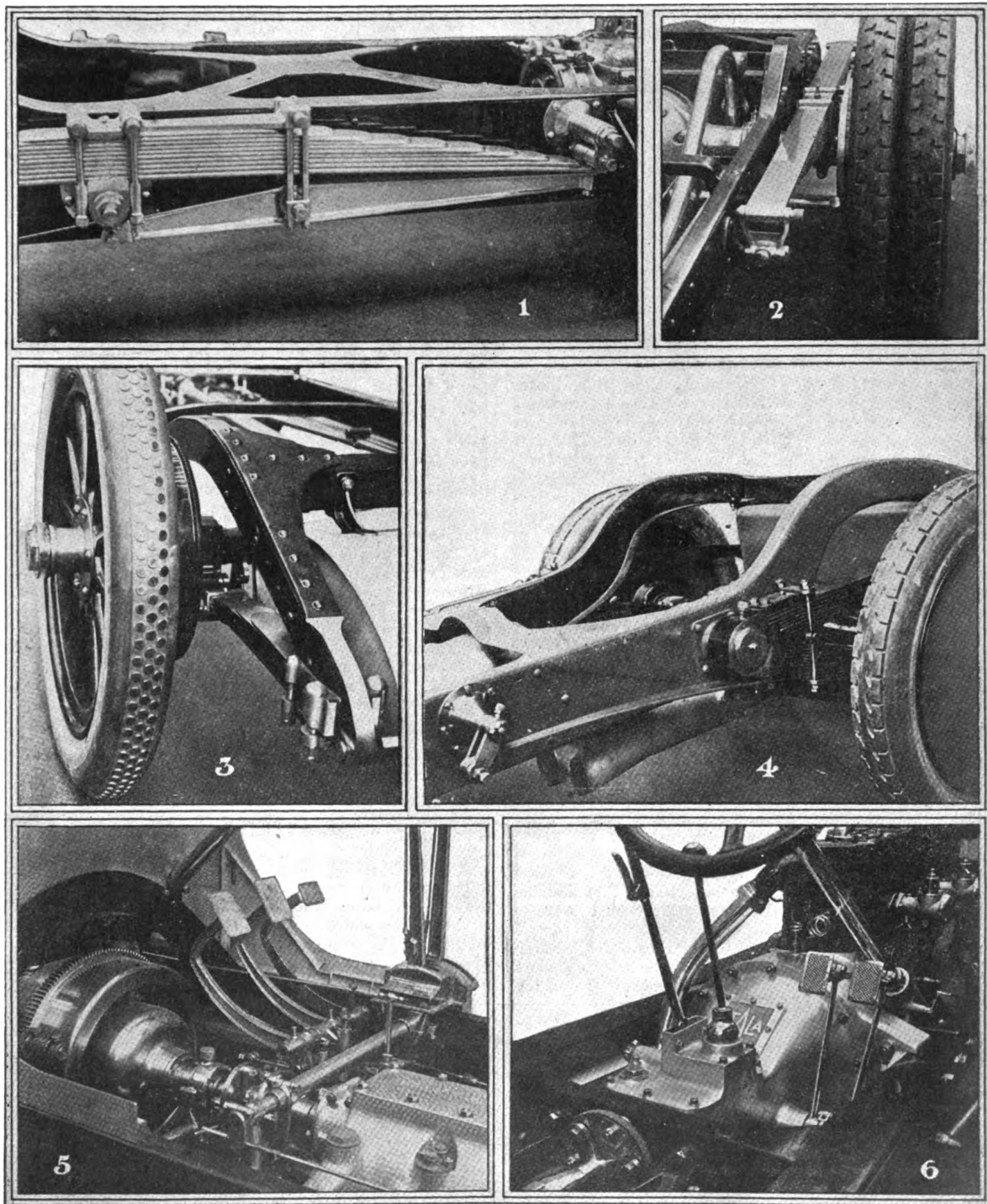
quality car is the Delage 11 hp. Talbot-Darracq, with a new and cheaper model of slightly smaller size than the Delage, fits a water pump. Link-type leather fan belts are in the majority, followed by flat leather belts. There is no use of fabric belts, and it is not the practice to use a single belt for driving two organs. Belt-driven impellers in the water circulating system are not used by Continental makers. On a large percentage of the higher grade cars gear driven fans are used, either with a flexible coupling or a clutch. At least 95 per cent of the fans are cast aluminum with two or three blades. Thermostatic control of the water has made no progress since last year except on a very few costly cars, of which the twelve-cylinder Fiat is one.

#### Unit Power Plants—Continuous Webs

It would be hard to find a new or redesigned model in the show which does not have unit construction of engine and transmission. Among the well-known firms having adopted unit construction for new types are Farman, Itala, Hotchkiss, Voisin, Ballot, Talbot-Darracq, Imperia-Abadal, Delaunay-Belleville 10 hp., Léon Bollée, Delahaye, D. F. P., Delaunay-Clayette. This takes no account of the makers having used this feature for some time. On the small and medium size cars it is customary to attach the power-plant into the chassis by three points. On the small Voisin there are ball and socket connections at the rear of the block and a cylindrical connection at the front. On bigger cars the more general practice is to employ four point attachment to the frame, thus making use of the engine to stiffen the chassis. There is a growing tendency to carry the crankcase webs right up to the frame members, so as to avoid the use of an underpan, or to reduce this to the smallest possible size. On high class cars, generally, the Hispano-Suiza practice is being followed, not only of extending the crankcase webs to the frame members, but of making a tight fit between the bottom of the metal dash and the top of the flywheel housing; thus all the air entering through the radiator must escape laterally through louvers in the engine hood. This gives the clean appearance so much sought after by critical users. Examples are Fiat, Voisin, Delahaye, Imperia-Abadal, and also the Beck, a very original small car, in which this feature is particularly well worked out. Paulet has attained the same object by having a detachable plate between the crankcase hangers, and putting the electric generator and starting motor under this. These parts requiring little attention, there is no loss of accessibility, and a clean unbroken surface is secured from the crankcase to the frame members.

#### Control Members Mounted on Engine

It is also becoming quite a common practice to mount the steering gear and all the control parts on the engine, independently of the frame members. This practice is being followed out not only on the high class models, but also on the cheaper types, makers having been driven to it from the double standpoint of efficiency and cheapness. Two very good examples are the 11-hp. four-cylinder Delage and the 10-hp. Delaunay-Belleville, which are laid out so that the engine and transmission unit carries all its accessories and can be lifted into the frame complete. Even the accelerator pedal is made quite independent of the dash. With this design the steering gear box is bolted to the engine base chamber instead of to the frame members, and the steering column is stayed to the dash, or in some cases to the instrument board. On the six-cylinder Paulet the steering gear box is attached to the engine base chamber and the column secured by ball and socket joints both to the aluminum dash and to the aluminum instrument board.



1—Star-shaped cross member of frame on Hotchkiss six-cylinder chassis, through which torque and driving thrust are transmitted. 2—Flat platform springs on Delaunay-Belleville six-cylinder chassis. 3—Reversed quarter-elliptic spring on 10 hp. Panhard. 4—Gobron suspension combining a pair of quarter-elliptics and a single leaf cantilever. 5—Arrangement of control members on Delaunay-Belleville six-cylinder chassis. 6—Center control on new Italia chassis

Left-hand steering is being taken up rather slowly. It has been adopted by Citroen, Renault and Lorraine-Dietrich for their big production models. Other firms using it are Paulet, Delage, Farman, Delahaye, Ballot. No enthusiasm is being shown by the French public for left drive, and as all the Continental makers have some interest in the British market, they are obliged to lay out their cars for both left and right-hand drive, according to the country to which they will be shipped. This robs them, in a very large measure, of the advantages of left-hand drive, for if the steering is on the right the levers ought also to be on the right. Some makers get over this by moving the steering from left to right, according to demand, and leaving the levers in the center. This is acceptable on the cheaper grade of cars, but is not looked upon with favor by purchasers of costly cars.

### Three-Speed Gear Boxes Increase

The percentage of three-speed gear boxes shows an increase. Makers of the very light type of car have abolished a gear in order to save cost, and on the expensive types it is the high ratio of power to weight which makes a fourth speed unnecessary. The new Talbot-Darracq and the small Voisin are examples of the tendency toward three speeds on light cars; Citroen, Berliet and Lorraine-Dietrich are other cheap cars provided with only three gears. In the powerful and expensive class three gears are used by Fiat, Hispano-Suiza and Voisin. There is a greatly increased use of helically cut gears for constant mesh pinions and for the third combination.

The method of providing for the drive has undergone modifications by reason of changes in the gearset location and in the types of springs. The majority of Continental cars now have central drive, either with a ball head at the front end of the propeller shaft housing, as on all the Fiat models, or with forked arms to a cross frame member or to the rear of the gearbox. Another new example is the six-cylinder Itala. This system of drive has developed to the detriment of the Hotchkiss drive, and has increased with the more general use of cantilever springs. Hotchkiss, among others, has the fork type of central drive on one model and ball head type on another car. Hispano-Suiza abandoned Hotchkiss drive two years ago. Delaunay-Belleville, on the other hand, has taken up Hotchkiss drive on the new 10 hp. car.

On the high-powered models the drive is not taken through the gearbox, but through a heavy cross frame member. This was adopted by Hispano-Suiza two years ago, and is now used on the twelve-cylinder Fiat and the six-cylinder Hotchkiss. On this latter model extreme rigidity is obtained by a star type construction of central cross frame members, the drive being transmitted through the center of this star, and the ends of the cross members giving greater strength for the attachment of the spring shackles and trunnion.

Drive and torque through the springs have been taken up by Delahaye but, speaking generally, this system is only employed to a wide extent on light cars and cycle cars.

### Suspension Practice

Rear suspension by means of cantilevers has not made any progress, for while this type of spring is found on several new cars, a few makers have abandoned it, particularly for their faster models. Voisin is an example, the cantilever being retained by this firm for the normal 18 hp. model, but dropped by them for the sporting type chassis, and not used on either the twelve-cylinder or the cheap small car. The objection raised against the cantilever is the lateral instability of the chassis at high speeds, and it is on this account that Fiat has brought forth a

special arrangement on the new chassis, the second leaf of the spring being extended rearwards to the rear hangers of the frame. Hotchkiss has a device (see cut) by which it is claimed that variable flexibility is obtained. It keeps the spring under tension, so that the car always rides as if it had its full load of passengers. It is claimed that there is a considerable improvement not only as regards comfort of the passengers, but in the stability of the car on the road at speed.

Renault, on his two big six-cylinder cars, uses long, thick-leaf diagonally mounted cantilevers, which are shackled at the rear below the ends of the axle housing, and at the front end to a rigid central cross frame member. This system was adopted two years ago, when the ends of the springs were carried in rollers. It is declared that the present type, with shackled ends and the front anchorage brought very near the center line of the chassis, has proved very satisfactory, particularly as regards the ability of the car to hold to the road at high speeds. The platform type spring appears to be used only on one of the Delaunay-Belleville models and on Scap cars. Bugatti has adopted his special type of quarter-elliptic spring, with the thick end to the rear, and the thin end shackled to the axle, on his new eight-cylinder model. There is a very similar type of spring on the new 10 hp. Panhard-Levassor.

### Chassis Lubrication

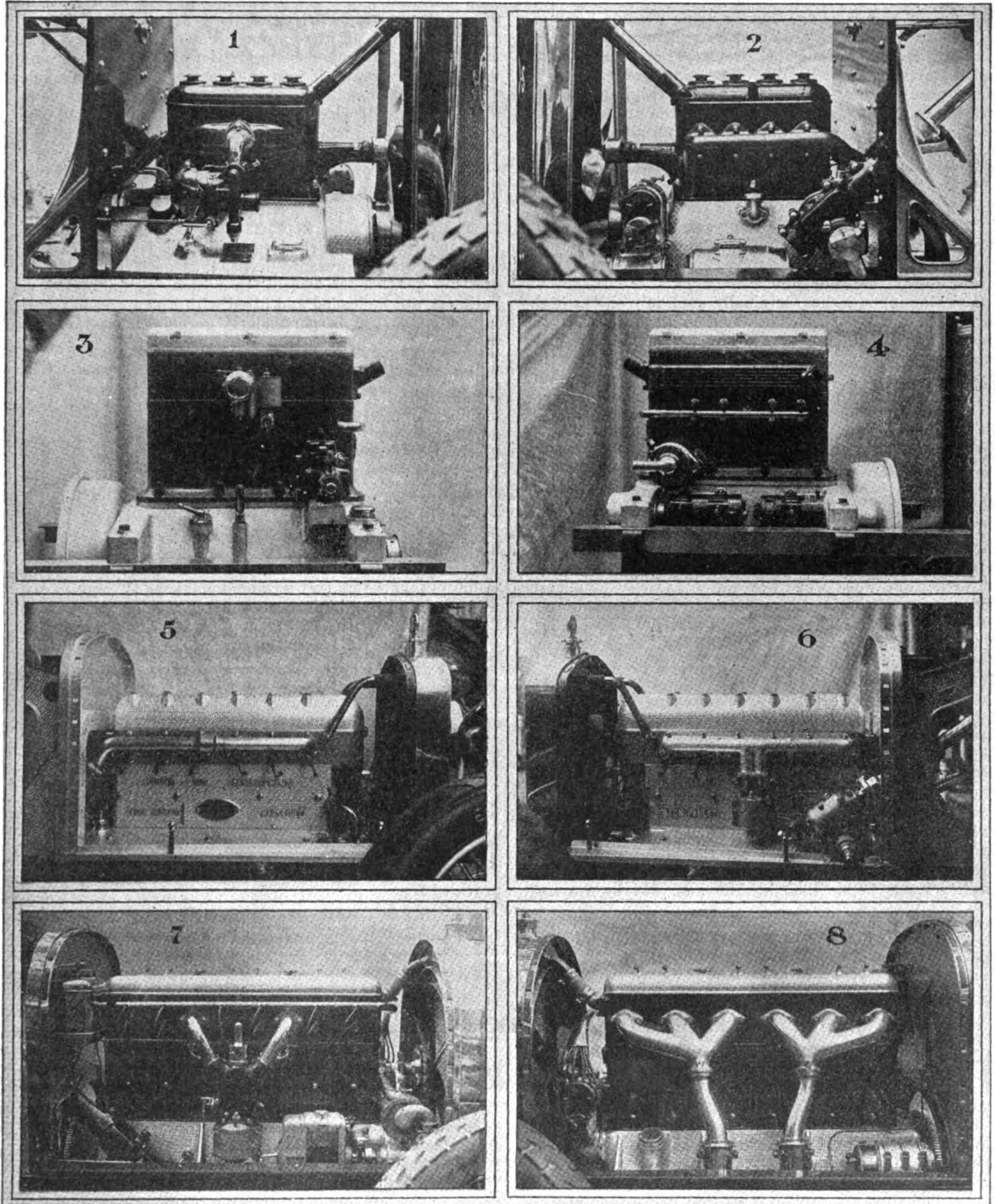
Oilless bushings for spring shackles are only just beginning to make their appearance, being used among others by Talbot-Darracq and Delage. The only car shown with a quick action force feed gun with pressure or bayonet attachment for the shackles and other parts, as used so extensively in America, is the Hispano-Suiza. On high-grade cars provision is frequently made for automatic lubrication from the inside of the oscillating spring pad on the rear axle housing, thus doing away with an external lubricator on this much neglected part. While much has been done to eliminate parts requiring external lubrication, by reason of more important changes in design (unit construction of engine and gearbox, enclosed engine accessories, enclosed clutch, brake and change speed mechanism, enclosed propeller shaft drive, etc.), little has been done to improve the lubrication of spring shackle bolts, or parts of the steering gear. For these parts the old-fashioned screw-down greaser is still in general use.

### Fabric Universals Greatly on Increase

The exhibition shows a most pronounced increase in the use of fabric universals. These are most commonly found on the smaller and cheaper models, examples being Citroen, Mathis, Vinot-Deguingand, Talbot-Darracq, D. F. P., Gregoire, Scap, Sigma and Delahaye; on the bigger cars with enclosed propeller shaft there is also a tendency to use a fabric joint at the front end of the drive shaft, particularly when the torque member terminates in a fork attached to a cross frame member or to the gearbox. An example of this is a six-cylinder rotary valve Itala of entirely new design. On a new Vinot-Deguingand car, with Hotchkiss drive, there is not only a fabric universal at the front end of the propeller shaft, but a fabric coupling enclosed within the flywheel, interposed between this member and the clutch. The clutch, a normal type leather faced cone, is external to the flywheel. A somewhat similar idea has been worked out on the Sizaire-Berwick, by the use of studs in rubber bushings, between the flywheel and clutch. Bugatti has made use of fabric as a coupling between the steering gear column and the steering gear worm shaft.

An important change is the use on a big scale of pressed steel welded rear axle housings. Before the war these





1 and 2—Panhard & Levassor 10 hp. Knight engine, the smallest Knight engine ever built. Note steering gear on engine. 3 and 4—Ballot 122 cu. in. overhead valve engine for a new passenger car about to be produced by the Ballot company. 5 and 6—Paulet six-cylinder overhead valve engine, designed by Michelat, formerly Delage engineer. Steering gear on left is mounted on crankchamber. 7 and 8—Delaunay-Belleville overhead valve six-cylinder engine with detachable cylinder heads and tappet rods at side of cylinders

were very rarely employed, but more modern plants has enabled French and other Continental firms to produce this type of axle housing, thus securing greater lightness with increased strength. Those now using this type of axle are Delaunay-Belleville, Delage, De Dion Bouton, Talbot-Darracq, Itala, Berliet. The same general type of axle is used by Fiat, but in this case the two halves of the pressing comprise the axle housing and the propeller shaft housing. There is only a slight use of all aluminum axle housings, the Bignan with steel tube reinforcements being one of these. In the cycle car class there are some examples of all-aluminum axle construction, but this feature has not been extended to full size cars. Bugatti, on his eight-cylinder, has got very light construction by means of a central aluminum housing for the differential and the two gears, with tubular housings for the axle shaft machined out of the solid billet.

Cast aluminum dashes, originally used only on the highest classes of cars, are now common on all models. In the great majority of cases the dash carries nothing more than the vacuum feed tank and acts as a support for the steering column. There is nearly always a separate polished aluminum plate mounted on aluminum brackets, in which the instruments are recessed. Even on low-priced cars of the Mathis class the aluminum dash is frequently found. Among the high-grade makers only a few of the more conservative firms adhere to the wood dash.

### Wheels and Tires

There is not much change so far as wheels are concerned. The detachable wheel, as distinct from the detachable rim, is used everywhere. Renault, Panhard and Talbot-Darracq use detachable wood wheels except for a few special fast models, where the wire wheel is fitted. Fiat is the biggest maker using the Sankey type hollow spoke wheel. This is not a true Sankey, for the hub and the spokes are made of two pressings welded together and then welded to a Michelin rim, whereas the Sankey is a two-piece wheel. The Michelin steel disk wheel is very extensively employed, particularly for the smaller and medium size cars. On very expensive types the wire wheel is a serious competitor.

Straight side tires have not made their appearance, although it was believed one firm would adopt them this year. The clincher bead tire is therefore used exclusively throughout the continent of Europe. Michelin and Bergougnan have both increased the size of their tires for truck service, the largest dimension now made with clincher beads being 1085 by 185 mm. (44 by 7.3 in.).

Both these are cord tires. Tire pumps are confined to high class cars, and are practically always built in with the gearbox, or to be driven off the gearbox. Few of them are now driven off the engine. Paulet has a very neat arrangement, the pump being driven off the gearbox, and the lever for putting it into engagement being on the side of the frame member hidden by a circular sheet metal hinged cover. Inside this cover, wrapping around the control lever, is a length of hose sufficient to reach all the wheels on the car.

Michelin has produced an indicator which notifies when the air pressure falls below a determined figure. This apparatus is only applicable to steel disk and wire wheels. It consists of a valve kept off its seat when the tube is fully inflated, but which drops and explodes a percussion cap when the air pressure drops, thus notifying a fall in pressure whether the wheel is in motion or standing. The indicator can be loaded and fitted with a new cap in a few seconds. Its use is particularly recommended for dual wheels.

### Ballot Now a Car Manufacturer

Ballot entered the Paris show as the manufacturer of a high-grade sporting type car, guaranteed to be an exact duplicate of his 122 cu. in. racing mounts. It was declared that only 100 of these would be built, the chassis selling price being 80,000 francs. For sporting purposes the chassis had been fitted with electric lighting and starting, aluminum dash, aluminum instrument board, special indicators, etc., and the sample chassis were shown with very highly finished two and three-seater sporting bodies.

Before the exhibition closed Ballot announced that he would put on the market a commercial type 122 cu. in. car, which, while being high class, would be sold at a very much lower price than the racing duplicates. Only the engine was exhibited. It is a clean-cut block-cast four-cylinder with detachable head, overhead camshaft and two overhead valves per cylinder mounted vertically in the head. The vertical drive shaft is in the front portion of the cylinder block and operates a cross shaft with the Delco distributor on one end and the water pump on the other. There are no followers between the cams and the valves, the arrangement being a special one which, it is declared, avoids all thrust on the valve guides. The transmission is a unit with the engine and provides four speeds ahead and reverse. The chassis has full floating rear axle with spiral bevel gears, and drive and torque are taken up by the springs. Both left and right-hand steering are being provided for.

## English Gasoline Rail Trucks

TWO interesting, and in some respects novel, petrol engined rail locomotive-trucks embodying the Stro-nach-Dutton patents have been built by Guy Motors, Ltd., in England. Each truck has two engines of 30 hp. each, duplicated radiators, and are of a unique design. They have been built for use in Uganda, where the cost per mile for a light railway is about \$40,000. The cost of the trucks, including the trailer stock and permanent way, is less than \$10,000.

The hauling capacity is 250 tons (British ton 2240 lb.) on the level on low gear and 50 tons at 13 miles an hour on top gear. The front of the tractor rests on a four-wheel bogie with flanged wheels for running on the rails,

but the rear wheels are solid rubber-shod and will run outside the rail track on a prepared smooth surface. Provision exists for replacing the rail bogie and wheels with an ordinary Ackerman steering equipment and rubber-shod road wheels.

The powerplant comprises two 30-hp. (1000 r.p.m.) Guy "four" truck-type engines placed side by side over the driving axle, and driving through a couple of cone clutches and a short flexible shaft to a silent chain reducing gear with a dog clutch interposed, which serves to couple both power sets as a common unit. The drive thence through a shaft and four speeds and reverse gear to double reduction (spur and bevel) axle gears.



# New Earl Car Is Larger Edition of Briscoe

New features are added to the former model, however, and some parts have been changed. The heavier car has called for a more powerful engine. Fittings and trimmings include new appliances and a feature is the design of ignition system enabling operation of all lights with the left hand.

By J. Edward Schipper

**A**S recently announced through AUTOMOTIVE INDUSTRIES, the Briscoe Motor Corp. has been succeeded by Earl Motors, Inc., and the Earl car, a refined and larger edition of the previous Briscoe, is ready for delivery. The factory has recently been refinanced to manufacture, on a minimum basis, 15,000 cars annually. Production at present, however, is not starting on a capacity schedule, although in a recent statement President C. A. Earl said that plans are being made to double this minimum capacity and to aim for a 30,000 schedule in 1922.

The new car is longer and more powerful than the previous product. The wheelbase has been increased from 109 to 112 in., and cylinder dimensions are  $3\frac{7}{16}$  by  $5\frac{1}{4}$  in., as compared with  $3\frac{3}{8}$  by 5 on the previous model. In conformity with the increased weight of the car, the tire size is now 32 by 4 in. (non-skids, all around) in place of the 31 by 4 in.

on the previous product. In mechanical details the car closely resembles the previous Briscoe.

Practically the entire Earl car is manufactured in the Jackson plant, which makes its own engine, transmission gearset, steering gear, front and rear axles. The engine is a four-cylinder, block cast, L-head type with detachable cylinder head, three-bearing crankshaft and four point flexible suspension. This suspension is designed to hold the engine rigid against the torque reaction, but to allow the frame to twist.

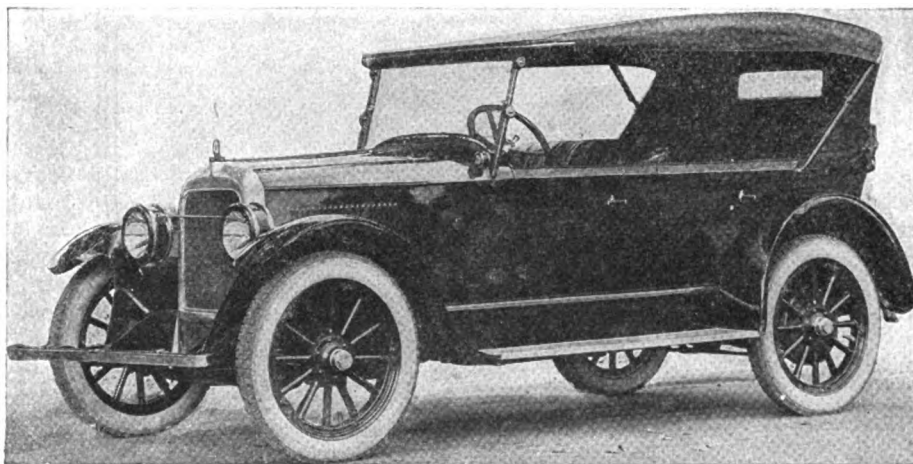
The crankshaft diameter has been increased to 2 in. and end thrust is now taken up on the middle of the three bearings by means of flanges. The endplay of the crankshaft is limited to between .002 and .004 in. The attached counter-weights in the former model have been discontinued. The timing gear train comprises steel crankshaft and generator gears and a fabroil camshaft gear with a cast iron center. These gears are cut with helical teeth of 1 in. width of face.

Cooling is by the thermo-syphon system. The hose con-

nections are large, being 2 in. in diameter, and the water jacket on the cylinder is carried below the bottom end of the stroke and all around the valve seats. The capacity of the cooling system is 5 gal. The radiator is located so that its bottom edge is on a level with the bottom of the combustion chamber, which tends to keep the hot water in the top tank of the radiator and the upper half of the core, and the cooler water in the engine.

Fuel is fed from the gasoline tank in the rear and by vacuum to the Scoe 1 in. carbureter.

This is a variable venturi type in which the venturi opening on the carbureter is arranged to adjust itself automatically to the load requirements of the engine, so as to maintain constant air velocity at all engine speeds. The electrical equipment of the car comprises a two-unit Auto-Lite starting and lighting system in connection with Connecticut battery ignition.



The Earl Model "40" Touring Car

The rear axle is semi-floating with differential and drive gears of nickel steel. The standard gear ratio is 4.66 to 1, instead of 4.18 as on the old model. Hyatt bearings are used in the differential and rear wheels and New Departure radial and thrust bearings in the drive pinion assembly.

The frame is a single drop type with 7 in. side bars braced with five cross-members and two gusset plates. The rear springs are 56 in. in length and the front springs are 36 in. All are semi-elliptic. The front wheels are mounted on Timken roller bearings and the front axle is of the drop I-beam type. The steering gear is a worm and gear type mounted on ball bearings provided with adjustment features. The chassis is lubricated by the Alemite system.

In the trimming and fitting work particular care has been employed to bring the new model up-to-date. The windshield, for instance, is of the new one-piece ventilating type with a glass 38 in. wide. It is leakproof in rainy weather, a molded rubber weather strip being fitted over the cowl immediately under the windshield to give a rain-

(Continued on page 816)

# A German Passenger Car of Radical Design

The engine is aft and every possible obstacle on the streamline body is removed to minimize air resistance. A single seat for the driver in the center of the car gives him a clear view of the road. Transmission and differential gear, engine and clutch are combined into unit powerplant.

IT seems a rather late day for introducing a design of car in which the principal components are grouped in an entirely novel manner, now that all of the world's leading makers have practically agreed on one standard form of chassis. Yet it must be admitted that the conventional design is not ideal by any means; that many of its features are subject to more or less serious objection, and that there is a possibility of improvement.

A design intended to overcome some of the acknowledged shortcomings of the present conventional passenger car was exhibited by Dr. Edmund Rumpler at the recent Berlin automobile show. Dr. Rumpler is one of Germany's leading aircraft manufacturers, but he has also had considerable experience in automobile design, having been connected in earlier years in engineering capacities with the Adler and Daimler firms. The principal defects which Dr. Rumpler set himself to overcome by his design are the following:

In the standard car, owing to the great distance of the engine from the drive wheels, the efficiency of transmission is rather low. Because of non-conformity of the chassis and body to streamline shapes, the air resistance at high speed is very great, resulting in a waste of power. The suspension is not as good as it might be and prevents fast driving on poor and indifferent roads. Other minor faults are that the shape of the body is such as to raise annoying dust clouds on roads which are not dust-proofed that the rear seat passengers are subject to unpleasant drafts and that sometimes the driver does not command a sufficiently free view of the road ahead.

As may be seen from the photographs herewith, the body of the Rumpler car is of streamline form, running out into a blunt edge in front and a sharp edge in the rear. The steering post is arranged centrally in front, and the control members are located for right-hand operation by the driver. Floating cantilever springs are fitted both front and rear; but whereas the front springs are arranged parallel to the axis of the car inside the body, the rear springs are placed at an angle to this axis and the rear half protrudes from the body. The front axle is of con-

ventional design, with Ackermann type steering, and extends through openings in the frame. Room for spare wheels is provided inside the body, the wheels being carried horizontally and introduced through suitable openings in the frame members.

A six-cylinder W or fan type engine is fitted, and is located back of the rear seat in a compartment of the body. What may be called the stern of the car, i. e., that portion back of the rear seat, is divided by the radiator into two compartments. In the forward one of these com-

partments, which is covered by the usual bonnet, the engine is located. The bonnet is provided with louvres through which cooling air for the radiator can enter, and the air, after passing through the radiator, leaves the rear compartment through louvres in its wall. Water circulation is by pump, and the air is circulated by a positively driven four-bladed fan.

Engine, clutch, transmission and differential gear with bevel drive are combined into a unit power plant. This whole unit is spring-supported, and only the rear axle

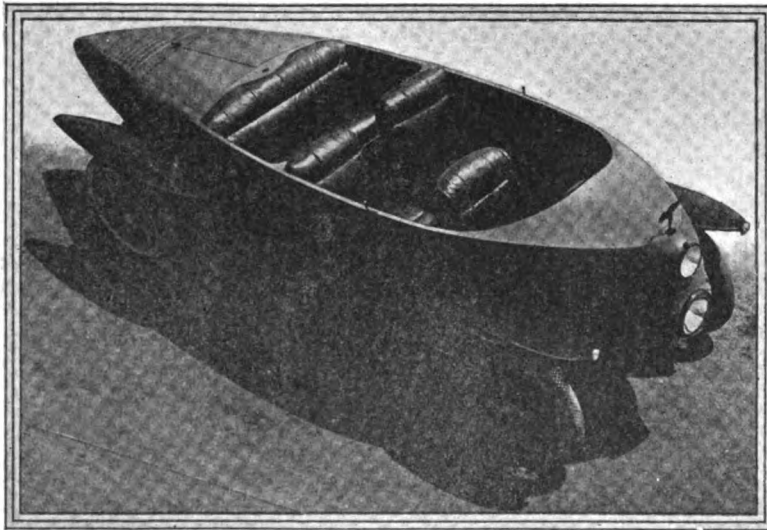


Fig. 1—The Rumpler streamline car

ends, which are independently movable of each other in a vertical plane, are unsprung. Thus the unsprung weight is reduced to a minimum, and the car should be very easy riding. Short, light radius rods connect the ends of the rear axle and the extreme rear end of unit power plant, where there is a spherical joint. There is a service brake at the rear end of the unit power plant and in addition there are emergency brakes on the rear wheels. Front wheel brakes are also fitted, the control being by cable passing through the knuckle pins. The muffler occupies the extreme rear end of the body and the car is completely enclosed underneath by an undershield attaching to the frame and extending from tip to tip.

The engine comprises three pairs of twin-cast cylinders set at angles of 60 deg. with each other. Cylinder dimensions are 74 by 100 mm. (2.91 x 3.94 in.) and the engine develops 36 hp. at 2000 r.p.m. There are four valves in each cylinder head, operated by a short camshaft carrying two cams, which is driven from the crankshaft through helical gears. Each cam operates one inlet and one exhaust

valve, and for closing the valves only two springs (leaf springs) are required.

The two-throw crankshaft is completely balanced by balance weights on each crank arm and is mounted in babbitt bearings. There are master connecting rods for the two central cylinders and swiveled rods for the others. Aluminum alloy pistons are used.

Lubrication is by force feed with dry sump, a feature borrowed from aircraft practice. A small plunger pump draws oil from a tank and forces it into the hollow crankshaft. Through oil holes in the crankshaft and small oil tubes extending up the connecting rod shanks the oil reaches the crankpin and piston pin bearings. The surplus oil accumulates in the crankcase sump, and as soon as a certain level is reached therein a second oil pump begins to work and returns the oil to the tank. The drive of the fan is by gear, with the usual friction clutch.

A sectional view of the power unit is shown herewith and brings out the fact that it is extremely short. There is a multiple-disk-in-oil clutch in the flywheel, with comparatively few disks of rather large diameter. A clutch brake facilitates gear changing. The three-speed gearbox is also unusually short, being rendered so by the fact that there are sliding sets on both the primary and the secondary shaft. The tail shaft of the transmission extends through the center part of the rear axle and carries the differential and the foot brake drum. The arrangement of the bevel gear drive and differential is similar to a design which has been used by Mercedes for the purpose of permitting of arching the axle. Instead of being co-axial with the rear axle, the differential gear is mounted on the driving shaft, and each of its side gears is provided with an elongated hub at the outer end of which there is an integral bevel pinion. Each bevel pinion meshes with a bevel gear on one of the rear axle shafts. The two bevel gears are not of the same pitch diameter, one being sufficiently larger than the other so that its pinion does not interfere with the other gear. Both bevel gear sets have the same ratio, of course. The object of using this design of differential in this case is to permit each axle end to rock independently around the axis of the propeller shaft. In the longitudinal section of the transmission and drive the compact arrangement of the transmission gears will be noted, and it will also be seen that ball bearings are used throughout the transmission and drive. The drum of the transmission brake overhangs its bearing.

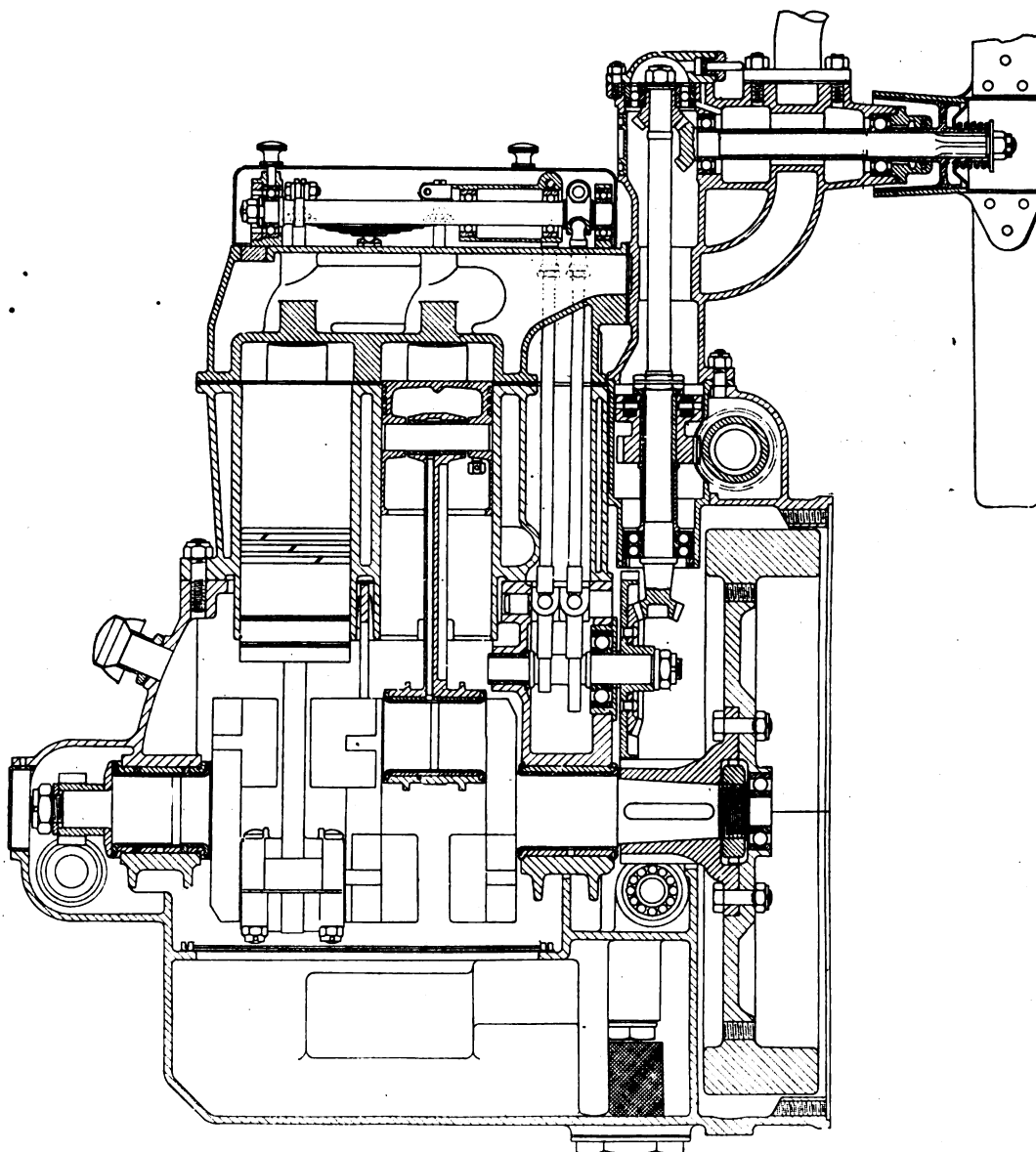


Fig. 2—Vertical section through engine

In Fig. 7 will also be seen guide slots in the differential housing above and below the driving gear. These two sections are of the same guide slot, which extends all around the cylindrical differential housing and accommodates two guide shoes into which the inner ends of the axle tubes are fastened. This is clearly shown in the sectional view of the rear axle. The driving shafts are mounted in ball bearings in and on the axle tubes, and the axle tubes and shaft together therefore can swing vertically around the propeller shaft axis, the differential housing being provided with large openings for the purpose on both sides, which are closed by means of leather covers. To brace the axle halves in the horizontal plane, radius rods are run from the ends of the axle tubes to a spherical joint at the rear end of the power plant, as clearly shown in the longitudinal section and the photographic view of the power plant. The result of this mounting is that if one of the rear wheels encounters a road obstruction, only that wheel and its half of the axle are thrown up thereby, the central housing of the axle being spring-supported and not directly subjected to road shocks. It is obvious from the above that the unsprung weight is exceedingly small, and it is claimed that this results in unequal smoothness of riding. This effect is obtained without undue complication and without the use of universal joints. In this design the differential compensates not only for any dif-

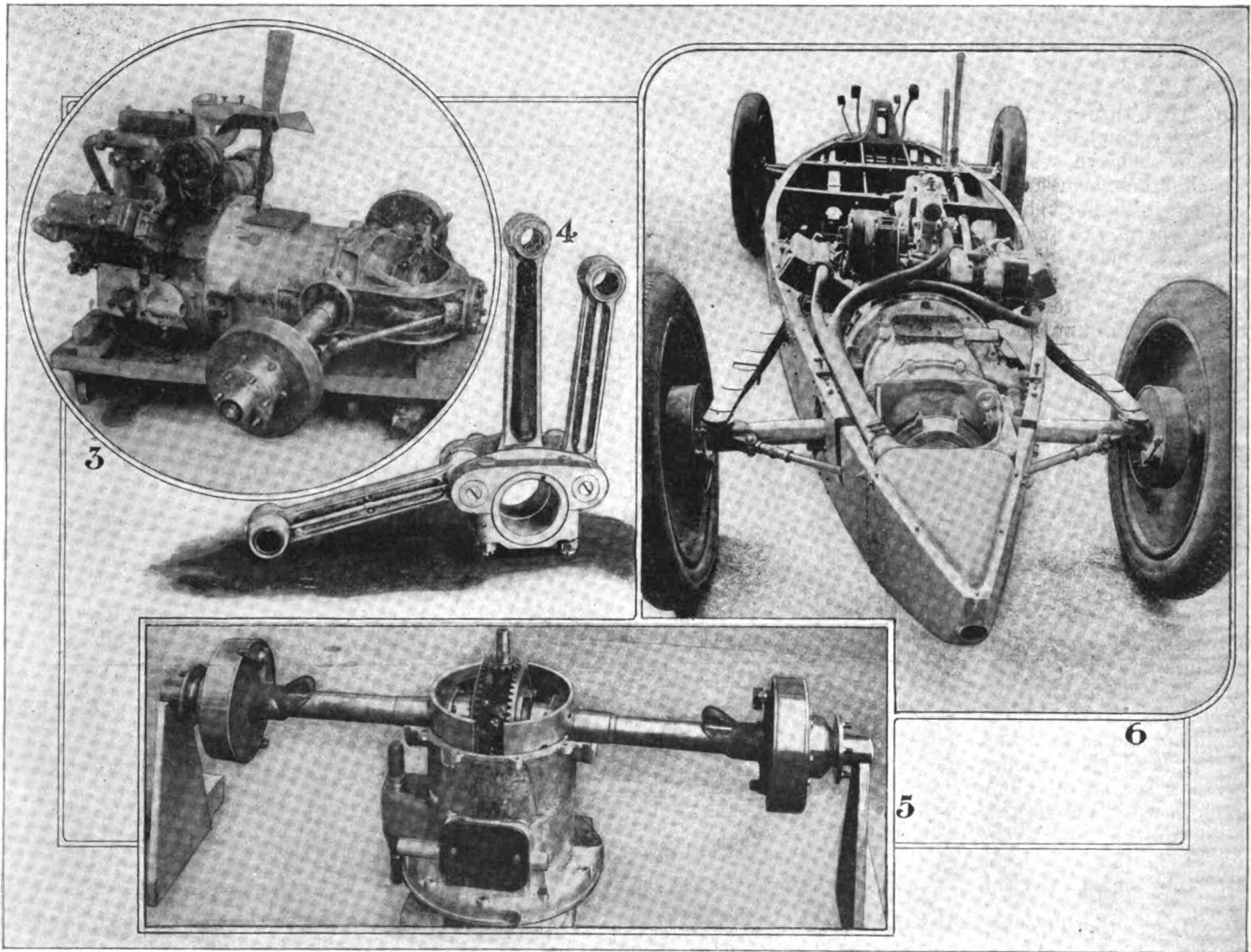


Fig. 3—Power plant and rear axle complete. Fig. 4—Connecting rod assembly. Fig. 5—Rear axle with half of casing removed, showing guide shoes. Fig. 6—Three quarter rear view of chassis

ferences in the horizontal travel of the two wheels, but also for any differences in vertical motion.

Fig. 9 shows the arrangement of the front springs, which are completely enclosed by the frame and under-shield. The springs have a spherical mounting at the center on a transverse frame member, and there is a similar connection between spring and frame at the rear end. The front ends of the two springs are pivoted to the front axle, and from the center of this axle an adjustable radius rod with ball joints extends to a frame cross member near the front end of the frame. The frame consists apparently of a single wide channel section, there being a welded joint at the front and a considerable number of cross members, while the muffler joins the two rear ends. Both the main frame channel and the cross members are pressed with large openings, partly to lighten the construction and partly for the passage of control rods and the entrance of the spare wheels. The openings for the spare wheels are closed by pressed steel cover plates.

While the small unsprung weight is a factor tending toward easy riding, the distribution of weight and the arrangement of the seats also influence this factor to a considerable degree. As may be seen from the diagram Fig. 11, in the Rumpler car the passenger seat is located at the center of gravity of the whole car (this center of gravity having been found by taking moments of the weights of the different components in the usual way. In a standard car the center of gravity is usually located at the driver's

seat, which, of course, is not as desirable in a car intended to be driven by a chauffeur. In the Rumpler, however, the driver's seat is also well inside the front axle. From the illustrations it is apparent that the car is of quite low build and that its center of gravity must be low. By taking moments in a vertical plane it has been found that the center of gravity is only  $28\frac{1}{4}$  in. from the ground. The weight is pretty well concentrated between axles, and this results in a low mass moment of inertia around a horizontal axis through the center of gravity. This moment is found by multiplying the weight of each part of the car by the square of its distance from the center of gravity, adding these figures, and then dividing by the acceleration of gravity. A Rumpler open car with driver and four passengers weighs approximately 3000 lb. and has a mass moment of inertia of 780 ft.-lb.-sec.<sup>2</sup>; a closed car with the same number of passengers weighs 3470 lb. and has a mass moment of inertia around a horizontal axis through its center of gravity of 800 ft.-lb.-sec.<sup>2</sup> It is stated that for standard cars carrying the same number of passengers the weights and moments of inertia are for the open type, 4070 lb. and 1485 ft.-lb.-sec.<sup>2</sup> and, for the closed type, 4730 lb. and 1515 ft.-lb.-sec.<sup>2</sup> With a smaller mass moment of inertia, it is stated, if the car body is set in vibration by road inequalities, these vibrations will be damped out more quickly. On the other hand, it would appear that such a body would be set in vibration more easily.

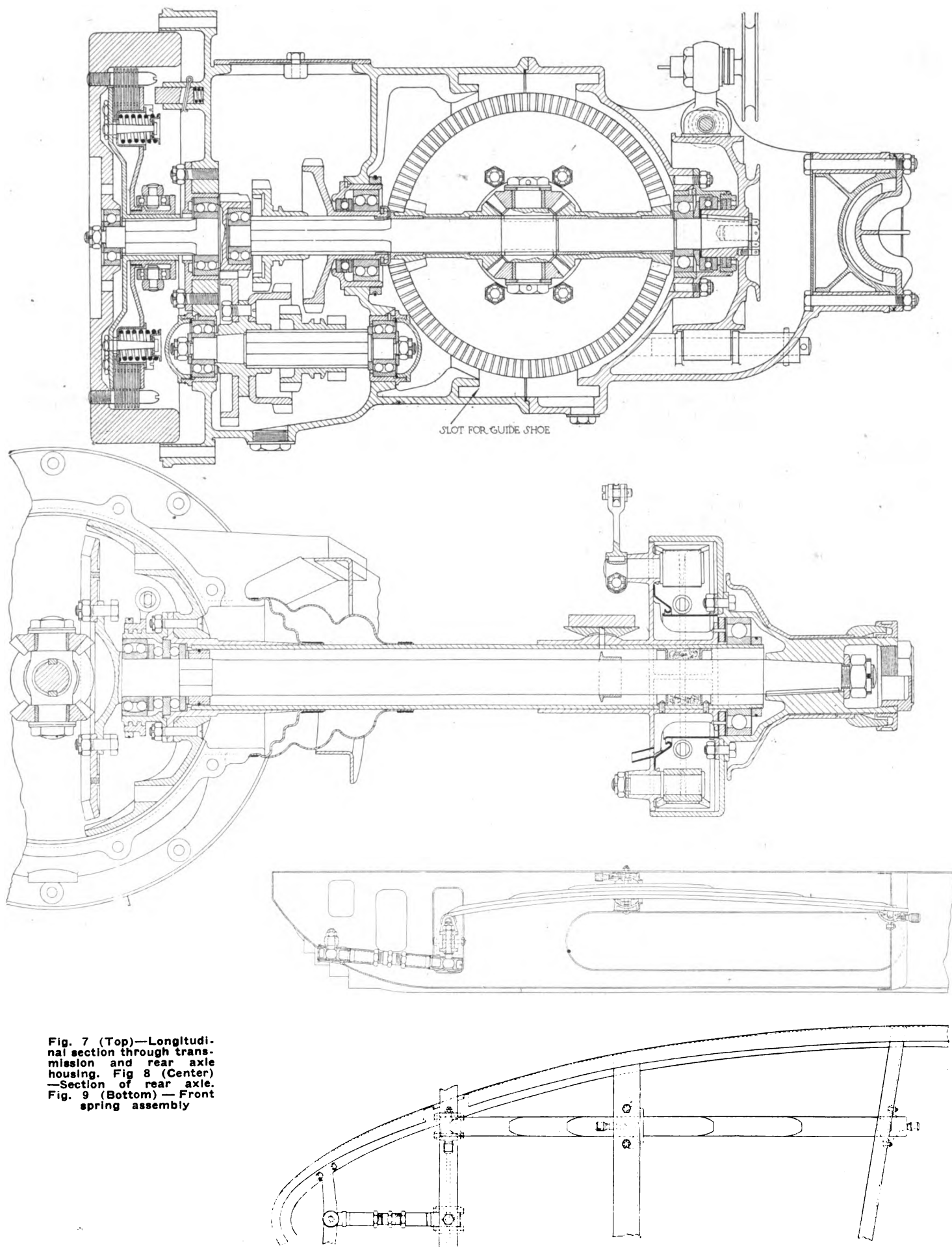


Fig. 7 (Top)—Longitudinal section through transmission and rear axle housing. Fig. 8 (Center)—Section of rear axle. Fig. 9 (Bottom)—Front spring assembly



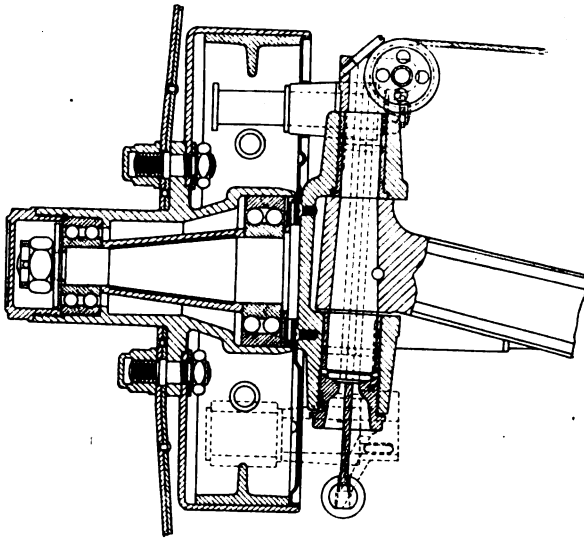


Fig. 10—Front axle end with front wheel brake

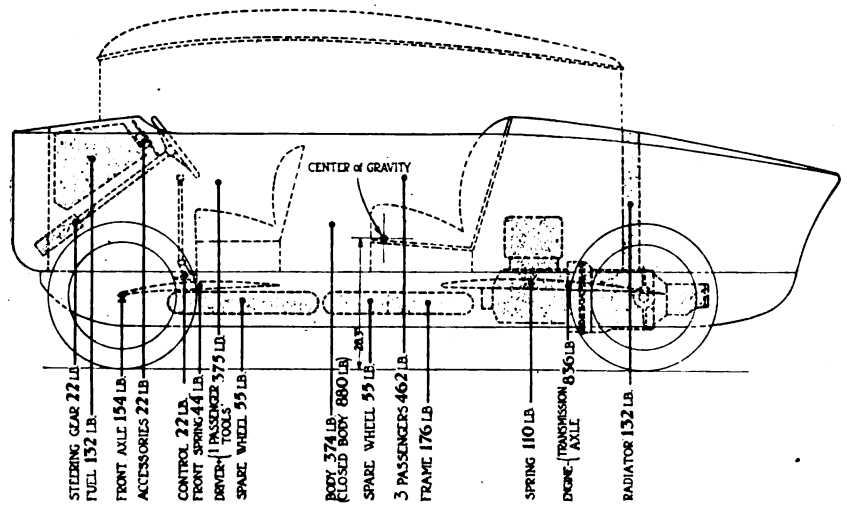


Fig. 11—Diagram of weight distribution

The body is of full streamline form, as shown by the photographs, and to obtain this form not only the spare wheels but also the battery and tool box are concealed within the body. No running board is provided, but instead there is a step, which, after having been used, folds up automatically so as to reduce the air resistance. When the door of the car is shut the step disappears in a space provided for it in the side of the body.

In order to minimize air resistance the head lamps are mounted in the front of the body, being held in place by light tension bolts.

A pure streamline body naturally cannot be fitted with the conventional mudguards. Dr. Rumpler uses for his car fin-shaped mudguards of elongated streamline section. Over each front wheel there are two mudguards, arranged one above the other. The larger of these carries at its forward end the built-in side lamp or parking lamp.

The car has a wheelbase of 114 in. and a track of 51 in. It is fitted with 880 x 120 mm. tires all around and is capable of a speed of 56 m.p.h. For long trips a detachable trunk can be fitted over the rear end of the body. The engine is said to be as accessible as in the standard car and the rear axle and transmission more so.

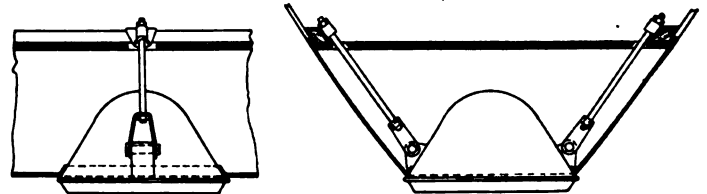


Fig. 12—Headlight mounting.

The principal advantages claimed for this new design are the following: The air resistance is very low, on account of the streamlining of body, underpan and limousine top, as well as enclosed axles, springs, spare wheels and accessories. The mechanical efficiency is high, on account of the absence of a long propeller shaft, torque tube and universal joints (this increased efficiency is probably largely imaginary.—Editor). Comfortable riding and great stability in turning corners, owing to the low center of gravity, small unsprung weight, rational arrangement of seats and proper distribution of weight. The car raises little dust. Passengers are not annoyed by odors and gases from the engine. The driver has an absolutely clear view ahead in crowded traffic. The machine is light and is cheap to produce.

## New Earl Car Is Larger Edition of Briscoe

(Continued from page 811)

tight joint. The top of the open car is provided with a low, clear vision light with French bevel plate glass. By dropping the floorboards below the top of the frame the seats are brought low to the ground, while still leaving them the usual height above the floorboards.

An interesting feature which is found on all models is the design of the ignition switch. It is mounted on the instrument board at the left of the steering column in a separate case within finger reach from the steering wheel. This makes it possible for the driver to control all of the lights on the car with the left hand, leaving the right hand to handle the steering wheel and center control. The headlamps are the new drum type and side lights are provided for parking. A rear view mirror above the windshield and an adjustable sun visor and car heater are included in the equipment for the closed models. The touring car comes in genuine leather upholstery and the sedan and brougham are trimmed in wool broadcloth. The door windows on the closed cars are operated by the new Dura crank type regulator and the interior hardware is of

oxidized silver finish, with a blue enamel design. The road weight of the touring car without passengers is 2550 lb. and that of the sedan, 2800 lb.

The prices of the different models are as follows: Touring car, \$1,285; sedan, \$1,995; brougham, \$1,995; roadster, \$1,375; panel delivery, \$1,160; screen delivery, \$1,085.

THE small car bids fair to remain popular in England for at least another year, although a stabilization of industrial conditions will likely bring about a demand for heavier cars. The Manchester Guardian, in discussing the subject, says the small car, in addition to its relative cheapness, has been found entirely satisfactory to owners. They point to the fact that motoring has become a business and unless the business depression is removed it is unlikely that buyers will want to sink large sums in more expensive machines. However, the Guardian says, once a man becomes a real motorist the demand for more power is apparent.

# British Tractor Trials Develop Interesting Engineering Features

Many farmers attended the exhibitions carried on over 500 acres of land. In addition to the official tests salesmen had opportunities to give demonstrations of their machines to the visitors. American-made machines received favorable comments and a number of new models were introduced.

By M. W. Bourdon

THE question as to whether there is justification in continuing the annual tractor trials—of which the third has, at the moment of writing, just been concluded near Shrewsbury, England—was answered most emphatically in the affirmative by all of the many interested parties on the spot who were interrogated. "Are you satisfied that the time, trouble and cost expended on such organized trials are worth while?" "Do they stimulate sales?" were among the questions put to numerous representatives of British makers, English distributors of imported machines and dealers, while some of the farmers present engaged in conversation promiscuously and casually were asked: "Does this sort of thing appeal to you as a practical and forceful demonstration of the advantages of tractors?" The answers were invariably "Yes."

The only individual heard to suggest that the 1921 British trials could well be the last for five years to come was a member of the staff of an agricultural journal.

Admittedly, the members of the industry who were questioned were only too well alive to the fact that most British farmers are holding tight to their pursestrings this year; in other words, tractor selling in England is now all work and no pay—or very little of the latter. But it is held that of the several ways and means of attempting to get the farmer interested in tractors, to show him what they will do, to enable him to make up his mind which type or size will suit him best, and eventually to make him a buyer, tractor trials run on the lines of those just finished in England are proving as successful as any.

Although the British trials were planned and organized solely by the Agricultural Section of the Society of Motor Manufacturers and Traders in 1919 and this year, and in 1920 in conjunction with the Royal Agricultural Society, the aim has been so to frame the rules and to impose such tests under impartial observation that the official reports issued after each event as to operating costs, work done, speed, etc., shall be above reproach. Further, to avoid the need for awaiting the final and full report before anything definite can be learned on such matters, the organizers this year placarded, at

the administration offices on the ground, tabulated performance results immediately these were ready during the four days over which the trials were spread. These tables accompany this article.

## Scene of the Trials

Plowing and cultivating were carried out this year on 26 fields widely spread in slightly undulating country, the total acreage available being approximately 500, with the largest field some 50 acres in extent. The character of the soil varied very appreciably, and, while there was none which could be described as really light or exceptionally heavy, the latter class was closely

approached — "full three-four horse land," a local farmer termed it. And, what is more, this heavier land had been dried so hard on the surface during the remarkable drought, even now barely broken, that it was exaggeratingly referred to as resembling concrete. "No sane man would attempt to plow it in that state with horses," two farmers remarked to the writer. "If tractors can tackle that, they can tackle anything," said another.

The weather was dry during the trials, and the only case of insufficient adhesion observed occurred with a Renault chain-track machine (Fig. 1) doing six furrows at once on a piece of rising ground. This machine weighs 7270 lb., has a four-cylinder engine, 3.7 x 6.3-in. bore and stroke, and in the drawbar tests gave a sustained pull of 3620 lb., but with a drawbar horsepower of only 14.3. On the same field as this Renault, on the next plot, was the 45-hp. Case (5½ x 6¾ in.), hauling with ease two three-furrow plows of the same size, but set to a depth of 6 in., as compared with the Renault 5 in.

## Scheme of the Trials

In previous British trials the machines have run only under official observation, which means that for quite 50 per cent of the period of the trials they were standing idle. But this year the idea was that every tractor should be at work all the time, so that no matter which day of the four allocated to plowing and cultivating the individual visitor should select to be on the ground, he

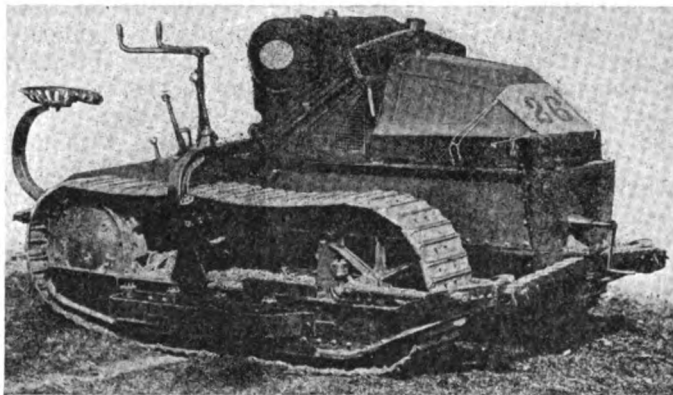


Fig. 1—Side view of Renault chain tractor

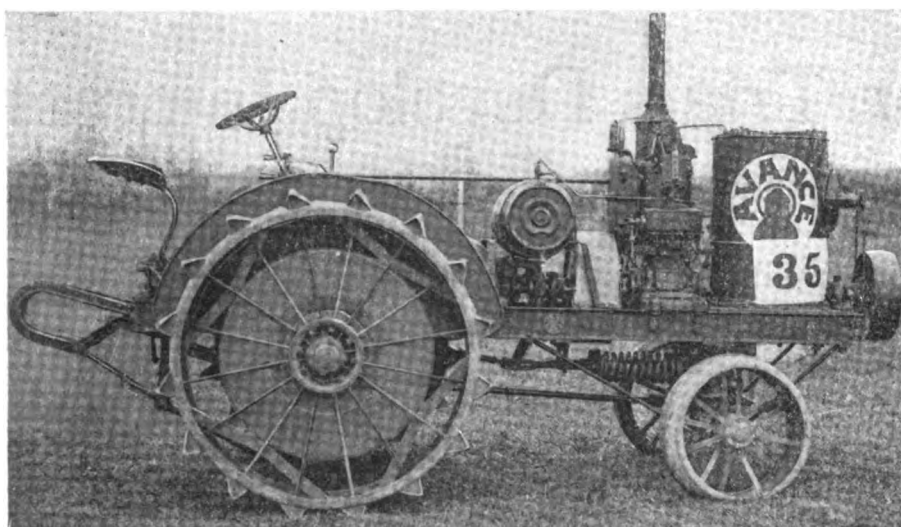


Fig. 2—Avance tractor with single cylinder semi-Diesel engine

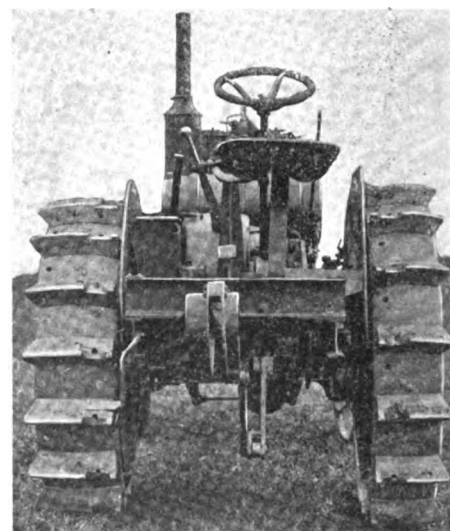


Fig. 3—Rear view of Avance

could, if he wished, see any one or all of them at work. When the machines were not undergoing one or other of the official tests they were demonstrating.

But this plan, though it was adhered to, did not work to full advantage, owing to the wide area covered by the fields available. Grass land is as much in evidence in the district as arable, and as a result it was a physical impossibility for any one man to visit every tractor and give each one due consideration. In future trials it is probable that it will be arranged that on one day all the tractors will be at work in one field or in two or three adjacent inclosures demonstrating pure and simple, the official tests being held on the other days whenever it may be convenient to have them. The day of the concentrated plowing will be advertised in advance, so that the farmer can select that day to visit the trials.

### The Official Tests

With the new Watson drawbar dynamometers available more prolonged, more numerous and more precise tests could be made than in previous years, and certain

factors which have previously been judged by mere opinion or casual measurement were brought out mechanically.

On the Saturday and Monday, preceding the four days on which the public was invited to attend, the machines were weighed and tests of maximum drawbar pull were made; in the latter the dynamometer was interposed in series with the drawbar coupling, while the machine under test hauled one, two, three or four other tractors, the drivers of which applied their brakes if required to impose the necessary load. The results of these tests were posted up on the ground immediately they were concluded (see Table I).

For four days the official plowing tests were conducted, a group of the machines being taken in hand each day until all had been dealt with. At other times they were demonstrating with plows and cultivators. Between whiles, too, each was submitted to a belt pulley test against a water dynamometer outfit rigged up on a heavy truck trailer hitched to a tree.

TABLE I  
Tests of Maximum Drawbar Pull\*

Tractor No.	Name	Speed in feet per minute	Pull to skid wheels, lb.	Sustained pull, lb.	Drawbar, hp.
1	Austin (kerosene)	215	2,000	1,820	11.4
3	Austin (gasoline)	206	1,920	1,720	10.6
5	Blackstone	125	4,060	3,470	13.2
6	20.4 hp. Case	161	2,090	1,710	8.4
8	28.4 hp. Case	167	3,660	2,680	13.6
10	45 hp. Case	152	5,080	4,080	18.8
11	Cletrac	225	2,940	2,650	18.0
13	Fiat	168	3,500	3,000	15.3
15	Fordson	175	1,440	1,235	7.35
17	Glasgow	166	2,900	2,450	12.3
18	28.8 hp. Hart Parr	225	3,110	1,725	16.7
19	17.8 hp. Hart Parr	175	2,150	1,730	8.4
20	International Junior	143	2,200	1,700	7.4
22	Lauson	141	3,160	2,400	10.3
23	Parrett	135	3,480	3,140	12.8
24	Peterboro	157	3,950	3,300	15.7
25	Renault (wheel)	150	2,400	2,040	9.3
26	Renault (chain track)	130	4,840	3,620	14.3
27	Samson	130	1,820	1,500	5.9
29	Saunderson	138	3,080	1,930	7.9
30	Titan	156	3,430	2,760	13.1
32	Twin City	175	3,000	2,470	13.1
33	British Wallis	181	2,750	2,560	14.0
35	Avance	86	2,700	2,450	6.4
36	Fowler	124	2,040	1,690	6.4
39	Service	60	480	410	.75

\*In every case the drawbar pull was limited by adhesion and the nature of the ground, not by engine power.

TABLE II.—BELT TESTS

No.	Tractor	B.hp. at 2200 ft. per min. belt speed.	Max B. hp.
1	Austin (Ker)	23.25	23.75
2	Austin (Gas)	25.2	26.5
5	Blackstone	24.3	24.3
6	20.4 hp. Case	10.5	14.5
8	28.4 hp. Case	20	26.5
10	45 hp. Case	—	(a)
11	Cletrac	20.5	23.1
13	Fiat	26.2	27.5
15	Fordson	16.0	21.5
17	Glasgow	17.5	17.5
18	28.8 hp. Hart Parr	28.75	30
19	17.8 hp. Hart Parr	17.5	17.5
20	International Junior	21.5	22.5
22	Lauson	28.0	28
23	Parrett	22.3	24.9
24	Peterboro	24	25
25	Renault (wh)	21.5	24
26	Renault (ch. tr.)	18	19.2
27	Samson	15.5	15.5
29	Saunderson	22	23.5
30	Titan	27	27
32	Twin City	25.25	29.25
33	Wallis	25	29.5
35	Avance	11.5	11.5
36	Fowler	19.25	20.0
39	Service	—	(b)
40	Simar	—	6.25(c)

(a) Did not line up in time allowed.

(b) Belt pulley too narrow for test.

(c) Could not attain belt speed of 2200 ft. per min.

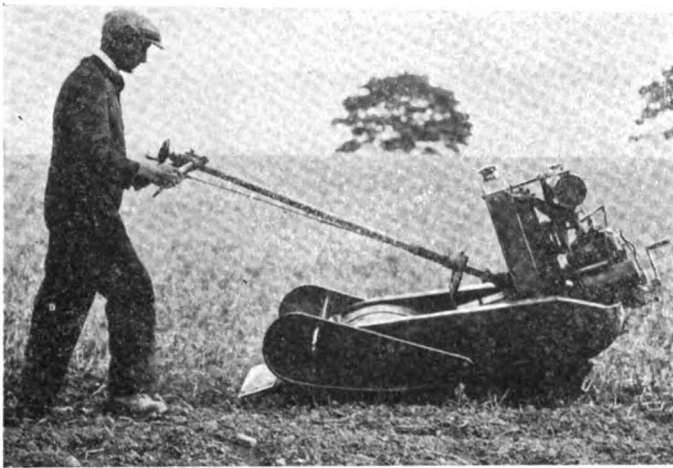


Fig. 4—The Simar Rotary tiller. This size, the smallest of three, represented the new system of tillage

In the latter test the tractors, with their pulley shafts at right angles to the longitudinal center line of the machines, showed up to great advantage over those having the pulley shaft longitudinally arranged. The Parrett, for example, was called forward, got in position, had the belt mounted and was under test in approximately three minutes, where the Avance (a Swedish tractor), with its pulley at the front end of the longitudinal crankshaft (Figs. 2 and 3), was nearly half an hour before matters were satisfactorily arranged, with crowbars applied under the wheels to supplement engine power in maneuvering. The results of these belt tests were also posted up as they became available (see Table II).

#### Fuel Consumption, Speed and Drawbar Pull

Reverting to the plowing tests, an official observer was appointed to each machine (in each case he was the representative of another tractor maker) and it was his duty to take precise records of fuel and water consumption, the tanks and radiators being drained as a preliminary and the surplus from the replenishment measured at the conclusion of the test. Observers also recorded the area of the land plowed, duration and cause of each involuntary stop, minimum width of headland required for turning and number of attendants required for plowing. The recording dynamometers dealt with the drawbar pull, depth of furrow, distance covered and time occupied, and all these factors will be covered in the complete official report.

But, while to the technical mind the tabulated reports alone will be sufficient to enable the relative merits of the tractors' performances to be realized, the farmer would probably be mystified by them, and if he drew any conclusions at all might do an injustice to certain machines. He might look at the "fuel per acre" column of Table III only, and not realize that the varying resistance of the land and the difference in gradients of the fields might affect adversely or favorably the showing of the individual machine. It is the intention, therefore, that the final report shall make these matters clear, and the results will be made available in such form that direct comparisons can be made.

Coming back to the usefulness of the trials to the industry, there can be no question but that the average farmer was impressed by the thoroughness of the organization and tests apparent at Shrewsbury. The visitor could not fail to observe the signs indicating that a number of tractor makers have sufficient confidence in their machines to submit them for trial to a body com-

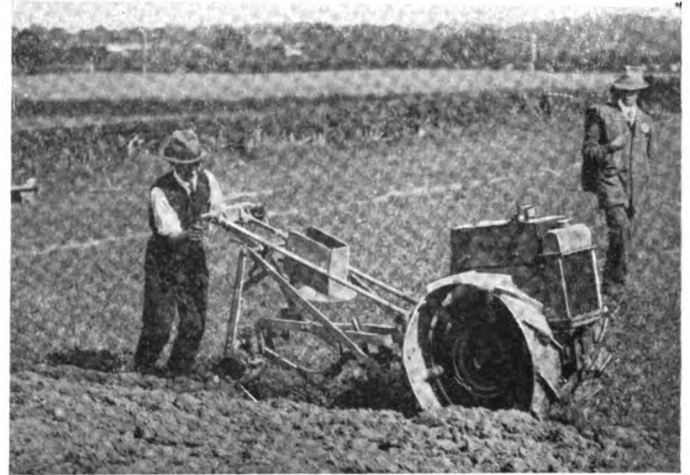


Fig. 5—Service hand tractor at work

prising their own trade rivals and willing to have the results of the tests published broadcast.

#### Engineering Features at the Trials

Thirty-eight of the 40 machines entered by their makers or distributors were submitted for trial and these represented 27 models of 23 makes. Of these 23 makes only five had engines other than automobile types, viz., Blackstone and Saunderson (British), Avance (Swedish) and Titan and Hart Parr (American).

The Blackstone has a three-cylinder motor with low-tension ignition, pressure feed for fuel injected into the combustion chamber and compressed air for starting and diluting the charge. This design appeared to be impractical for an agricultural engine, with its high-pressure air container, valves and intricate and fragile valve gear. Its principal merit is that it self-starts on kerosene from cold. The machine is of the chain-track type, with certain peculiar but not pronouncedly advantageous features. It has appeared in three trials in succession and has been taken up by a combine of agricultural engineers.

The Saunderson engine is a two-cylinder plant made by De Dion, and the tractor itself has a good following among those who favor a heavier and slower speed motor than the automobile type. It does not make an impressive showing alongside the majority of other ma-

TABLE III.—PLOUGHING TESTS

No.	Name	Maximum Pull	Average Pull	Depth in.	Acres per hr.	Fuel br. Acre pts.	Fuel used
1	Austin	1980	1720	5½	.49	24	Kero.
3	Austin	2440	1920	5½	.51	23	Gas.
5	Blackstone	1200	1070	7½	.62	15.7	Kero.
6	20.4 hp. Case	2060	1840	5½	.46	18	Kero.
8	28.4 hp. Case	1780	1370	7½	.82	19.8	Kero.
10	45 hp. Case (1)	3240	2485	6	1.11	23.6	Kero.
11	Cletrac	1900	1780	5½	.59	26.5	Kero.
13	Flat	2500	1650	7	.69	15.3	Kero.
15	Fordson	1320	1230	5½	.58	23.5	Kero.
17	Glasgow (2)	1870	1630	6	.54	18.8	Kero.
18	28.8 hp. Hart Parr	2590	2240	7½	.81	22	Kero.
19	17.8 hp. Hart Parr (2)	1190	910	7	.45	30.2	Kero.
20	International Junior	2000	1320	5½	.53	24.6	Kero.
22	Lauson	1600	1210	5½	.74	25.7	Gas.
23	Parrett	1880	1370	7	.62	17.8	Kero.
24	Peterboro	2680	1665	7	.77	24.5	Kero.
25	Renault (wh)	1460	1010	7½	.79	18	Gas.
26	Renault (ch. tr) (1)	3420	2740	5	.64	17.6	Gas.
27	Samson	1488	1072	5½	.42	24.4	Kero.
29	Saunderson	1500	1030	7½	.67	20.6	Kero.
30	Titan	1700	1440	6½	.68	25.5	Kero.
32	Twin City	1645	1540	5½	.71	27	Kero.
33	British Wallis	1800	1200	6½	.78	19	Kero.
35	Avance	.....	.....	6½	.37	26.2	Crude
36	Fowler (3)	.....	.....	6	.37	45.3	Gas.
39	Service (4)	.....	.....	6	.12	12.9	Gas.
40	Simar (4)	.....	.....	4	.19	25.6	Gas.

1. These machines hauled two 3-furrow plows.

2. These machines had plots of awkward shape causing loss at headlands.

3. Self-contained motor plow.

4. Garden cultivators, operator walking behind.



Fig. 6—A general view of the field tests with three machines at work

chines in the field, and in general efficiency it is probably lower. But it is a substantial general purpose tractor, with winding drum, and has a good name for durability after being on the market for at least ten years.

#### The Swedish Avance Machine

The Titan and Hart Parr are, of course, well known to readers of *AUTOMOTIVE INDUSTRIES*, but the Avance strikes a new note in tractor design. It has a semi-Diesel, single-cylinder engine of 6.85 x 7.32-in. bore and stroke, which, as usual with this type of engine, is reversible and eliminates the need for reverse gearing—though in maneuvering the waiting for the engine almost to stop before it can be reversed occupies more time than slipping in a reversing gear. There are also several unusual features in the general design. The ordinary type of radiator, for example, is displaced by a cylindrical cooler wherein the pumped water is caused to trickle over the surface of a coil of gauze, spiral in plan, while air is circulated through and around it by a fan at the front (Fig. 8).

Then, again, the Avance can be used either as a self-contained plow or as a tractor with separate implements, but the shares of the attached plow were soon found to be unsuited to the land where this machine was set to work, and it was therefore taken off and a two-furrow separate implement was hauled. The drawbar pull from this tractor is exerted through two long and heavy helical springs under the engine, and these springs are compressed unduly if the plowshares meet with an unusual obstacle in the soil—a tree root or big stone, for instance—and by means of coupling rods and levers the engine clutch is then disengaged, thus bringing the machine to a standstill and preventing damage to the plows.

The general design of the Avance does not strike one as being entirely practical. Its center of gravity is obviously too high and its front wheels unusually small in diameter. Incidentally, its rear wheels are of unequal size, that on the right being 54 in. in diameter as compared with the 48 in. of the other, in order to keep the engine approximately vertical when the right-hand wheels run in the furrow.

The desirability of using a semi-Diesel type engine in agricultural tractors is a matter of opinion. It has points in its favor and seems to appeal to those people who incline toward a slow-speed engine; at Shrewsbury the Avance ran on crude mineral oil in the tests and subsequently demonstrated with palm oil as a fuel. Its exhaust was by no means invisible with either, and it was inclined to misfire somewhat erratically even when pulling steadily under load—though, of course, this

shortcoming is not a necessary accompaniment of the semi-Diesel system.

#### Simar Rotary Tiller

Another newcomer to British trials was the Simar Rotary Tiller, a Swiss production in which tines or hooks of round section spring steel are rotated and provide a fine tilth—resembling that resulting from the use of plow and harrows. It is claimed that an equally good seed bed is thus provided at one operation instead of three or more, and, while as a disturber of the soil the machine is remarkably efficient, this system of tillage does not meet with universal approval from agriculturists, though it is highly spoken of by some users; it does not bury the stubble and weeds as completely as a plow, but merely disturbs them, some being buried, while the remainder lie scattered about half in or out of the soil.

This type of machine is made in three sizes, the two largest being termed 25 hp. and 40 hp. respectively, and having three wheels, but the front one is merely a castor wheel, steering being accomplished by declutching one or other of the rear ones. These two machines are comparable with tractors or self-contained motor plows of similar power, but unfortunately they were not at Shrewsbury, the system being represented by the smallest type, which is hand-controlled and steered by its attendant walking behind (Fig. 4). It is a model intended for use on vegetable farms, orchards and other plantations where its narrow track (22-in. wheel centers, with a maximum of 28 in. of the rotary tiller drum) makes an appeal. It has a two-cylinder Vee engine of approximately 3¼ x 3¾-in. bore and stroke, and on medium land at the trials it steadily tackled a "furrow" of 28 x 8 in., a performance which demonstrated its superior efficiency in a mechanical sense to that of a plow, for obviously an engine developing but 7 hp. at 1200 r.p.m. would not suffice for a two-furrow, 14 x 8-in. normal plowing outfit. Wheel adhesion, incidentally, is quite remarkable, for it is enhanced by the fact that the tines assist to haul along the machine as a whole.

Another "hand" tractor at the trials was a single-cylinder outfit with a single-furrow plow attachment, the Service; but it was out of its element in big fields and heavy land, being, like the small Simar, intended for garden and plantation use in light soil.

No other new tractors were present and some of the old ones seen at previous trials were absent. Among the latter were certain machines of American manufacture—Moline, Chase, E. B. and G. O.—but the United States was represented by the following: Case (three



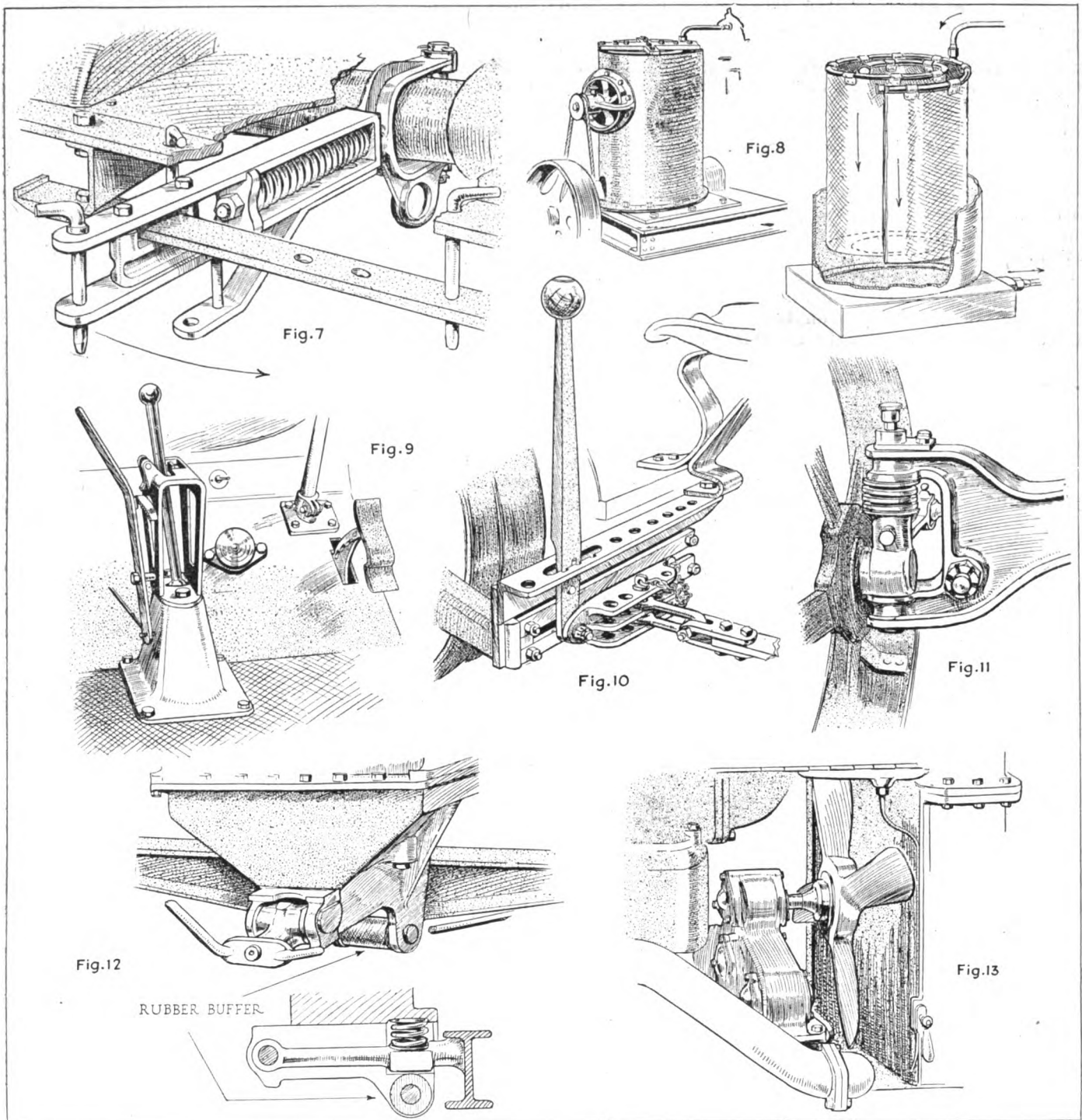


Fig. 7—Drawing shows the Saunderson shock absorbing drawbar coupling with provision for lateral adjustment. Fig. 8—Advance water cooler displacing usual type of radiator. Fig. 9—Peterboro controls. Note raised "gate" for spherically pivoted gear shift lever. Fig. 10—Glasgow adjustable drawbar. Fig. 11—Saunderson spring buffer for front swivel axes. Fig. 12—Austin flexible front suspension of power unit on axle. Fig. 13—Austin direct drive fan

models), Cletrac, Fordson, Hart Parr (two models), International Junior, Titan, Lauson, Parrett; Samson and Twin City, while the British Wallis also exemplified American design; entirely British machines were the Austin, Blackstone, Glasgow (Continental engine), Saunderson, Peterboro, Fowler (Waukeska engine) and Service. Fiat (Italy) and Renault (France) each had two machines at work.

As regards general engineering tendencies, there were few changes of note. Both gasoline and kerosene were used as fuel, and Austin had two machines running on the one and two on the other. The Austin vaporizing system for the heavier fuel consists merely of a com-

bined inlet and exhaust manifold with a Zenith carbureter, the contact between inlet and exhaust branches being complete throughout their length alongside the cylinder block. This system appeared to serve quite efficiently, gave a clean exhaust, and in the tests of maximum drawbar pull the kerosene-fed machine actually showed better results than the other.

Only one three-wheeled tractor was present, the Glasgow, with its all-wheel drive. For some reason or other this machine has not made the headway in output and sales which was expected of it, but possibly this is accounted for to a certain extent by production delays not making it available in quantities until the slump

commenced. It is still looked upon, nevertheless, as a type which will survive, despite the gradual disappearance of other three-wheelers. Contrary to expectation, by the way, this tractor, notwithstanding its three driving wheels, was limited as to its drawbar pull by lack of adhesion, not by engine power. But in this case, as in many if not all the others, the soil was actually too dry to enable the machines to show up to best advantage. The field where the maximum drawbar pull tests were made was stubble on fairly light soil and kicked up almost as readily as road grit 6 in. deep; even the chain-track machines suffered in performance for this reason.

One of the Hart Parr tractors used a front axle extension to enable the right front wheel to run in the furrow while the other three ran on the unplowed land, and this arrangement seemed to appeal quite strongly to

many of the farmers present. Those of the latter who work heavy land with a clay-like subsoil object strenuously to the two wheels on one side running in the furrow, because of the compression of the subsoil which then occurs, tending to cause the land to become waterlogged, especially when two-furrow plows are used. But they object, also, to running all wheels on the unplowed land, because of the need for the driver constantly to be on the alert for steering. Thus the Hart Parr arrangement appealed as a good compromise, causing but a small proportion of the weight to be imposed on the subsoil and providing something approaching a self-steering effect. The Cletrac self-steering arm also gained approval for a similar reason, but no British maker had any feature of this nature, and all the four-wheeled machines of home production ran with two wheels in the furrow.

## Rate of Penetration in Case Hardening

**I**N the cementation process direct contact between the iron and the powdered charcoal is essential. According to Le Chatelier and Bonnerot no cementation takes place in the absence of any gases in a vacuum, while Guillet and Griffiths obtained some penetration in a vacuum when the charcoal was pressed against the iron. Iris Runge, who has been investigating the problem at Göttingen, believes with Giolitti and Astorri, that gases play an important part in the penetration, but that solid penetration is also possible. In order to study the rate of diffusion of carbon into iron, she had to work with carbonaceous gases. While Giolitti had in similar researches analyzed the successive layers of an iron wire heated in a carbonaceous gas, Iris Runge relies on the increase of the electric resistance of the wire and on microscopical examination. She makes the assumption that the increase in resistance will be proportional to the amount of carbon absorbed by the iron; the assumption is somewhat questionable, but seems justified by her experiments, especially considering that iron does not, under her experimental conditions, take up more than 1.5 per cent. of carbon at near 1000 deg. C.

The wires used in the experiment were 0.5 cm. length, 50 cm. or 25 cm. long, wound to a spiral of 2.5 cm. length, and enclosed in an electric furnace. By copper leads, 2 mm. in diam., the wires were led to a Wheatstone bridge for resistance measurements accurate to 0.001 ohm., and taken every few minutes. The wires, mostly electrolytic iron, were first heated in a current of hydrogen or nitrogen until the furnace temperature and the resistance had become constant; this took about two hours, during which the resistance rose to about ten times its original value. The current of the respective gas was then turned on; the gases tried were: coal gas, as such or diluted with hydrogen or nitrogen; vapors of hexane, benzol, toluene, petroleum ether and methyl-alcohol, likewise diluted. The change in resistance observed would of course partly be a temperature effect. Sometimes a change in resistance was noticed, attributable to carbon; when there was a change, the wire would mostly be covered with loose sooty carbon; this was especially noticed with hexane, and was last noticeable with toluene. When there was no change in the resistance, little or no carbon would be found in the iron on subsequent examination. It was clear that the presence of hydrogen facilitated the penetration of carbon into iron, though the results were not very concordant. The rise of the resistance was generally rapid at first; within about forty minutes constant conditions would be attained. The absorption of 1 per cent. of carbon in-

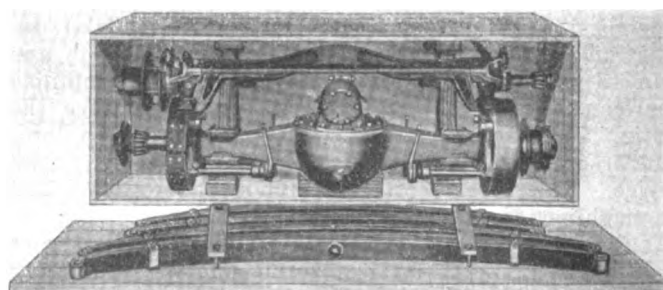
creased the resistance of the iron at 920 deg. C. by 5.7 per cent., at 830 deg. by 7 per cent., at 18 deg. by 40 per cent., the increase being reckoned on the corresponding temperature. The diffusion co-efficient at 930 deg. C. was  $2 \times 10^{-7}$  sq. cm. per second, and with an active gas 0.6 mg. of carbon passed through 1 sq. cm. of iron surface in the first three minutes. There was no appreciable cementation below 700 deg., and the rate of cementation rapidly rose at higher temperature. The mixed crystals formed above 900 deg. consisted of cementite and pearlite.

## Saving in Shipping Costs

**T**RANSPORTATION is one of the big factors that enters into the purchase price of a motor truck. Especially is this true of cars that are shipped for export. The Royal Rex Motors Co. of Chicago has designed all its truck models so that they can be knocked down and shipped in separate parts. The saving claimed by this method is well over 100 per cent on all shipments to foreign ports. The truck, once it reaches its destination, can be uncrated and assembled by two mechanics in four hours' time.

As an example company officials said the cost of shipping a truck from Chicago to Liverpool, under the old method, was \$250.75, divided as follows: Chicago to New York, \$58.75; New York to Liverpool, \$192. Under the new method a saving of \$155.75 is claimed. The cost from Chicago to New York was given as \$47 and from New York to Liverpool, \$48.

Shipments to other European ports and to South American and Pacific points were also shown to have been made with similar savings.



Crated for shipping

# The Manufacture and Assembly of a Cork Insert Disk Clutch

A description of machining and assembly operations on Hudson and Essex clutches. Most of the parts used in the two clutches are identical and the two are assembled simultaneously in the same department.

By J. Edward Schipper

**F**OR about eleven years the Hudson Motor Car Co. has been using a multiple disk clutch with cork inserts running in oil. This clutch has proven so satisfactory during this length of time that it has undergone but little change. The clutch used in the Essex car is identical with that in the Hudson except that there are two less disks and four springs instead of eight.

A sectional view of the clutch is shown in Fig. 1. The clutch is housed in the flywheel and inclosed by a clutch cover. The drive is transmitted from the flywheel to the driving set of disks by five pins which are riveted to the clutch cover. These pins pilot or seat in holes in the flywheel. From the driving disks, which are provided with cork inserts, the torque is transmitted to the driven disks by frictional contact. Frictional contact is maintained by four clutch springs in the Essex and eight clutch springs in the Hudson, which squeeze the disks together between the clutch drum, which carries the driven disks, and the pressure plate. The clutch is released by forcing pressure plate back against the spring pressure. The actual disengagement of the disks is effected by separator springs placed between them.

The principal units in this clutch, which is manufactured almost entirely in the Hudson plant, are the hub, the cover, pressure plate, disks and spider. The clutch hub is a drop forging, the blank being in solid form roughly flanged to shape. The machining operations on this part are not unusual, consisting of simply drilling the center bore on a Foote-Burt radial and reaming the hole on the same machine, Fig. 2. The hole which is  $1\frac{1}{4}$  in. diameter is then broached to size on a Lapointe broacher. A keyway is also broached in this hole on the same machine. The hub is turned and faced on a Fay automatic lathe capable of turning 12 hubs per hr. These

are turned down to a diameter of 1.8125 in. nominally, which leaves .020 in. for finish grinding. The work is held on an arbor which is pressed into the hub before it is mounted in the Fay lathe, this arbor providing the centers for the operations.

After the  $1\frac{1}{4}$ -in. center hole is chamfered, the holes are drilled for the tapered pins which fasten the hub to the transmission shaft. This is the pin shown at A in the section of the clutch, Fig. 1. Clearance for the nut which is screwed on the end of this pin is milled on a LeBlanc miller, after which eight  $21/64$  in. holes are drilled in the hub flange. Location for this drilling is from the keyway in the broached hole through the center. Two draw holes are then drilled in the flange for puller screws used in removing the clutch. The eight holes in the flange are then chamfered and all ten holes are tapped on a Garvin tapper. The hub is then ground to size and face flanged. This grinding is done on a Norton grinder, the hub being pressed on an arbor and centered, Fig. 3. The final operation on the hub is filing to remove any burr from the keyway.

The clutch cover is a stamping, the only machine operation necessary on this being to grind off the face

on a Blanchard grinder, Fig. 4. This assures a good seating contact with the face of the flywheel against which this cover bolts.

The clutch plates are stampings, the plates containing the cork insert having the holes punched in the plates. The plates which carry the cork inserts are ground on both sides. The pressure plate is only ground on one side, as it has contact only on the side which is drawn up against the contacting disk. The grinding of the plates is done on Blanchard grinders, the plates being held by magnetic chucks. The punched holes in the disks into which the corks are placed are counter-sunk on a Sipp

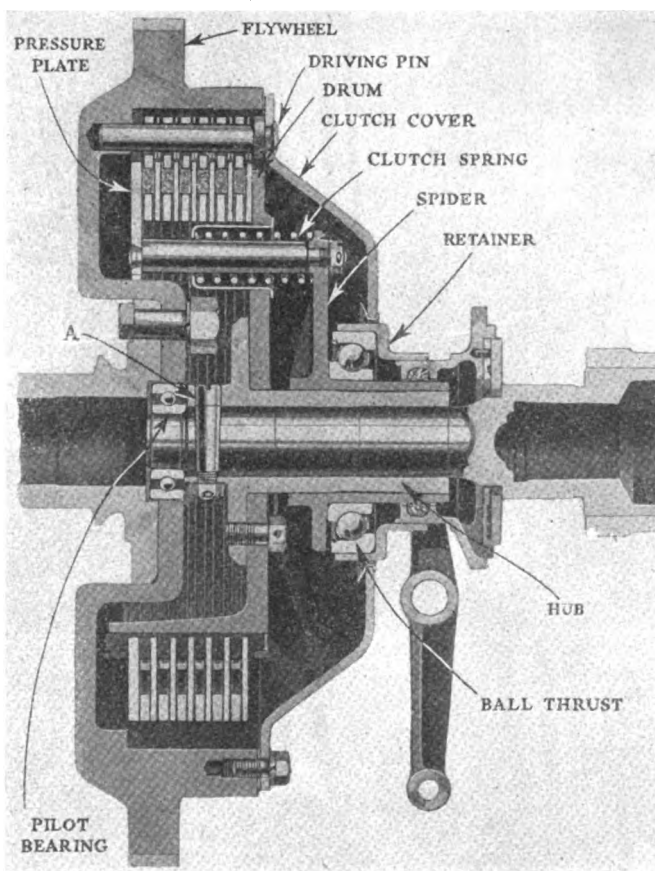


Fig. 1—Sectional view showing construction of Hudson clutch

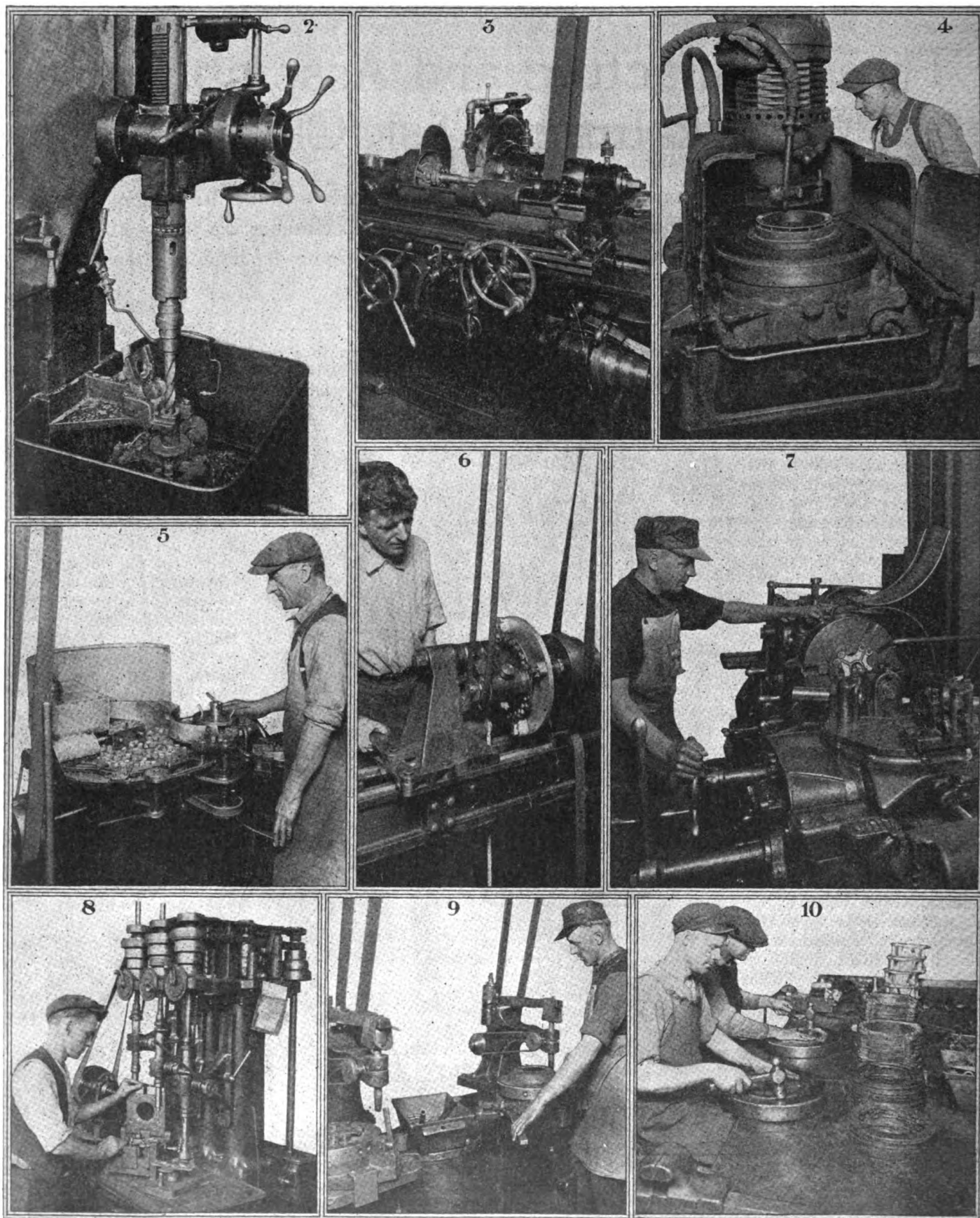


Fig. 2—The center bore on the clutch hub is drilled and reamed on a Foote-Burt radial. Fig. 3—Finish grinding outside diameter of clutch hub on Norton grinding machine. Work is held on arbor pressed into hub. Fig. 4—Facing the clutch cover on a Blanchard grinder to assure a good seating contact against the face of the flywheel. Fig. 5—Automatic machine for inserting the corks in the driving disks for the Hudson-Essex clutches. Fig. 6—Straddle slicing machine which slices off ends of corks on both sides of disks, leaving slight amount projecting for frictional contact. Fig. 7—Boring and reaming clutch spider on Pratt & Whitney machine. Fig. 8—Three-spindle Sipp used for drilling and spot-facing stud holes in clutch spider. Fig. 9—Automatic riveter which rivets the driving pins to the clutch cover. Fig. 10—Straightening clutch plates to within .010 in. limit by peening.



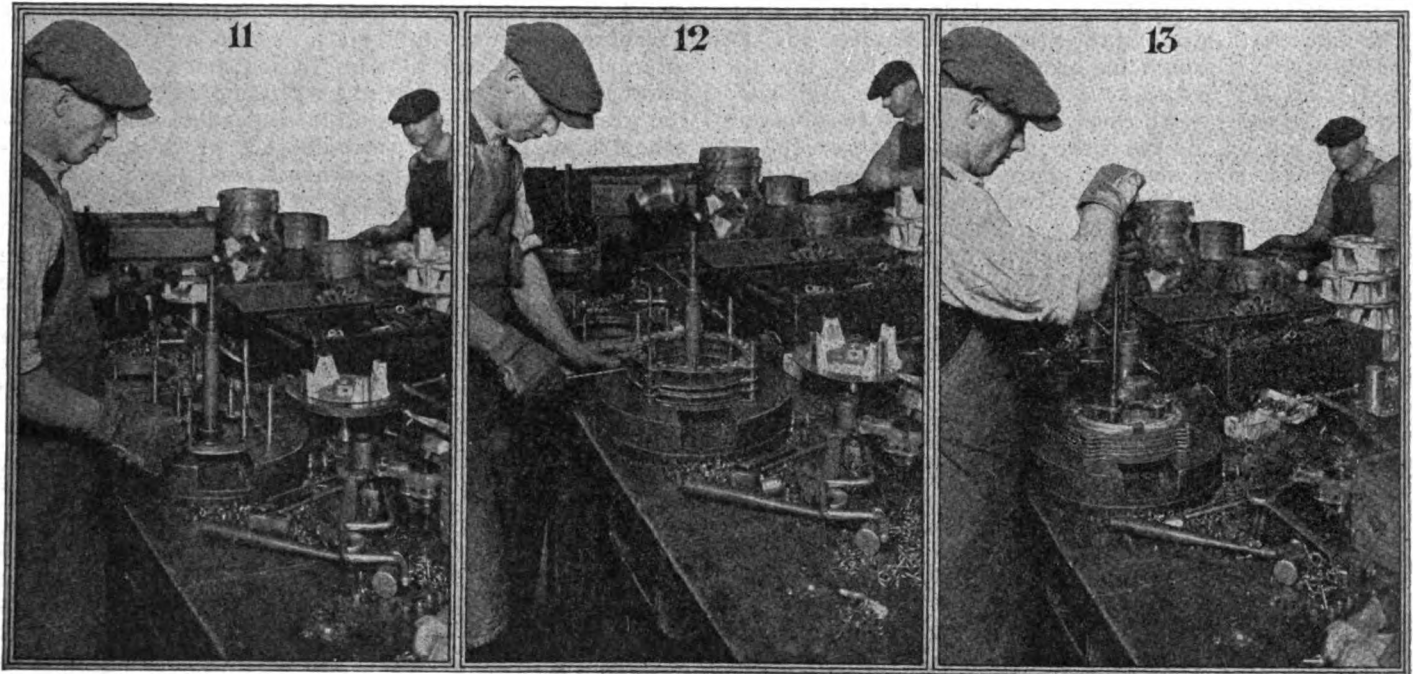


Fig. 11—Starting clutch assembly on four pins mounted in assembling fixture. Fig. 12—Clutch about one-half assembled, showing the pressure plate, some of the disks and the separator and silencing springs between them. Fig. 13—Final operation in the clutch assembly, putting the nuts on the ends of the pressure plate studs. These nuts are locked by means of cotter pins

radial so that, in assembling, the corks will not be damaged in pressing them into the holes. The plates are then straightened by hand, this being a peening operation. The corks are put in the disks on an automatic machine which has been specially designed and made by the Hudson company, Fig. 5. The machine has a centrifugal hopper which throws the corks into a feeding slot from which they are forced into the proper holes by means of the feed punch.

The clutch disk is rotated on an automatic indexing machine which always brings a hole in front of the punch in the proper position to fit the cork in place. The corks are soaked in soap and water for a considerable length of time before they are fed into the machine. The final operation on the cork disks is to pass them through a straddle slicing machine, Fig. 6, which slices off the corks on both sides of the disks at the same time. The slicing machine leaves a slight amount of cork projecting on each side of the disk so that even when the clutch is engaged under pressure, there is no metal to metal contact.

The clutch spider is a malleable casting. This spider carries the studs and also acts as the clutch spring retainer. Disengagement of the clutch is secured by moving this spider inward, which, in turn, depresses the clutch springs, allowing the plates to become free to disengage. The spider is bored and reamed on a Pratt & Whitney, the center hole being reamed to 1.8125 in. in diameter, Fig. 7. The location for this is from the outside diameter. This same machine also faces the bosses for the studs. A Warner & Swasey turns the outside diameter, location for this being from the inside bore by means of a roller pilot. The holes for the studs are drilled and then spot-faced on both sides. This work is handled by a three-spindle Sipp, Fig. 8. Grinding the hub to an outside diameter of 2.163 in. on a Norton grinder finishes the operations on this part.

The drum, being die-cast aluminum, requires no machining, except a small operation which is described under assembly.

The cast iron clutch retainer requires some work on a Pratt & Whitney machine consisting of facing off the

ends and boring, reaming, facing and turning the outside diameter. The throw-out pad on the retainer is also milled. The clutch studs are ground to .482 in. with a tolerance of plus or minus .0005 in. on a Norton grinder.

Before the clutch reaches the final assembly bench, there are a number of sub-assemblies made. The annular throw-out bearing is pressed into the retainer and the clutch spider is pressed into the bearing. After this has been done, the spider is finish reamed by hand to secure an accurate inner bore. The sub-assembly is then given a gasoline wash. The oil ring is assembled to the clutch cover, this ring being spun into the cover. The four driving pins which transmit the drive from the flywheel to the driving disks are riveted on the clutch cover on an automatic riveter, Fig. 9. The four pins which transmit the thrust of the clutch spider to the pressure plate on disengaging the clutch are riveted to the pressure plate on the automatic riveter and the pins and plate straightened on a fixture which is so arranged that the pins drop into holes on the fixture, permitting of proper alignment. The pressure plate is polished against emery cloth on a lathe.

The clutch drum, which is an aluminum die casting, is reamed to properly size the center hole and then broached. The jaw liners, which take the wear instead of the aluminum drum itself, are assembled in place and the drum is assembled to the hub with six bolts held in place by locking wire. Before assembly, all of the disks are straightened by peening operations to within .010 in. limits, Fig. 10.

In the final assembly, the clutch is built up on a fixture. The four pins are set up in the fixture and the pressure plate put in place, Fig. 11. The disks are then placed on with the silencing and separator spring placed between them, the disks being placed alternately, first, cork insert and then plain, Fig. 12. The drum and hub assembly is then put in place and the four clutch spring retainers inserted. These are cup shaped stampings which fit into the drum. The four clutch springs for the Essex clutch are then inserted and the spider assembly put over the springs. By means of a nut on the fixture, the spider assembly is



screwed down forcing the springs into the spring retainer. The nuts are then put on the pressure plate studs, Fig. 13, which project through the center of the springs into the spider, and the cotter keys are placed in the castellated nuts. The four clutch cover springs and the four spacers are then put on and the cover is put over the assembly.

It takes a good operator about 6 min. to assemble an Essex clutch and 8 min. for a Hudson clutch. The Hudson clutch takes longer on account of the additional disks and springs. The gang-work system is used on the assembly of these clutches, and owing to the similarity of the work, the same gang can work interchangeably on Essex or Hudson clutches.

Two clutches for two quite different cars come through the same plant and are assembled at the same bench by the same men. It will be asked, no doubt, whether or not this is a good policy from a manufacturing standpoint. This same principle is carried throughout the Hudson and Essex plant, which is combined into one unit at the present time.

It will be remembered that originally the Essex was to have been manufactured in a separate plant, and when normal times are again reached and steady production possible, this may be done. At the present time, however, the fluctuating manufacturing schedules to which all car manufacturers have been subjected have made this plan of

the Hudson and Essex company one possessing some great advantages. In the first place, it has been possible, by alternating the work on the Hudson and Essex through some of the departments where fluctuating schedules had the greatest effect, to maintain a steadiness in the personnel as well as in the machine work which would otherwise have been impossible. This is particularly true in a department such as this clutch department where the difference between the two clutches is so slight. The man who is accustomed to the Hudson clutch has no trouble whatever in doing other work on an Essex clutch, in the few minor instances where the two clutches are different. Even in the assembly work, it would be perfectly possible for a man to assemble first a Hudson clutch and then an Essex clutch without in any way becoming confused or making errors.

In the layout of the clutch department, the manufacturing operations are grouped around the assembly and the entire department is featured by the small amount of movement of parts necessary in completing the work. A square in the manufacturing establishment, roughly, 75 ft. each side, would be nearly sufficient to inclose the entire manufacturing and assembly department for both the Hudson and Essex clutch. This compactness and resultant economy in overhead on the two clutches has advantages which are apparent on the surface.

## Requirements for Successful Piston Castings

**T**HERE are a number of kinks in the manufacture of successful pistons which a specialist in this line of work must soon come to recognize. As specialists in this line of work the McLough Foundry has found that in order to get the best results in the machine shop and to minimize losses there are some definite precautions to take. The following ten requirements are important from the standpoint of successful pistons:

1. Pistons must be soft iron, easily machined.
2. Must be close grained and tight.
3. Must be free from hard spots.
4. Must be free from cracks.
5. Must be free from sand holes.
6. Must be free from sulphur holes.
7. Must be free from cold shut.
8. Must be free from shrink.
9. Must be perfectly round and balanced.
10. Must be strong and tough.

The answers to these ten problems are as follows:

1. A high silicon iron is necessary with correct proportion of sulphur and other ingredients.
2. A mixture of steel is used.
3. The silicon must be not too high and steel and manganese in perfect control.
4. Spiegeleisen and manganese help to strengthen the iron and prevent cracks.
5. Clean molding and perfect cores are necessary.
6. Sulphur content should be low.
7. Hot iron and perfectly tempered sand are necessary.
8. Shrink can be controlled by proper mixture of iron.
9. High silicon is necessary in producing machinable iron. Low sulphur is necessary, as too much sulphur is the worst enemy in the foundry, as it causes hard castings, holes and sponginess. This content should always be under perfect control and closely watched.

Manganese is a natural scavenger and has a natural affinity for sulphur, therefore should be kept well up toward 1 per cent, as it also toughens the iron. Steel is necessary to close the grain of iron, keeping it tight. Up to a certain per cent steel is a softener.

10. The chemical analysis for pistons should analyze between the following percentages:

Silicon, 1.80 to 2.25; manganese, .60 to .80; phosphorus, .40 to .45; sulphur, under .09.

This can be obtained from mixture of following iron:

Pickands Mather Co., Charcoal Iron Pile No. 1—Silicon, 2.90; manganese, .67; phosphorus, .185; sulphur, .03.

M. A. Hanna Co., Silvery Iron Pile No. 2—Silicon, 8.30; manganese, .34; phosphorus, .264; sulphur, .02.

Rogers Brown Co., Charcoal Iron Pile No. 3—Silicon, 2.26; manganese, .59; phosphorus, .178; sulphur, .014.

Mathew Addy, Princess Pile No. 4—Silicon, 1.86; manganese, .832; phosphorus, .438; sulphur, .019.

Spiegeleisen—Silicon, .75; manganese, 18 to 22 per cent; phosphorus, 10; sulphur.

Automobile Scrap (average analysis)—Silicon, 2.00; manganese, .50; phosphorus, .45; sulphur, .12, dangerous.

Steel Scrap (average analysis)—Silicon; manganese, .50; phosphorus, .08; sulphur, .08. Furnace charge of 1500 lb.

Pile 1.....	300 lb.
Pile 2.....	150 lb.
Pile 4.....	150 lb.
Automobile Scrap.....	750 lb.
Steel Scrap.....	150 lb.
Spiegeleisen .....	25 lb.

Total .....1525 lb.

If this mixture is closely adhered to, successful pistons will result, with a foundry loss of about 5 per cent.

Great care should be placed in the making of cores and of molding to keep losses down.

**T**HE recent action of the National Automobile Chamber of Commerce in declaring a pintle hook to be part of the standard equipment of a truck or part of a complete truck, recalls the fact that the S. A. E. has a recommended practice on trailer hitches and this embodies a pintle hook for trucks.

# Motor Bus and Motor Coach Transportation in the British Isles

Automotive vehicles are successfully competing with the British railroads and tramways in both short and long haul passenger traffic. Facts and figures gained in a study of these systems made by an American railway engineer make it apparent that our vehicle manufacturers can profitably investigate the domestic market for large passenger-carrying vehicles.

By Walter Jackson\*

**T**HE recent appearance in Great Britain of Volume 1 of "T. B. R." (Travel by Road) marked the fact that the motor bus and motor coach have attained such importance as to require a national monthly route and time-table guide. From now on every newsstand in the United Kingdom will apprise the public that they can travel from almost anywhere to almost anywhere via tire instead of rail. The first issue of the guide lists 1876 routes; this is far from complete, as a number of important operators have not yet co-operated in its compilation.

The motor bus and sight-seeing car of Great Britain have a long and respectable lineage. The earlier coming of good roads there and the fact that many localities were not so abundantly served with rail service as here led to automotive passenger transport at a time when we had no thought of applying gasoline to public utility vehicles. Of great importance in the evolution of high-grade designs was the fact that the development was in the hands of companies doing business with specifically public utility vehicles, and not in the hands of individual jitney operators, ready to run anything that will move.

The strongest impulse to turn out an economical, reliable motor bus was furnished by the tempting traffic prize of London. Following the days of the horse bus a great variety of types were tried by a large number of competing companies. To-day one concern, the London General Omnibus Company, operates by far the greatest part of the buses used and the remainder is supplied by companies with which the L. G. O. has friendly agreements.

## A 3000-Bus Concern

So many erroneous statements have appeared about the importance of motor buses in the London transport scheme that it may be well here to summarize the position as it really is:

\*Consulting electric railway engineer, formerly editor the *Electric Railway Journal*.

Taking relative use first, we find that in the year 1919, according to figures submitted to Parliament by the Advisory Committee on London Traffic, there were carried 659,000,000 passengers on local underground and other intra-city railroads, 861,000,000 passengers on motor buses and 1,053,000,000 on street railways. There were also carried 468,000,000 passengers (estimated) on the suburban lines of the trunk line railroads entering

London. From this it will be seen that the motor bus stood ahead of the local underground lines, but not of the tramways. A cause of confusion has been that the returns of the great London Traffic Combine (underground, bus and some suburban tramways) under the direction of Lord Ashfield have been mistaken for a return of all London traffic. In the case of the Combine, it is a fact that of the 1,171,701,868 passengers carried in 1920 (exclusive of street railways), 767,953,649 were transported on motor buses. When we take the associated bus routes into consideration, it is safe to say that London's buses now carry about one billion

passengers a year. This should be honor enough!

Second to consider is the fact that London's layout has been exceptionally stimulating for motor bus operation. Because of many narrow and winding streets, the street railway is almost completely shut off from the old cities of Westminster and London, which are the richest sources of traffic. In this area the buses have no competition except from underground railways under the same management. Since the buses, as a traffic proposition, could not very well confine themselves to dropping or taking on passengers at the boundaries of the business and shopping area, the routes have been extended from year to year, until to-day they not only traverse every part of London but go well beyond it. In a number of instances the bus route extends only from the rapid transit terminal outward, but the passenger usually can go in town all the way by bus if he cares to transfer to another route. Many patrons use the bus for the short rides to and from underground stations,

a species of traffic which is encouraged by the use of fares graduated according to distance traveled.

The operations of London bus companies range all the way from the short-haul pick-up service in the congested district to all-day sightseeing country runs with guide and meals included. At present some 2700 motor buses a day are in daily operation, the maximum being reached on Saturday and Sunday. An important change in capacity has been necessitated by the great wage increases of recent years. The 34-seat, Type B bus is being superseded by the 46-seat Type K, of which more than 1000 have been built, and a still bigger bus, the 54-seat, Type S, is in use on certain routes—265 having been put in use in July, 1921. All London buses are made by the allied Associated Equipment Company (A. E. C.).

While the term "supplementary" is hardly adequate to describe a transport system of L. G. O. dimensions, it would be proper to refer to it as being frequently an "alternative" method of transportation. Thus, since no standing is permitted in the new "K" and "S" buses, there are times when a certain amount of traffic is diverted to the same management's underground lines, or in competitive districts the street car will be used. Also, in inclement weather many bus-riders failing to obtain inside seats will ride all or most of the way underground or by street car. The fact that other British cities operating buses lack alternative transport accounts for the general preference of the provinces for single-deck buses.

Accompanying cuts show the character of stop signs which tell the public not only where the buses stop but also what routes go by a given stopping point.

#### Tying Street Railway and Bus Together

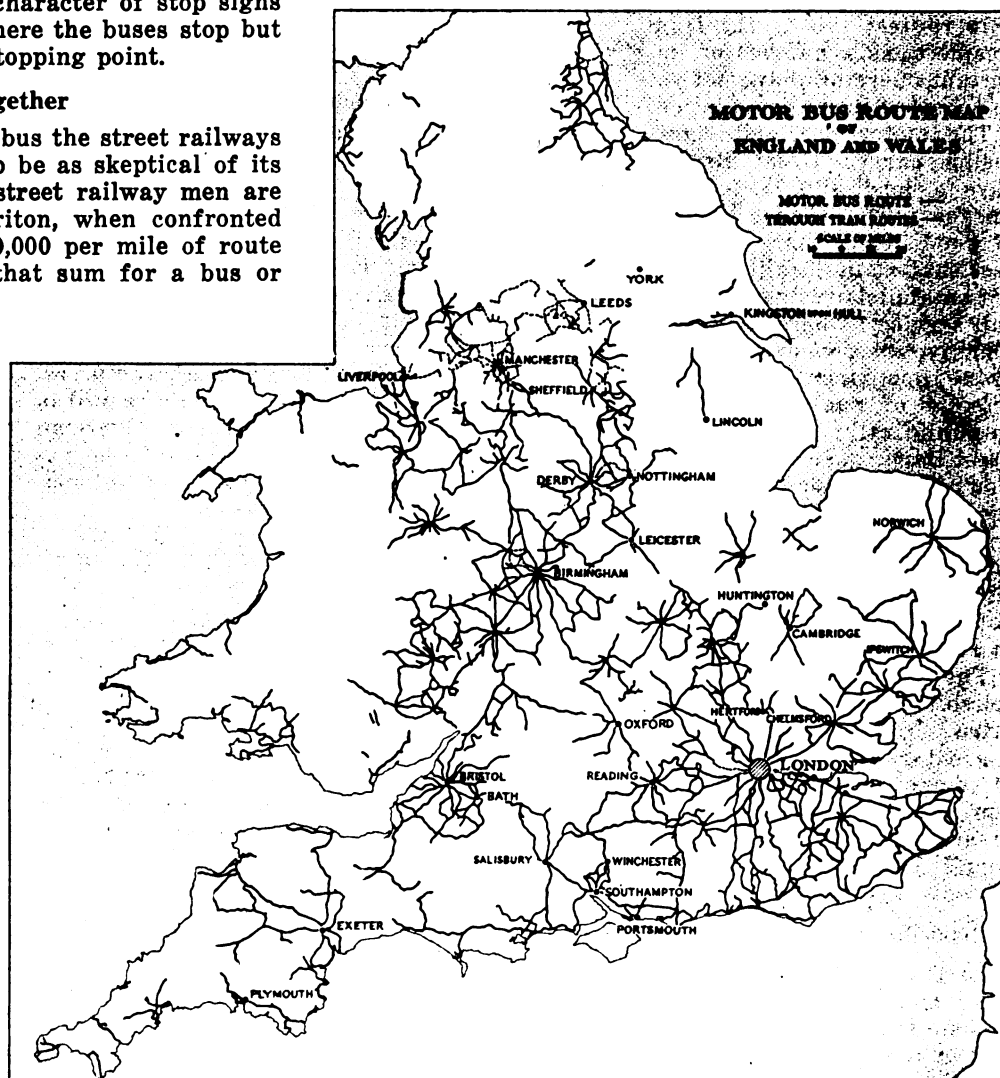
In the early days of the motor bus the street railways of Great Britain were inclined to be as skeptical of its possibilities as many American street railway men are to-day. But the hard-headed Briton, when confronted by the problem of spending \$100,000 per mile of route via the trackway, or one-tenth that sum for a bus or two to handle the traffic, did not hesitate long. Hence we find that almost all of the municipal tramways that are not running motor buses yet are petitioning Parliament for the right to do so. If it were not for the expense and time involved in getting these permits, the municipal railways of Great Britain would have much more extended bus services than at present. In some cases they have suffered the chagrin of seeing private companies put on motor bus services at will, even in competition with themselves, while they have been tied hand and foot by limitations placed on what the British call "municipal trading" and what we call "municipal ownership."

Of the installations studied on the latest trip made by the writer, Sheffield and Edinburgh were exceptionally interesting. Sheffield is the largest municipal combination of motor buses and trams; Edinburgh, with still more buses, bought within

two years, presents a novelty in that the present bus service is the successor to cable lines pending possible electrification.

The Sheffield installation, comprising 42 buses at the time of the writer's visit in June, 1921, is used primarily for extensions of the original trolley routes. This service has become so important that to-day the route mileage of the buses actually exceeds that of the street railways, the relative figures being 60 against 40. It will be understood, of course, that the greatest density of traffic is on the street railways, since these run through the densely built-up sections of the city. Thus it is that the buses carried approximately 5,500,000 passengers while the cars carried approximately 152,000,000 in the fiscal year ended March 25, 1920. It will interest the reader to learn that depreciation is on a seven-year basis, which corresponds, roughly, to 150,000 miles' life. As a matter of fact, the first buses were sold at public auction after seven to eight years' service.

Fares are higher on the bus routes to compensate for higher operating cost and thinner traffic. The rate per mile is  $1\frac{1}{4}$  pence, or slightly over 3 cents per mile, whereas the car fares are 1 penny (2 cents) per mile and 2 pence (4 cents) for the entire route. Bus passengers in Sheffield are usually transfer passengers—that is to say, they must use both car and bus in making the trip. Other British operators prefer to cater to the building up of direct through service. This is done by charging



Map reproduced from the T. B. R. (Travel by Road) guide showing the extent of the motor coach routes which form a network covering most of England, Scotland and Wales



Signs used in London to indicate the stopping points for buses which follow various routes

an excess rate wherever a street car is available, so that the city passenger is kept off of vehicles intended for the suburbanite.

A certain amount of Sheffield bus traffic also comes from people taking short rides to and from the steam suburban stations.

The relative fields of the motor bus and street car have been studied very carefully by A. R. Fearnley, general manager, Sheffield Corporation Tramways. In his paper before the 1919 convention of the Municipal Tramways' Association he showed that, despite the greater cost per seat of the bus, it was the most suitable vehicle for: (1) Connecting up cross-town routes; (2) relieving congested traffic by diverting part of it along other routes; (3) connecting up villages and rural districts.

The introduction of the motor bus as a part of Edinburgh's transport system came about through the taking over in 1919 of the antiquated cable system by the city of Edinburgh. Owing to the extremely high cost of new track and electric power facilities, R. Stuart Pilcher, general manager, recommended that certain of the northern routes be turned over to motor bus operation, pending the working out of electrification costs, etc. As the result of the experience gained with this service, especially in increase of traffic, the management has gained a clearer idea of the advantages and limitations of the motor bus. In his report of April 2, 1921, to the Council, Mr. Pilcher said:

"The limited accommodation of the bus is its chief disability. The bus cannot lift the crowds of people in emergency such as is done by a tramway car. On the other hand, it has the advantage of mobility and speed and of never being subject to the complete blockage of a route. It is rather strange that the bus, notwithstanding its restricted space and size, and sometimes congested condition, appears to receive a preference."

Further statements by Mr. Pilcher show that the introduction of motor buses lead to an increase in traffic as compared with the cable lines. Thus for the 11 weeks' period, January 8-March 19, 1920, the cars on one route

carried 990,314 passengers, but in the same period of 1921 the buses carried 1,102,761. This is not all, however, for the earnings per mile due to higher fares and greater density rose from 21.8 pence (43.6 cents) to 30.6 pence (61.2 cents), an increase of 17.6 cents per mile operated. In a general way it may be stated that the tendency of the bus has been to more than offset its higher running costs by its higher earning ability.

By the end of the fiscal year ended May 15, 1921, a total of 71 single-deck, 32-seat buses of A. E. C. and Leyland types were in service, carrying 10,158,810 passengers on eight regular routes, 1.5 to 6.5 miles long, and in various special services. The Edinburgh system also conducts char-a-banc service, few cities in the world having more attractions for the sightseer. Nine of the sightseeing cars seat 28 and six seat 32 passengers.

It must not be supposed that the rapid development of motor bus service in Edinburgh is due to exceptionally favorable conditions. On the contrary, there are many steep grades in this hilly city and the standard paving is of granite block. There are points—such as vibration—in which the service is open to improvement, as Mr. Pilcher has mentioned in his reports, but the flexibility and higher speed of bus service in Edinburgh have more than outweighed these difficulties.

In London the passenger has the option of underground railways and inclosed top-deck cars if the weather becomes too unpleasant. Such an alternative is not presented at Edinburgh. However, as the present standard capacity of 32 seats is rather low for two-men operation, the management is trying out a side-entrance bus which seats 42 passengers.

Edinburgh is the center of a great automotive service conducted to outlying points by the Scottish Motor Traction Company.

#### 126-Mile Overland Bus Service

Not satisfied with its triumphs in city and suburban work, the motor bus has been reaching out ever further afield to give either new or more frequent service to the country districts and to tie together places, 50, 100 or more miles apart. The largest of these undertakings is that of the Birmingham & Midland Motor Omnibus Company, Ltd., which operates more than 200 buses of the Tilling-Stevens gas-electric-drive type. There are also some double-deck buses in use. A significant fact is that this company is affiliated with the British Electric Traction Company, which was quick to recognize where motor bus operation is advantageous, and which now has a large number of installations, either in co-ordination with its tramways or entirely separate.

The Birmingham & Midland originally included a motor bus service in the city of Birmingham, but in 1914 the city of Birmingham took over the city buses and these are now a part of the local street railway and motor bus system. The number of routes exceed 100.

The variety of services given varies from the short-headway operation required in the suburban districts of a great city like Birmingham to the once-a-day run to a distant terminal. The most interesting example of the latter is that to Llandudno, Wales, a distance of 126 miles. This bus leaves Birmingham at 9.30 a. m. and, after making half a dozen intermediate stops, is in Llandudno by 6.10 p. m. Better running time than this is possible, but it has been found from experience that on long runs passengers appreciate the opportunity of stretching their legs. It is not desirable to tire patrons by making them sit in one place for four to five hours. A running speed of 30 miles an hour is entirely practicable on these trips.

The motor bus company does not pretend to compete with the railway in speed, but it gets a lot of business because so many people want to travel by road. However, the rates themselves compare favorably with the third-class charges on the railway. For example, the railway rate between Llandudno and Birmingham is 17 shillings 8.5 pence, while the bus fare is 16 shillings. So, too, the railway charges 16 shillings 2.5 pence third-class to Weston, 108 miles, whereas the bus rate is only 15 shillings. The business man may value his time highly, but there seem to be many more people who put comfort, cheapness and novelty ahead of time-saving; and that is why the long-haul bus prospers. Special rates are made for children, the concession usually being one-half the adult fare, except on holidays.

Passengers are permitted to take parcels up to 21 lb. in weight without extra charge; otherwise they are urged to ship heavier baggage via the company's combination of street railway and motor vans, said to be the only one of its kind in Great Britain and giving very largely a door-to-door service.

Unlike many motor coach operators, this company does not sell round-trip tickets. This matter of getting the return fare is left to booking agents at the terminals, who get a commission on sales. One reason for this policy is to avoid selling the same seat twice. In the case of the long runs it would be worth while to use the telephone or telegraph to avoid overlapping.

A pretty example of the ability of the motor bus to meet special situations is afforded by the policy of this company with regard to the Shakespeare summer festival held at Stratford-on-Avon. During this period the travel to and from Stratford is greatly increased, particularly by tourists and vacationists who want to enjoy the scenic beauties of Warwickshire, Worcestershire, etc., coming and going. To encourage this traffic the company is prepared to run special buses at ordinary round-trip fares between various outlying cities and Stratford for parties wishing to attend afternoon or evening performances. The only condition is that 25 passenger fares be guaranteed. Thus, people of the simplest means may enjoy the exclusiveness of the millionaire.

Ample care is given to publicity. Maps of the routes are sold for a penny and complete time-table with map for threepence, both through conductors. For sixpence the person interested in the beauty spots and famous places of the district can secure a handsomely illustrated booklet entitled "The King's Highway by Midland Red Motor Bus." The brilliant red coloring of these buses is in itself a good advertisement. A recent summer folder, entitled "Where Are You Going for Your Holiday This Year?" saved the reader the trouble of selection by showing the six best routes for a trip. As in the case of the motor coach companies, this operator's livery or private party service is a regular factor in the business—whether it be the conducting of parties to a play or to a football match. Circular tours are very popular, since those who partake in them get a maximum of sightseeing for a minimum of expense.

As the Birmingham & Midland offers such a good example of long-haul motor-bus possibilities, it will be unnecessary to describe other installations of like character. The company is deservedly proud of its record of safety and reliability in service. In 1920 it rolled up the total of 4,500,000 bus-miles. In May, 1921, it operated more than 40,000 miles per breakdown despite the long runs and many hills in its territory. This is a satisfactory answer to the question: Can motor buses be relied upon to give steady service day in and day out?

While the territory served by this company is excep-

tionally fine for pleasure travel, the writer found the motor bus no less popular in districts where nature and the highway departments have been less generous. This was particularly so in mining and mill districts where interest in sports is so keen that people will travel long distances to see their favorites play in the inter-county cricket or football matches. The hiring of individual motor buses by groups of friends makes these trips more attractive than rides on British railway cars with their isolated eight or ten-passenger compartments and their absence from the open road. The great increases in railroad fares and the excessive overcrowding of the trains in recent years, for one cause or another, have also been potent factors in drawing the masses to the overland motor bus.

### The Great Vogue of the Sightseeing Coach

Aside from the growing numbers and services of passenger motor buses, there has been an equally striking increase in the number of what we term sightseeing cars, and the British call motor coaches. The excellence of British roads, the Britisher's love of out-doors and the absence of American extremes in heat and cold all tend to the permanent popularity of this form of transport.

While our own sightseeing cars have been confined to turns about the large cities and nearby resorts, the British motor coach has reached out several hundred miles. The vehicles are of ever-improving comfort and luxury, with pneumatic tires to make the harder roads easy and suitable protection against changes in weather. The operators of these services are doing everything they can to promote the feeling that the ride on the coach to and from the vacation destination is a part of the vacation itself—not like a hot ride on a train. The fare is no greater than third-class railway. While the trip, naturally, takes longer than the train there is compensation in its agreeableness, and the sureness of a seat. These latter features are appreciated by many others than vacationists. It has been found that women, especially, will take all-day rides by motor coach in visiting distant friends—and this is true quite regardless of the season.

To stimulate traffic on off-days, the experienced operator also grants half rates on certain days or makes some other concession that will keep his investment busy. On some of the regular runs, there is a temptation for the passenger to return the same way by rail for the sake of saving time. This is offset by a liberal reduction in the round-trip rate. Thus where the one-way fare is 13 shillings, the round-trip fare will be 21 shillings instead of 26 shillings. Children in arms are usually carried free, and those under twelve years of age are carried at half rates except Saturdays, Sundays and other high-pressure times. The luggage of the patron is handled for him by the operator's own express vans under far more agreeable conditions than if he traveled by rail.

### Motor Coaching as a Business

Characteristic of the great development of the motor coach services is the work of the Samuelson Transport Company, which has taken all England, Scotland and Wales as its province. Its slogan of "First class service at third class (railway) fares" has been liberally advertised in newspapers, on billboards and elsewhere, so that the traveler is not left in much doubt as to the cost of a journey.

The term "booking for a journey" has a very real meaning in Great Britain, the Britisher being far more used to making reservations than we are. This practice naturally is a great help in the economical scheduling



of traffic, and is best for the traveler himself since he is assured of getting just what he expects. Seats for longer tours by day or week can be reserved by mail on forms. Either 25 per cent or all of the fare is paid on making reservation. In the former case, the remainder of the fare must be paid three days before the tour starts. For shorter runs, booking can be made with a shorter period of grace, either at the offices in London or at those of any booking agent throughout the country. In any case, all seats are booked in advance.

An important feature of this motor coach service is that the passenger's luggage up to 56 lb. is carried free in advance from the passenger's domicile to his next stopping place by special motor trucks or vans which call a day in advance. Excess luggage is handled at less than railway rates. Therefore, the vehicle is not encumbered with unsightly trunks or other baggage. The service also includes the reservation of hotel accommodation where that is desired.

A splendidly printed guide book describes the six to ten-day circular tours of North Wales, the Lake District, Devon-Cornwall and other beautiful spots of Great Britain. These are now made truly accessible by rubber-tire transport, for no vehicle on rails can approach the sight-worthy places so well or give the passenger so free and smokeless a view.

At the present time, this company is running daily services between London and the principal seaside and country resorts for passengers booked on regularly scheduled vehicles. The flexibility of motor coach service, however, permits the throwing in of many extra vehicles on any desired route almost instantaneously—as in concentration on the Derby or other great races. The Derby of 1921, by the way, was called the "Petrol Derby" because the coal strike left the handling of the vast masses who go to this race so largely to the gasoline vehicle. In addition to the regular touring and coaching services named, this company like others does a large business in carrying private parties to any part of the country via any combination of routes desired.

#### Road Sleeping Coaches Next

The hold which the motor coach has taken on the imagination of the public may be gaged from the fact that England's most widely-circulated newspaper, the *Daily Mail*, devotes several columns every Wednesday to this subject. The startling announcement has recently been made by one operator that he is preparing a night motor coach service between Manchester and London. Two night coaches with sleeping berths and other luxuries, he said, are already under construction.

#### The Legal Status of the Motor Bus and Coach

Although both motor buses and motor coaches pay a definite license to the Government, not all the questions that have come up through their widespread use have yet been answered. Operators of local transport undertakings—whether street car or bus—are rather afraid that these outside vehicles may pick up en route people who would otherwise take short rides with them. In one case, where the local transportation company complained it was shown that the only people picked up were those who had already booked their seats in advance. Nevertheless, the complainant held that these passengers should have been picked up only at the regularly designated booking station in town. If the latter practice were followed, patrons would be deprived of the convenience of having the vehicle stop at or near their homes. Generally speaking, the fear of such competition is exaggerated, inasmuch as these vehicles are not run for the rapid interchange of short-haul passengers.

—TRAVEL BY—

# SAMUELSON

## MOTOR COACH

—THE BEST IN THE LONG RUN—

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BETWEEN  
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RETURNS TICKETS AVAILABLE FOR 12 MONTHS

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**SEATS NOW BEING BOOKED FOR THE DERBY**

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An example of one of the numerous posters used to advertise the extensive motor coach service operated by various concerns

The fewer stops they make, the better the service they can offer to the long-haul rider they are after.

The growth of overland or interurban motor coaching has also outstripped the facilities for loading and unloading these vehicles. In one large provincial city, the writer has seen forty to fifty coaches in the morning covering most of the chief public square and adjacent highways. Some towns allow the local bus and coach operators the use of their streets for parking while denying that privilege to the outsider, who is compelled to go to some garage or hotel. As the business grows, however, the cross-country operators are getting together to acquire definite parking spaces, the interests of these companies having been taken in hand especially by the Commercial Motor Users' Association and the Motor Trade Association. The first station opened in London this year is said to be that of the Brixton Motor Works, Ltd., which acquired a three-coach space that is available to anyone in the field.

Thus it will be seen that as in the case of the motor-bus, the Britisher has carried the sight-seeing car to a point far beyond our "Seeing Chinatown" and similar diffident, short-haul services. Indeed, he has made it an integral feature of the transportation facilities of the nation.

IT is stated on good authority that the present automobile production of Austria, which consists of Vienna and surrounding mountain districts, is greater than the entire German production. Naturally owing to the economic conditions in Austria, very few cars can be sold there, and practically the whole production has to be exported.

# Purpose, Aims and Possibilities of the S. A. E. Research Department

Manager of new activity gives his views of the functions to be performed and results sought. Difference between development work and fundamental research made clear. Society primarily interested in the latter.

By H. C. Dickinson\*

**I**N general the testing of any individual device or any particular material is not included in the definition of research. On the other hand, the study of methods of test as well as the deduction of general information from a systematic series of tests is properly so classed, although to be of value as research the results must be put in such form that they can be of general application.

Development research is recognized as clearly an exclusive function of the individual engineer and the industrial laboratory. By far the largest part of the work of all laboratories connected with the industry is of this nature and as such is recognized by the department as essentially confidential, whereas it is coming to be more and more generally recognized—although we regret, sometimes more as an abstraction than as a course of action—that there is much more to be gained than lost through a free interchange of all research information which is capable of general application.

The Research Department of the Society of Automotive Engineers will confine its efforts to explorational and intensive fundamental research. Much work of this nature, which is in progress in the industrial laboratories, will be of interest to the department and it is hoped that much more such work will be undertaken in the future. But with the major part of the work of these laboratories which is development work, we will not concern ourselves.

## Time and Effort Saving

An unbelievable amount of time and effort is wasted in the trial of expedients which a more careful application of the fundamental laws of physics and chemistry would have shown at a glance were based on incorrect assumptions. This fact was startlingly illustrated during the war when thousands of inventions of every conceivable sort were presented for consideration of the Government. It is safe to say that at least 90 per cent of these proposals showed such obvious and fatal errors in fundamental physical and chemical principles that they could be absolutely condemned at a glance. Of course most of them could be condemned equally on practical grounds, but one's judgment as to practical possibilities is by no means so safe a guide. Many things which look impractical do actually work, but so far as we know nothing works which violates the law of conservation of energy, or the second law of thermodynamics, or Newton's laws of motion, barring Einstein, or any other of a few hundred such principles.

Successful engineering research, as well as economical

development work, requires men with a peculiar combination of broad fundamental knowledge and sound common sense, with the enthusiasm of the typical inventor but without his typical shortcomings.

The most common incentive for the organization and continued support of research laboratories or of any systematic research program is necessarily the commercial one. In fact, this is almost the only one if we except some of the educational laboratories which have been endowed purely for the sake of the advancement of science. Thus almost every research laboratory and particularly the industrial ones present a constant conflict between these two points of view which are somewhat incompatible. The true research worker is interested in securing facts and will not be satisfied until his results are complete. Moreover, every problem he undertakes presents to him numerous side-lines which are of absorbing interest. If given his own way, unless he is endowed with unusual self-control, he will either carry through his problem to a final conclusion or switch to some side-line of greater interest, according to his temperament. On the other hand, the director of the laboratory or the "man who pays the bills," unless endowed with unusual patience and foresight, will, as soon as some fact of apparent commercial value is developed, recommend dropping the research and developing something useful. A happy compromise between the two points of view is difficult to attain. But a real compromise is necessary since both viewpoints are important and neither side may be neglected.

Up to within the past few years the United States, which has shown by far the greatest industrial development in our line, has contributed comparatively little to the sum of automotive research. The work of British and German experimenters had to serve the needs of our own engineers even though it was entirely inadequate for our needs. In the past few years, however, there has been a general awakening to the need of research among members of the Society. Its importance has been so ably presented in recent papers and discussions that it is hardly necessary to further emphasize this phase of the subject. We are now awake to the need, and once awakened the United States will not lag behind. In fact, perhaps a warning is needed that while the possibilities of research can hardly be overestimated, the realization of these possibilities in terms of industrial results, rests with the engineers in charge of design and development. No matter how many and able the research engineers, nor how important their conclusions, these conclusions will be of value only insofar as they are embodied in successful design.

In general, the object of the Research Department is to secure through concerted effort more, and more re-

\*Abstracted from a paper by the author, recently appointed Director of the Research Department of the Society of Automotive Engineers, read at a recent meeting of the Detroit Section of the Society.

liable, fundamental technical information for the use of the members of the Society and to make this information more easily available. The distribution of information may be handled in several ways.

Fundamental research is in the last analysis almost entirely a question of men rather than of equipment. Many of the most important scientific results have been obtained without laboratory equipment worthy of the name. A study of the research situation in the various laboratories leads to the conclusion that these laboratories are even now sadly undermanned, particularly with men of real ability. To establish a new laboratory could not increase the supply of first-grade research men; hence it would have to be manned at the expense of existing institutions. Thus, whatever results the new laboratory might attain would be at the expense of other institutions and the net result would probably not be increased research. It appears therefore that the department can most profitably devote its efforts to assisting existing laboratories.

The three classes of laboratories—educational, industrial and independent—occupy altogether different positions in regard to research, and any general plan must take account of these differences. It is recognized that the prime object of the industrial laboratories, those directly connected with the various manufacturing companies, must always be development research. But in connection with this we hope there will be accomplished an ever-increasing amount of fundamental research work which can be made of general value—such work as deals with general principles rather than specific questions of design. It is a very common experience to find one laboratory undertaking a research intended to cover some problem which has been carefully covered elsewhere, but no record of which is available. It is one of the aims of the Research Department to secure, so far as possible, the publication, or at least a record of such non-confidential general results and to act as a clearing house of information on research problems of this character. For the most part, the various laboratories are rather well supplied with problems, but from some institutions where new facilities or new men have become available, there have come requests for suggestions as to problems or general lines of work which might be taken up to advantage. It would seem that here is a splendid opportunity for better use of the educational laboratories by the industry. The custom of farming out individual research problems has been followed to some extent, but there is room for much more of it. The Research Department stands ready to offer any possible assistance in securing more co-operation of this kind.

#### Duplication of Research

Recently very much caustic criticism has been heard regarding duplication in all sorts of connections, including research. One might make remarks about the duplication in criticism. Research is always a matter of duplication since no physical fact is ever established except through repeated observation. Much apparent duplication is not only desirable but necessary. Nevertheless, this applies to intelligent duplication only. Not much is to be gained by having several different laboratories working on the same problem unless each knows something about what the other is doing. This latter sort of duplication should be avoided particularly among the educational laboratories so far as possible. Since the results of most research are not to be had in print for months or perhaps years after the work is begun, the most promising means of preventing unnecessary repetition seems to be through some central clearing-house

for work proposed and in progress. This function the Research Department will hope to fulfill.

One of the important objects of the Research Department is to assist toward the development of a more systematic program of research throughout the industry. The formulation of such a program is too much of a problem to be solved for some time to come. It must be built up little by little with the co-operation of the members of the Society.

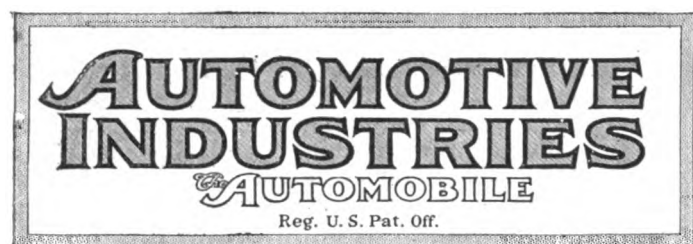
#### General Research Program

There are, however, two broad general problems which are brought to our attention at once by their importance and the insistent demand for immediate information. These are the fuel problem and the highway problem.

A very important question is, What is the relation between endpoint or volatility of fuel and the average fuel consumption in actual service? To answer this we must know what constitutes upper limit of volatility—is it endpoint or something else? Mr. Wilson of Massachusetts Institute of Technology has brought out something of interest here, but the question is not yet answered.

The highway problem has received less attention by the automotive industry partly because its importance seems to have been less recently appreciated and partly because it does not appear at first sight so immediate a problem of the industry. It has been heretofore mainly a question of "good roads." So far as the passenger car alone is concerned, this may be largely true. Considering, however, the broad question of the economics of highway transportation, the problem is distinctly an automotive one. It is not possible to consider only the design of a truck, for instance, that will give maximum ton-miles per dollar if it has a road to travel on, without including also the cost of the highway. So long as registration fees for passenger cars paid for good roads, we were all reasonably content, but as soon as the highway is commercialized, so to speak, someone will be inquiring about the proper distribution of the highway bill among the different classes of traffic. Some answer to this question will have to be made. Perhaps it is a problem for the road engineer, but the automotive engineer will be very much interested in both the answer and the method of arriving at it. The nature of this answer or the relative license fees which may be based on it will be a large factor in deciding what sort of truck will be most economical for any given class of service.

THE quarterly progress report of the British Electrical and Allied Industries Research Association (E. R. A.), states that the council is carrying out a comprehensive program of research at the National Physical Laboratory. Tests are being made upon cotton fabrics dressed and undressed of various weights and treated with varying thicknesses of varnish. A collection is being made of samples of treated fibrous insulating materials with a view to classification before proceeding with tests. A complete series of purchasing tests is to be made on samples of untreated papers used for various electrical purposes, the investigation including the testing for impurities such as metallic inclusions and carbon obtained from soot in the atmosphere, as well as porosity conditions. A large number of samples of treated papers has been collected. The numerous other materials in use have been classified, with the exception of vulcanized fibers, and a preliminary schedule of acceptance tests for purchasing purposes has been prepared.



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## Service—An Aid or Hindrance to Sales?

**A**NALYSIS of the market for future car sales indicates definitely that service will play an increasingly important part in selling. It will be a sales resistant or a sales help, depending largely upon the way in which service is handled during the next few years. The percentage of replacement sales is constantly mounting, and in every such sale previous service experiences will be a factor in buying. The man who has never owned a car may not consider service facilities and methods very seriously, but the man who is buying his second or third car will be influenced definitely by his past experiences as regards buying parts and having repairs made.

This fact should be fully recognized in discussing service policies. The manufacturer of cars and trucks is in business to make a profit from the vehicles which he sells. He will ultimately make the greatest profit if his product is serviced to the satisfaction of the user. The user will be best satisfied when he re-

ceives the best possible service at least possible cost.

A prominent student of this question recently defined service as "taking care of the owner; making the owner satisfied." Service of this kind will mean lessened sales resistance and consequently greater profits. From a purely business standpoint this should be the basis of service policy discussions. The question as to who should have the right to sell parts must ultimately be solved by allowing the person to sell the parts who can do it the most economically. Efforts along this line will be of more permanent value than any attempt temporarily to resist economic laws.

## Improving the Fuel as Well as the Engine

**T**HERE is a disposition among automotive engineers as a class to accept as inevitable the general tendency toward a decrease in the volatility of motor fuel without much thought being given to the benefits which would result if the fuel as well as the engine could be improved instead of being allowed to deteriorate in quality. There are, fortunately, some few engineers who insist that it is neither just nor expedient for the automotive industry to bear the burden of continually changing engines to meet, or attempt to meet, the conditions imposed by having to utilize poorer and poorer fuel, while the petroleum industry sits back and serenely assumes that it is impractical to improve the quality of fuel—that the only way to meet the demand for motor fuel is to continue to cut deeper and deeper into the crude with corresponding decrease in volatility.

It is at least conceivable that the entire petroleum motor fuel supply might in some way be so changed as to render it usable in much higher compression and consequently more efficient engines, and that by this means the tendency toward increasing total consumption might be checked and the available supply made to go much further, while at the same time engine performance is improved. This apparent possibility is the subject of intensive research on the part of one of the largest automotive manufacturers in the country, and there are indications that at least one of the large petroleum refiners is giving the matter serious attention.

This is said to have been brought about by the fact that one of the large oil companies retailing gasoline in and about Baltimore recently experienced a marked falling off in the sale of this fuel because of the competition resulting from the marketing of benzol-gasoline blends. The latter performed so much better than straight run gasoline that the public readily paid a slightly higher price for it and greatly decreased purchases of straight gasoline resulted. The oil company was thus forced to market a benzol-gasoline blend of its own.

The limited supply of benzol available makes it impossible to follow this practice generally over even a large proportion of the country, but it has at least shown the oil companies that there is a sufficient difference between certain fuels for the public to be

willing to pay more for the better grade, even though it cannot realize the full benefits which would result if the compression of the engines it is using could conveniently be raised.

It is to be hoped that the lesson taught by this situation will not be lost. There is good reason to believe that crude oil contains, in one form or another, hydrocarbons which, when blended with gasoline, give the fuel desirable characteristics similar to those which benzol-gasoline blends possess. In any case this and other possible means for improving fuel should be made the subject of intensive research and automotive manufacturers should allow no opportunity to pass to impress this fact upon the fuel industry as well as upon Government agencies in a position to co-operate to the same end.

## Interchangeability in Toothed Gearing

PRACTICALLY all systems of cutting gear teeth developed in the past were conceived in the belief that a practical gearing system should be interchangeable so far as numbers of teeth are concerned. For instance, in the standard involute system the smallest number of teeth is twelve, and a pinion with this or any other number of teeth will run satisfactorily with a gear of any number of teeth, up to a rack. This interchangeability, of course, is a valuable feature from the standpoint of the gear jobber who carries gears in stock and receives calls for all possible combinations. But it is of absolutely no advantage from the manufacturing standpoint. For instance, in the case of a train of gears in a machine, if one of the gears breaks or wears out, it must be replaced by another with the same number of teeth, because the center distance is fixed. In rear axle bevel gear drives it is sometimes desirable to offer an option on different reduction ratios, but any bevel pinion will mesh properly only with a bevel gear of a certain number of teeth, and the above remarks apply to spur gears only. The great majority of gears that are cut to-day are intended for a definite purpose, and what kind of mating gear they have to run with is definitely known before they are made. The interchangeable feature is then no advantage at all, and the sacrifices made to attain interchangeability are futile.

That a sacrifice in efficiency is necessary to gain this interchangeability is well known. The case is similar to that of combination tools. You can make a tool that will serve as a hammer, screw driver, wrench and several other things, but if you are using a hammer continuously you do not want that kind of tool; a tool designed for one purpose only will do the work better. Similarly a gear specially designed to run with another gear of a definite number of teeth can be made more efficient than one which has to be given such a form that it will run properly with a gear with any number of teeth from twelve to infinity.

In spur gears the tooth action is partly sliding and partly rolling, and the frictional losses naturally de-

pend very much upon the proportion of these two forms of motion. It is within the power of the gear designer to vary this proportion within certain limits. This ratio depends upon the pressure angle, the relative number of teeth in pinion and gear, and upon the addenda and dedenda. When interchangeability with respect to tooth number is not required, the designer is more at liberty to vary these factors so as to obtain a greater proportion of rolling motion, and hence a higher efficiency.

That manufacturers are paying too high for interchangeability, or, rather, are paying for something that is of no value to them, is gradually coming to be recognized, and a move seems to be shaping to break away from it. The system has been standard practice for so long that many have come to regard it as the last word in gear practice, but in this day of keen competition any standard that has outlived its usefulness is given short shrift, and it would not be surprising to see the interchangeable system of gear cutting discarded in manufacturing before very long.

## Foreign Selling Practices

THE success of certain foreign countries in international trade has been largely the result of uniform practice among manufacturers in conducting their foreign business. The German *cartels* were largely instrumental in aiding that country to gain and hold so many foreign markets.

This lack of knowledge among American manufacturers of what other manufacturers are doing has operated also to the detriment of each individual. The individual automobile exporter has not had the advantage of knowing in any accurate manner how his practices correspond with those of other manufacturers. Each exporter has had to blaze his own way to a certain extent.

In an effort to render practical service to the automobile industry, the recently reorganized Bureau of Foreign and Domestic Commerce is about to send to the various manufacturers a questionnaire designed to find out facts concerning various practices in connection with our foreign selling. While this questionnaire will deal with rather intimate information, the results will be held entirely confidential, as are income tax reports. The data obtained will be compiled in percentage form and the results made available to all the manufacturers in the industry.

Manufacturers will be enabled to know what is common practice; the Bureau will be able to examine foreign selling conditions in the light of these results and to give the manufacturers accurate and practical information that will be of real value in future foreign selling efforts.

The new Automotive Section of the Bureau of Foreign and Domestic Commerce is making a sincere effort to find out what practical information the industry needs and to secure that information in the most rapid and efficient manner possible. The success of this effort will depend largely upon the degree of co-operation extended by manufacturers both in supplying information and in giving constructive suggestions.



## Parts Makers Report Better Dealer Trade

### Increased Commitments Made to Meet Needs Developing in Near Future

NEW YORK, Oct. 26—Parts and accessory manufacturers who deal with automobile distributors and dealers are virtually a unit in reporting increased sales to this branch of the trade. They say there has been a marked improvement in the tone of this market and that the men who deal in automobiles rapidly are regaining their confidence. They have ceased to buy entirely on a hand-to-mouth basis and to an increasing extent are making commitments to meet needs likely to develop in the near future.

Business of the parts makers with manufacturers for October will show a slight decline from the volume of September in a majority of cases, although there are many concerns which report that their production has not been decreased and some which have had better sales. Generally speaking, conditions in the parts field are somewhat better in the east than in the middle west, except in the Milwaukee territory.

### Collections Satisfactory

Collections on current business are entirely satisfactory. In this respect there has been a steady improvement in conditions each month since the beginning of the year with one exception. The chief concern of the parts maker is over the old orders which have been on his books for many months and for which materials were purchased before his customers ordered him to hold up shipments.

Stronger efforts are being made to liquidate the cash tied up in materials of this character. Some progress has been made each month but it has been a dreary job. The parts men have been reluctant to take their troubles to the courts and seek to enforce legitimate contracts. As a consequence about the only way they have been able to move fabricated and partly fabricated stocks waiting for release has been to make price concessions. This usually brings results from customers who have ready cash.

### Expect Tapering Off

Parts makers generally expect a gradual tapering off of business from now until the close of the New York and Chicago shows. Most of those in the middle west are basing calculations on a greater decline than are those in the east. They are a unit, however, in the belief that fundamental conditions are growing stronger day by day and that there will be a steady improvement in conditions after the first of the year. They do not expect a boom and want none. Their expectation is that each month will show a gradual improvement over the one preceding, although they

look for greater seasonal declines than have been apparent this year.

While there is no concern in the parts field over the trend of business, there is apprehension lest some of the smaller automobile companies may fail to weather the storm. This relates to companies which have done little or no business for more than a year. There are more truck than passenger car concerns in this category.

There is a considerable number of companies, almost without exception comparatively small, which are virtually in the hands of their creditors. Every effort will be made to save them, but some have reached the limit of their resources.

The situation in regard to finances is exceedingly gratifying on the whole, however. There have been no really large failures and there is no fear that there will be. Few companies have all the cash they need, but this condition is occasioning no alarm, although the burden of carrying creditors is bearing down more and more heavily on the shoulders of parts makers.

## Three More Distributors Are Taken Over by Willys

BOSTON, Oct. 24—At a dinner of the dealers comprising the Eastern New England territory numbering 160, President John N. Willys, of the Willys Overland Co., announced the taking over of the distributor organizations at Boston, Portland and New London. The largest of the three is the Connell & McKone Co., of Boston. Willys stated that the discount to the distributor had to be reduced in order to increase that to the dealer.

The Connell & McKone Co. will continue selling Overlands at retail at its Worcester, Quincy and Manchester, N. H., branches. The Wentworth-Smith Corp. of Maine, taken over, will sell the line at Portland and Augusta.

The personnel of the new factory branch at Boston will be W. G. Northrup, formerly manager at Springfield, Mass., New England branch manager; Weldon McKone, Metropolitan Boston manager; C. R. Arenschield, wholesale manager; C. F. Boles, service manager.

## Jackson Is Taken Over by Associated Industries

JACKSON, MICH., Oct. 27—Announcement was made here to-day that the Jackson Motors Corp. will be taken over on Oct. 29 by the Associated Motors Industries which was incorporated recently in Delaware with a capital of \$80,000,000. The real property of the Jackson corporation will be purchased for \$1,105,000 in the preferred stock of the new company. Merchandise claims and bank indebtedness will be paid in bonds and stock following an appraisal.

The Associated Motors Industries proposes to take over at least a dozen other companies with physical assets valued at more than \$50,000,000.

## Supreme Court Ends Perlman Rim Action

### Refuses to Review Decision of Lower Courts in Long Standing Litigation

WASHINGTON, Oct. 24—Refusal of the Supreme Court of the United States to review the decision of the lower courts brings to an end the litigation concerning the right to manufacture demountable automobile rims. The appeal of the Perlman Rim Corp. against the findings of the courts below in favor of Louis deF. Munger deals with the infringement of patent rights. The petitioner presented the question of validity and scope of the alleged invention of Munger. However, the action of the court allows the judgment of the lower tribunals to stand.

The Perlman corporation insisted that their appeal was in the public interest inasmuch as approximately one-half of the 9,000,000 of the automobiles in service are equipped with a set of five demountable rims and the decision of the courts below authorizes the collection of royalties by Munger amounting to \$.1399 per rim. It was claimed that the effect of the decision below is to give Munger a monopoly in respect to wedging a tire to a rim.

The court was advised by the Perlman corporation that "Munger's principal invention was a non-collapsible tire and not a demountable rim." They furthermore claimed that the secret of the Perlman invention was the conical fit with the free space between the surfaces, except the narrow line of contact. This suit was instituted about five years ago.

## M. A. M. A. Plans Mature for Export Department

NEW YORK, Oct. 21—Plans for the promotion of an export department within the Motor and Accessory Manufacturers' Association are being matured. A strong committee will be appointed to initiate the work and carry it on. It is proposed to co-operate closely with the automotive division of the Bureau of Foreign Commerce. The M. A. M. A. headquarters in New York will be used as a clearing house for all export information in relation to possible markets for accessories and parts.

### HUFFMAN ACTIONS DISMISSED

ELKHART, IND., Oct. 24—The Circuit Court of Elkhart County has dismissed actions filed against Huffman Brothers Motor Co. by creditors with claims aggregating \$14,845. It is understood the claims have been paid. They were filed by the Goshen Buggy Top Co., the Ligonier Automobile Body Co., the Marion Malleable Iron Works and the Woonsocket Mfg. Co.

## Goethals to Handle New York Operations

### Plans Are Developed by Port Authority in Case Strike Develops

NEW YORK, Oct. 24—Governor Miller has vested in the Port of New York Authority, a board established by the states of New York and New Jersey, authority to handle all transportation facilities available in the event of a railroad strike. A plan of operation to meet an emergency already has been worked out by Elihu C. Church, consulting engineer to the Port Authority. General George W. Goethals has been selected commander-in-chief of the motor service.

The essentials with which the city must be supplied in the event of an emergency are food, including staples, milk and forage for horses; mail; gasoline and coal. There also will be some essential long distance passenger transportation and some essential commuter business.

The means of transportation in the event of a strike will include a few railroad trains, depending on the number of locomotive engineers available, trucks, barges and ships.

#### To Police Road Traffic

In the event of a strike one member of the Port of New York Authority will be in touch with the retailers to determine what supplies are needed and where they are most urgently required. Another will keep in touch with wholesalers in the Metropolitan area to determine where such supplies can be found.

Another member, working with the state highway commission, will have authority to declare certain roads trunk lines and to close them to other traffic for a certain period during which another member of the board will arrange to have freight collected at a central loading point and still another member will allocate transportation units to that particular haul. Trucks using the trunk lines will move in convoys both ways under direction of motorcycle patrolmen.

Other members of the board will see that the necessary number of vehicles are available, that trunk road traffic is policed and regulated, that trucks are dispatched on time, that there are facilities for repairs in case of breakdown, that proper loading and unloading facilities are available and that each unit of transportation hauls a full load.

The Port of New York Authority also has collected all the data available on the number of trucks available in the Metropolitan area.

#### Parts Makers Will Use Trucks

NEW YORK, Oct. 24—Information received at headquarters here of the Motor and Accessory Mfrs. Assn. indicates that a great majority of the members are determined to continue factory operations by the use of motor trucks if there is a railroad strike. A majority of them

have well balanced inventories and would experience little difficulty in keeping production at present levels unless the railroad strike lasted several weeks, which is considered highly improbable.

Arrangements will be made by parts manufacturers to make deliveries regularly by motor truck. It is believed that if there is a general strike many shippers who will be forced to resort to the use of trucks never will go back to the railroads for short hauls because of the advantages which they will find in motor transport.

#### Club Offers Services

TRENTON, N. J., Oct. 21—The Motor Truck Club of New Jersey has offered its services to Governor Edwards in the event of a railroad strike. The trucks controlled by members of the organization would be used first for moving food-stuffs and fuel.

#### Measures Taken in Chicago

CHICAGO, Oct. 24—Defensive measures in case of a general railroad strike have been undertaken by Chicago. The Association of Commerce will look after the food supply, fuel, etc. The city has on hand food to last three months, and the coal in storage, excluding industries, would last for a year. The milk supply of the city is less than 100 miles and will be handled by trucks.

#### Kentucky Prepared

LOUISVILLE, Oct. 24—Should the railroad strike be called as threatened, Kentucky has 14,122 motor trucks to combat the cessation of train service, figures obtained from the State Department of Automobiles, show.

## Ford Says Manipulators Are Behind Strike Move

NEW YORK, Oct. 25—The threatened railroad strike is only "an attempt on the part of the manipulators" to bring about deflation, is the opinion of Henry Ford, and no one but the manipulators could possibly gain anything.

"The workmen have nothing to gain," Ford said in an interview at his New York headquarters. "I have talked with many of them during the past week and none knew definitely what he proposed to strike for. The public likewise has nothing to gain and much to lose if the strike actually goes into effect. The gang wants to get prices down so they can get in on more of the profits."

"We have no labor problems on the Detroit, Toledo & Ironton Railroad. All the workmen are paid on the same basis as the men in the Detroit factory. This is a higher rate than that paid to labor on other railroads. The 450 miles of road is now being operated profitably in spite of the fact that the workers are better paid than previously and even so we have reduced freight rates in whatever instances the Interstate Commerce Commission permitted."

Reverting to the automotive industry, Ford declared with emphasis:

"The world is on wheels. I have no fear for the automobile business. Why should I? Our branch across the river in the meadows on ground that used to be a swamp, now does a business of \$60,000,000 a year."

## Indiana Industries Join to Meet Strike

### Questionnaire Is Sent Out in Order to Obtain Truck Details

INDIANAPOLIS, Oct. 24—A definite detailed plan to meet the emergency of a railroad strike by means of highway transport has been presented to Governor McGray by Tom Snyder, secretary of the Indiana Highway Transport and Terminal Association, and Lynn M. Shaw, secretary of the Indiana Automotive Trade Assn. Under the plan 19 statewide industries in the transport, transfer, warehouse and automotive fields will co-operate. The plan provides for the appointment of a transport commissioner and a highway supervisor to direct traffic over the most suitable highways. The entire state would be zoned and the various units co-ordinated.

It is expected that approximately 50 per cent of the 40,000 trucks of the state will be available for use in the event of a strike. Every important center in the state has been reached by a questionnaire sent out several days ago and reports are being received by every mail giving the number of trucks each concern reached can devote to the emergency.

#### Fix Rates

Exact details of every truck pledged are being tabulated, giving the size, the kind of bodies used, the rates at which they will operate and the routes, warehouses and terminals to and from which these vehicles can operate most efficiently. In almost every case the rates to be charged for motor freight and express down to third class will be the common carrier rates, although some of the units will have to be assured of return loads to make this figure possible.

The Indiana Highway Transport and Terminal Association and the Indiana Transfer and Warehousemen's Association will form important units around which the emergency system will be built. There now are nine motor express lines radiating from Indianapolis with terminals in Crawfordsville, LaFayette, Marion, Kokomo, Muncie, Greengburg, Columbus and Bloomington.

The Indiana Federation of Farmers and the Indiana Automotive Trade Association will co-operate.

In Indianapolis alone, there are 2338 trucks engaged in the distribution, transfer, cartage and transfer service.

#### DUSENBERG WANTS MEDAL

PARIS, Oct. 16—Through the representative of the American Automobile Association, the Duesenberg company has put in a claim for delivery of the gold medal which constitutes the "Grand Prix" of the Automobile Club of France. The medal was won by Murphy in the race at Le Mans last July, but was not ready for presentation when the team sailed for America.

## Ford English Sales Reported Improved

### Output of Foreign Plants for September Aggregates 4525 Cars and Trucks

DETROIT, Oct. 26—Total production in the Ford Motor Co. plants outside the United States and Canada was 4525 cars and trucks in September. These were built in Buenos Aires, Copenhagen, Bordeaux, Sao Paulo, Cadiz and Manchester. The Manchester plant output was 2631. Ford Motor Co. of Canada produced 2937.

Sales in England are reported better than they have been for some time with business conditions showing a much firmer tone. Post-war depression is reported giving way not only in England but in many parts of the Continent and much better foreign trade conditions are looked for.

All Ford branches throughout the United States continue operating on a large scale. Detroit led in September assembly with 7408. Kearny, N. J., was second with 7036, Chicago third with 6000 and St. Louis fourth with 5525.

Body production at the River Rouge plant, Detroit, is on the increase, particularly in touring car bodies. Fordson tractors to the number of 827 were built in September at the Rouge plant.

Reports that a large part of the River Rouge plant would be set aside for the manufacture of gasoline propelled railway equipment, from hand-cars to locomotives, are denied at the plant. Equipment of Ford's railroad is overhauled in a section of the Rouge, but manufacturing is not under consideration.

## Portage Stockholders Make Counter Offer

CLEVELAND, Oct. 24—Stockholders of Portage Rubber Co., which F. A. Seiberling offered to buy for \$750,000 have made a counter offer of \$1,000,000 to the referee in bankruptcy. The referee recently ordered the Seiberling offer accepted by the trustees, unless stockholders demurred or offered a counter proposition before Oct. 21. Immediate hearing of the stockholders' proposal is expected, although final decision rests with Federal Judge Westenhaver.

## New Maccar Truck Model, 2-Tons, Listed at \$3,300

SCRANTON, PA., Oct. 25—An additional model, of 2-ton capacity, and known as Model H-A, has been developed by the Maccar Truck Co.

It is fitted with a Continental four-cylinder  $4\frac{1}{2} \times 5\frac{1}{4}$ -in. engine, Maccar fin and tube radiator, Zenith carbureter, Eisemann high-tension magneto, Mueller governor, Brown-Lipe gearset and clutch, Spicer universals, Merrill

springs, Ross steering gear and Timken worm-drive rear axle. The truck has a wheelbase of 150 in. and is also made in a long model with 162 in. wheelbase. The rear axle is of the full floating type and gives a reduction of 8.5:1 on high and 45.47 on low gear. The frame is made of alloy steel  $\frac{1}{4}$ -in. stock, the channels having a height of  $6\frac{3}{16}$  in. and a width of  $2\frac{1}{2}$  in.

Of the total weight of the loaded truck 70 per cent rests on the rear axle and 30 per cent on the front axle. The weight of the complete chassis is 5200 lbs. Steel wheels are fitted, with solid tires  $36 \times 4$  in., single in front and the same size dual in the rear.

The chassis price is \$3300.

## G. M. C. Stockholders Show 1513 Increase

NEW YORK, Oct. 24—The number of shareholders upon the books of the General Motors Corp. Oct. 3 was the largest in its history. The record taken in connection with the quarterly dividends which will be paid upon Nov. 1, showed 66,837 names, an increase of 1513 over the preceding quarter, and an increase of 29,943 over a year ago. The detail of the number of stockholders receiving dividend checks upon Nov. 1, compared with the preceding quarter follows:

Classes of Stock	Nov., 1921	Aug., 1921
6% Preferred.....	\$3,208	\$3,170
6% Debenture.....	10,083	10,107
7% Debenture.....	8,906	9,046
Common .....	44,640	43,001
Total .....	\$66,837	\$65,324

## Industry Contemplates Safety First Campaign

NEW YORK, Oct. 24—A movement is under way for the organizations within the automotive field to co-operate in the promotion of a vigorous safety first campaign to cut down highway accidents. It is realized that the large number of fatalities and injuries caused by motor vehicles has become a sales deterrent, and it is believed the industry should play a larger part than heretofore in combating carelessness not only of pedestrians but of drivers.

If such a campaign is undertaken all manufacturers and dealers will be asked to co-operate not only in their own communities, but in a nationwide educational effort to promote the use of safety appliances. Many accidents are due to faulty brakes, for example, and it is believed a campaign to bring about more careful and frequent inspections of brakes would do much to prevent accidents.

### HINKLEY TRUSTEE APPOINTED

DETROIT, Oct. 24—The Security Trust Co. was named as trustee for the Hinkley Motors Corp. at a meeting of creditors before a referee in bankruptcy. An involuntary petition against the company was filed recently by three minor creditors.

## Makers and Dealers Arrive at Agreement

### N. A. C. C. Committee Will Submit Conference Proposals to Members for Final Action

DETROIT, Oct. 24—Committees of the N. A. C. C. and the N. A. D. A. have closed the series of conferences which have been held on contractual relations by arriving at tentative agreements on the points outlined. These will now be submitted to the membership of the N. A. C. C. for consideration and final action.

In a statement following the meeting, Alfred Reeves, general manager of the N. A. C. C., said his organization was in complete harmony with the dealer group and was deeply interested in helping overcome the obstacles now interfering with the safe progress of the industry. Every effort will be made, he said, to clear away the difficulties with which the trade is now faced so that there will be no unnatural barriers to sales in 1922.

### To Stimulate Sales

One of the important actions taken at the conference in a sales stimulating sense was the decision to make the New York and Chicago national shows more merchandising events than they have been in the past. Recommendations will be made to the show committee of the N. A. C. C. which are designed to give dealers greater opportunity to develop sales on the show floor than at former shows.

A decision to go to the mat with the used car situation immediately was another matter upon which an agreement was reached and recommendations will be made to manufacturers at once so that dealers may have united backing in the movement. It was agreed that trade-ins are a necessary factor in doing business but that they can be handled in such a way that present abuses may be avoided. Reeves said a survey of the used car situation is now being made which upon completion will permit the manufacturers to approach the subject with a more complete knowledge of its ramifications.

### Discountance Truck Trades

The process of cure will be slow, he said, in view of the extensiveness of the evil, but it will be brought under control. The committees were agreed that trade-ins in trucks should be discountanced. N. A. C. C. representatives attending the conference were: W. E. Metzger, chairman; Colin Campbell, Hal B. Boulden, F. E. Conner, W. E. Voorhis, Percy Owen and Alfred Reeves. For the N. A. D. A. they were: Jesse E. Smith, Harry Harper, N. H. Cartinhour, Fred W. Vesper, J. E. Eldridge, Harry G. Mooock.

Directors of the N. A. D. A. who had attended a meeting preceding the joint conference were invited to sit in at the session.

## Little Change Seen in Retail Car Trade

### Outlook for Enclosed Models Especially Bright—Truck Sales Increase Steadily

NEW YORK, Oct. 25—The trend of retail trade in passenger cars has shown little deviation in the past week from the level of the last six months. The first half of October was surprisingly good, but a gradual slowing up of sales is to be expected in most sections of the country as the touring season closes. The outlook for enclosed car business is uncommonly good, however, and nothing has arisen to change the belief that the aggregate of sales in dollars for October will equal September.

There is evidence of a growing opinion among body makers that there is too great a difference between the prices charged by car manufacturers for open and enclosed models. It is held in some quarters that not all this margin is justified, and some body builders are inclined to stand pat on their prices for enclosed jobs until the cost to the ultimate consumer is reduced.

### Strike Will Help Trucks

Truck sales are increasing slowly but steadily as general business conditions improve. A fillip has been given them by the threat of a general railroad strike. The strike menace has given tremendous emphasis to the essentiality of motor vehicles as transportation units. Their reliability is proven by the fact that the nation has turned instinctively to them in the face of an emergency, in the realization that their mobilization will prevent industrial paralysis if the carriers cease to function. Manufacturers and dealers are taking advantage of the opportunity to convert bankers who have been skeptical about handling truck paper.

If there is a railroad strike it will not have a demoralizing effect on automobile production unless it is longer lived than is probable. Most passenger car makers have inventories sufficiently large to permit production for some time without bringing in large quantities of supplies. Such materials as may be needed can be transported to the factories by truck. It will be possible to deliver cars by means of "driveaways" except to points far distant from factories.

### Tractor Prospects Improve

Reports are filtering in from tractor and farm machinery manufacturers that the winter months promise to bring an unexpectedly large volume of business from the rural districts. This is evidence of generally improved conditions in the agricultural sections.

The crop of rumors about impending mergers, combinations and consolidations is growing larger rapidly. A few of them are plausible but most of them are somewhat ridiculous. Reports of prospective combines of truck concerns

are most common and a majority of the companies in the business are mentioned.

While it will be found that few of the reports are founded on fact, it undoubtedly is true that consolidations are in the air and the next few months probably will witness several of them. One which promises success would bring together fourteen automotive concerns with physical assets valued at some \$50,000,000. Another even larger combine is contemplated.

## Stockholders Will Ask Bankruptcy for Revere

INDIANAPOLIS, Oct. 24.—Stockholders of the Revere Motor Car Corp. of Logansport have perfected an organization known as the Revere Stockholders' Protective Association. Officers of the organization are J. H. Reitemeier, president; Carl Rehm, vice-president; Dr. R. L. Swindler, secretary; David Middleton, treasurer.

Perfecting of the organization is the first step in the plans of local Revere stockholders to have the concern declared bankrupt, it is said. Officers of the stockholders' organization plan to file a petition in bankruptcy in the Federal court at Indianapolis, it was announced by officers.

The concern at the present time is in the hands of a receiver, and stockholders hope, by having the company declared bankrupt, to reorganize and put the plant on a paying basis and retain the industry in Logansport.

## Underwriters Suggest Fixed Depreciation Plan

NEW YORK, Oct. 24.—The policy under which the amount of insurance is automatically diminished monthly has not met with favor by the committee on forms of the National Automobile Underwriters Conference which is holding meetings in this city and which is now taking up the question of a policy which provides that the assured shall bear a portion of each loss.

A suggestion has been made that the conference adopt a plan of fixed depreciation and make its use mandatory for insurance purposes under a form of policy which could not be construed as "valued." If a monthly decrease in insurable value greater than the mandatory decrease were accepted by the assured, it is suggested that a reduction in rate might be allowed. This it is felt would win the moral support of automobile manufacturers and take a long step toward putting the business on a proper basis.

### U. S. TIRE ADDS NEW SIZE

NEW YORK, Oct. 24.—The United States Tire Co. has added one more size to the Royal Cord tires, this being 30 x 3½ in., the retail price of which is \$24.75. The new size is made of the same material and compound as is used in the larger sizes. Experiments have been going on for quite a long time.

## War Supply Transfer Totals \$118,264,808

### Majority of Motor Vehicle Surplus Goes to Other Government Agencies

WASHINGTON, Oct. 25—Figures prepared by the Director of Sales to-day show that vehicles valued at \$118,264,808 have been transferred from the War Department's surplus material to other Federal departments. The classification of vehicles includes motorized equipment which represented the largest percentage of vehicular equipment transferred. Transfers were made through the Transfer and Inventory Section office of the Director of Sales.

Vehicles turned over to other governmental agencies represented more than half the total value of army surplus material which was transferred. Sixty-six per cent of the surplus material which was transferred to the Department of Agriculture, cost the Government originally \$138,290,529.

The vehicles transferred to the Agriculture Department were for the use of the Bureau of Public Roads which in turn transferred them to State highway departments. The total value of vehicles given to the Agriculture Department by the War Department amounted to \$98,876,028.

The Treasury Department took vehicles valued at \$2,766,712. The Department of Commerce received vehicles valued at \$4,362,475; Navy, \$2,014,732, and the Post Office Department \$11,013,401. Aircraft material valued at \$9,548,853 was also transferred. The air mail service of the Post Office Department took \$2,919,547 worth of this equipment; Navy Department \$5,088,456 and the Department of Agriculture \$1,565,009.

## Shuler Axle Creditors May Reach Settlement

LOUISVILLE, KY., Oct. 24.—Assets of the Shuler Axle Mfg. Co., recently adjudged bankrupt in the Federal court, exceeded the liabilities by \$274,495.86, according to schedules filed with Judge George A. Brent, referee in bankruptcy. The total assets are listed at \$651,473.83 and liabilities at \$376,977.97.

Several days ago permission was granted to the receiver to operate the plant. Orders on hand, it was said, amount to \$3,000. The first meeting of creditors will be called for Nov. 2. It is believed a settlement will be effected and the operation of the plant continued.

### BARLEY HAS NEW TOP

DETROIT, Oct. 24.—Barley Motor Car Co. of Kalamazoo, manufacturer of the Roamer line, has added a new California top to its models which will sell for \$2,950 f.o.b. Kalamazoo. Shipments of the new model are being made now.

## Mileage Guarantee Opposed by Dealers

### Tire Association Calls Present Policy of Adjustments Wrong and Unfair

CLEVELAND, Oct. 24—Delegates from all parts of the country to the National Tire Dealers Association, in session here, brought the word that the retail tire business is on the upgrade and that in their judgment there is to be a gradual improvement for some months. Dealer after dealer reiterated the assertion that October has produced better sales than September and that September business was in excess of August.

The delegates adopted a series of resolutions, militant in tone, for the betterment of the dealer. They went on record in favor of a policy to put an end to deceptive advertising with respect to tires. They recommended the abolition of the mileage guarantee, the discarding of adjustments, the adoption of a distribution policy that will prevent manufacturers of cars dumping unused tires on the market at unfair prices, and important exchange privileges. Copies of the resolutions adopted are to go to every tire manufacturer.

#### Association Expands

In his annual report, Secretary Philip O. Deitsch pointed out that the association had but 10 cities represented less than a year ago when the body was formed, and that to-day 24 cities are affiliated and 53 are in process of being organized for representation.

One of the features of the meeting was the accessories exhibition. Trips to Akron and Kent were a part of the convention program.

William O'Neil, general manager of the General Tire & Rubber Co., Akron; C. S. Harris, vice-president of the Union National Bank, and C. C. Waddell of the Goodyear Tire & Rubber Co., were among the speakers during the sessions.

R. F. Valentine of this city was elected president, to succeed Thomas F. Whitehead of Chicago, who became a member of the board of directors. Frank Zeman of Chicago, was chosen vice-president and Deitsch was elected secretary-treasurer. These officers and the following, in addition to Whitehead, constitute the board of directors: R. J. Walters, Baltimore; E. P. Farley, Minneapolis; R. R. Dooley, Cincinnati, and A. B. Clark, Kansas City.

#### Resolution Adopted

The resolution in relation to mileage guarantees follows:

"Whereas, We are all agreed that the present policy of adjustments by tire manufacturers is erroneous, misleading and unfair to the legitimate tire dealer and ultimate consumer, and often used to the disadvantage of the tire manufacturer, therefore be it

"Resolved, That the manufacturers of quality tires should take prompt action to correct this evil by eliminating the mileage guarantee as it permits the 'snowbird' or 'gyp dealer' or 'broker' to prosper unfairly by

selling an inferior quality tire with an inflated list price and a long mileage guarantee to the trade at a big reduction from the inflated list price as an inducement to the trade, so when a tire proves defective and a customer returns with it, said dealer informs him that he will make an adjustment, but of course that said adjustment will be based on the list price. Therefore, the customer is compelled to accept said adjustment on that basis if he accepts it at all. This enables said dealer to make a profit on the adjustment at the expense of the user, therefore, be it further

"Resolved, That we believe a quality tire manufactured by a reputable manufacturer and sold by a reputable dealer needs no mileage guarantee. If the manufacturers do not deem it advisable to remove the mileage guarantee at this time, then we request that all adjustments be made through their authorized dealers who qualify as to their capability, and further be it

"Resolved, That said adjustments be based on the dealer's cost price of the tire, and why should not an authorized dealer make his prorated profit on what he purchased as a quality tire but which proved to be otherwise, the same as though he sold a new tire?"

#### Rubber Association to Act

NEW YORK, Oct. 27—The tire manufacturers' division of the Rubber Association of America will hold a special meeting at the Yale Club in this city to-day to consider a report made by a special committee which has been considering the subject of mileage guarantees on tires. The committee will make certain recommendations which the manufacturers will be asked to discuss.

A similar report was made some time ago but it was not entirely satisfactory to the majority of the manufacturers and the committee was asked to continue its investigation. While nothing can be learned in advance of the purport of the report there is a strong sentiment within the industry for the abolition of mileage guarantees.

Another subject which will be taken up at the meeting will be protection against price declines. This was first considered in September and since that time definite action has been determined upon.

## Dunlop and Michelin Fusion Conjectured

LONDON, Oct. 7—(By Mail)—The Dunlop Rubber Co., Ltd., announces that dividends on the 5 per cent cumulative preference stock and 8 per cent cumulative ordinary stock up to Aug. 31 will be paid after the annual meeting which has been postponed to the end of this month. The reason given is that "important negotiations of a nature advantageous to the company" are in progress but will not be completed before that time.

There is much conjecture as to the nature of the "important negotiations." The belief is expressed in some quarters that there is likely to be a fusion of Dunlop and Michelin interests. It is pointed out that the revised price lists of the two companies which have just been issued coincide in all respects as to prices.

## Durant Shipping Cars from Eastern Factory

### Deliveries to Purchasers Will Probably Begin on Large Scale Nov. 1

NEW YORK, Oct. 21—Production of the Durant Four now is well under way in the Long Island City plant of Durant Motors of New York. While this factory will supply only the eastern territory after the Lansing plant gets under way, cars now are being shipped to dealers in all parts of the country. They went to California by express and are said to have met with a flattering reception there. It is expected that deliveries to purchasers will begin on a large scale about Nov. 1.

Rapid progress is being made in building up a dealer organization. The main centers of population in the eastern territory now have been covered and many distributors and dealers have been appointed in other sections of the country. The Michigan dealer organization has been practically completed and orders have been placed for the delivery of 10,000 cars in that State in 1922.

The Collins Motor Car Co. has been organized in Boston to distribute the Durant and A. A. Leidermann, who has been Pierce-Arrow dealer in Utica, will handle the Durant in that city. The Boston company is capitalized at \$100,000 and is headed by Jerome T. Collins.

## Name Markin to Head Commonwealth Motors

CHICAGO, Oct. 24—Under a reorganization of the Commonwealth Motors Co., a new staff of officers has been elected headed by Morris M. Markin who entered the automotive field in Chicago several years ago with the Markin Auto Body Corp. It is understood these two companies will be combined under one roof at the Commonwealth plant in Joliet.

Other officers of the company are three of the older members of the Commonwealth organization. Amel Carlson has been made vice president and general manager, Edward J. Bouchard, treasurer and Walter L. Kroneberger, secretary and sales manager. The plant at Joliet is now running six days a week. The general offices have been removed to 1509 South Michigan avenue, Chicago.

#### SETS BOND IN PATENT APPEAL

CHICAGO, Oct. 24—The Stewart-Warner Speedometer Corp. will be required to file bond of \$150,000 pending action on the appeal of the company from the decision of Judge Carpenter in the United States District Court, of northern Illinois in the suit brought by Seager & Harrington, charging infringement of patent on the vacuum tank being manufactured and sold by Stewart-Warner.



## Requires Financial Aid of Bus Patrons

### Tidewater Lines, Inc., Makes Every Farmer Along Routes a Stockholder

WASHINGTON, Oct. 24—The Tidewater Lines, Inc., which operates fifteen passenger lines and ten freight trucks out of Washington over six routes reaching all points of Southern Maryland and down to Colonial Beach, Va. has inaugurated a plan for financing of passenger and cargo transportation lines which virtually makes every farmer making use of the service a stockholder.

In addition the company is given the hearty support of all of the town banks along the routes. These banks, realizing the need of this means of transportation, are often instrumental in getting the farmers to invest in stock through showing them that by aiding the company they are in turn also benefiting themselves through better service.

#### First Sell Banks

To date, there are 500 stockholders in the company, most of whom are farmers from Southern Maryland. The company realizes the importance of this financial support as a factor in determining the confidence of its patrons. Before opening a new route, it requires the entire support financially of all the farmers along that specific route. In a majority of cases, the local banks are first sold on the proposition. Sale of the stock is then carried on by the banks.

The governor of Maryland recently gave the company a franchise to operate its vehicles over the state roads. As a result of this permit, the company has effected a number of consolidations of competing truck and bus lines in Maryland, the most recent being that of the Arndt Transfer & Express Co., operating out of Baltimore. It has therefore been necessary for the Tidewater Lines to increase its capital to \$250,000 7 per cent. preferred with a \$100 par value and 12,500 shares of common, no par value.

## Stock Dividend Ruling Is Amended by Treasury

WASHINGTON, Oct. 24—Considerable progress has been made on the tax bill now before the Senate. The Senate has increased the income surtax rates from 32 per cent, as provided in the House bill, to 50 per cent, to meet the demands of the so-called agricultural bloc. It is expected, however, that this rate will be reduced to about 40 or 42 per cent in conference.

The Commission of Internal Revenue to-day issued a new paragraph to be added at the end of Article 1547 or Regulation 45, as amended by Treasury Decision 3206, which relates to stock dividends.

It reads as follows:

"Where the stock with respect to which a stock dividend is declared was purchased at different times and at different prices, and the identity of the lots can or cannot be determined, but the dividend stock issued with respect to such stock cannot be identified as having been issued with respect to any particular lot of such stock, then any sale of such dividend stock will be presumed to have been made from the stock issued with respect to the earliest purchased stock, to the amount of the stock dividend chargeable to such stock."

## Tractor Sales Increase in Southeast Territory

ATLANTA, Oct. 24—Tractor sales in the Atlanta territory the first two weeks of October were better than they have been at any time within the past year, due to the recent increases in the prices of farm products, principally cotton. Few large tractors are selling in the Southeast, but the demand for the smaller machines has been so great the past three or four weeks that some dealers are unable to secure all of the tractors of this kind they can sell.

Virtually all of the dealers throughout Georgia are reporting good business. Business in middle and eastern Tennessee has been good all summer and is unusually good at this time. In North Carolina and Alabama conditions have picked up materially the past three weeks and are getting better daily.

Sales in South Carolina, however, are still rather poor and have been all year. In Florida, and especially the southern part of the state, sales are at normal for the first time almost in two years.

## Mutual Truck Insolvent; Bank Appointed Receiver

SULLIVAN, IND., Oct. 24—At a hearing before Walter F. Wood, as special judge, the Mutual Truck Co. of this city was declared insolvent and on the petition of the Shuman-Pomeroy Co. of Chicago, with the Electric Steel Co. of Indiana, as the intervenor, the National Bank of Sullivan was appointed receiver.

Judge W. H. Bridwell, judge of the Sullivan circuit court, did not act, feeling that his interest in the Citizens' Trust Co., a creditor, disqualified him. In the presentation of the evidence, Luther Steele, vice-president of the concern, testified that the liabilities of the company amounted approximately to \$85,000. He was unable to state definitely the assets of the firm, but said the personal property alone would total near \$45,000.

#### NAME HOLMES RECEIVER

NEW YORK, Oct. 24—A petition in bankruptcy has been filed against the Holmes Motor Car Corp., of New York by three creditors who hold claims for about \$2,600. Judge Hahn appointed Z. W. Butler as receiver under a \$3,000 bond. The liabilities are estimated at approximately \$40,000 and the assets about \$6,000.

## Small Car Favored by Japanese Buyers

### Trend Is Also Shifting Noticeably From Enclosed to Open Models

LOS ANGELES, Oct. 24—Light, small cars continue to hold the Japanese automobile market, according to the latest advices received here. The trend from the large six-cylinder automobiles to the lighter types, which started following the imposition of the severe Japanese tax on automobiles, has become more and more marked in recent weeks.

The smaller cars, particularly those calling for the minimum tax, are moving fairly well, but the larger fours and sixes are finding few buyers. As a matter of fact, virtually the only sales being recorded in the larger cars are those being disposed of to government departments that do not have to pay the automobile tax.

There has been a very noticeable change in the demand for various body types in Japan in recent months. During the last six months open cars have become very popular in Japan, while formerly enclosed cars were all the vogue. Perhaps the change is due to the increasing number of owners who are driving their own cars and also because more motorists are taking trips into the country rather than confining their motoring to city streets. There are a number of instances reported from Japan where owners are selling their limousines and buying smaller cars with open bodies.

The Japanese body building trades are not enjoying a very healthy demand for their product, as the demand for the body of foreign manufacture is as insistent as ever. The Japanese body is declared to be usually equal, and often superior, in appearance to most foreign bodies, but the Japanese body builders seem unable to construct a body which will stand up for any appreciable length of time.

## Africa Sends Wichita Order for Ten Trucks

WICHITA FALLS, TEX., Oct. 24—Decided improvement in its export trade has been noted by the Wichita Motors Co., which has received an order for ten 1½-ton trucks, pneumatic tired, to be shipped to the Gold Coast of Africa. Inquiries from many foreign countries are now being received and J. G. Culbertson, the company president, declares that export sales will continue to attain a better volume.

Nearly all motor transportation facilities in foreign countries depreciated during the war and owners now are discarding them for those of modern design. Culbertson added that the countries of South America, Africa and the Far East are purchasing practically all of the trucks from United States firms.

## Paris Show Promises Good Business Year

### Public Responds to Lower Prices —Repeal of Gasoline Tax Boosts Sales

PARIS, Oct. 16 (*By Mail*)—Manufacturers generally are satisfied with the results obtained at the Paris automobile show. Sales have been good in the lower and medium price class cars and moderate in the high class cars. When the show opened makers were nervous regarding results, for they had made a considerable effort to attract customers by better value and lower selling price, but they had no assurance that the public would respond.

It seems to have been realized that no further price reductions are possible, and as a consequence buyers' resistance has broken down and sales have taken place. This movement was accelerated toward the end of the show by a Government announcement of the repeal of two cents per litre on the state gasoline tax, to go into effect immediately, followed by another reduction of one cent on Jan. 1.

Owen Clegg of the Talbot-Darracq Co. stated that business had been so good they would have to start a double shift in the machine shops in order to keep pace with deliveries. Isaac Koecklin of the Peugeot Co. declared that the results had been surprisingly good, sales having been brisk on the whole series of models. In his opinion the show had surpassed expectations.

The Fiat Co. reported good business on the 10 hp. model. Louis Delage indicated that his small 11 hp. four-cylinder had sold well and there was a healthy outlook for the other types. Lancia reported good sales. Citroen is said to be fully booked up on his two lower price models.

It is believed generally that if the political situation remains clear the coming year will be a very successful one for French manufacturers. Gasoline prices are going down, tires are dropping, there will be no increased taxation on automobiles, and selling prices have stabilized.

### S. F. Bowser Absorbs Richardson-Phoenix

MILWAUKEE, Oct. 25—The Richardson-Phoenix Co., which manufactures automatic lubricating devices and appliances for filtration and reclamation of lubricants at a large plant in this city, has been consolidated with the S. F. Bowser Co. of Fort Wayne, Ind. The deal involves more than \$1,000,000. The combined companies have assets exceeding \$10,000,000.

J. William Peterson, president of the Milwaukee company, becomes vice-president of the Bowser company. S. B. Bechtal, vice-president and general manager of Bowser, will assume the same duties at the Richardson plant, succeeding Louis

### EPIGRAMS THAT RIDE WITH JOHN N. WILLYS

NEW YORK, Oct. 24—John N. Willys, who has devoted much of his time for months to addressing Willys-Overland dealers in all parts of the country, has developed a reputation as a maker of epigrams. Here are a few of those he used in one of his recent dealer addresses:

"I take a train from New York for Toledo that gets in at 4:40 a. m. so I can get an early start instead of the train that gets there at bankers' hours."

"I'm never going to quit when business is bad."

"I'd rather work out than rust out."

"The public had me broke a year ago, and it saved me from a lot of 'touches' and explaining."

"Three weeks out of every four I am at the factory, and the other week I'm out on the road helping the dealers."

"My dealers have always been pals, not forced to walk on the bridge of formality to reach me."

"It takes a strong man to throw a bull, but we've had too many conversational bull throwers in the motor industry."

E. Strothman, who is seriously ill and will retire to take a long rest. The officers of the Milwaukee plant will be retained. It is understood that the Richardson-Phoenix Co. will retain its identity with Peterson continuing as president.

### Wins \$417,477 Verdict in Columbian Suit

EAST PALESTINE, OHIO, Oct. 25—George W. Stevens has been given a verdict for \$417,477 in a suit against the Columbian Tire & Rubber Co. for breach of contract. The jury found that Stevens made a contract with the company to act as general sales manager for which he was to receive 5 per cent commission on the net sales of tires and tubes. The contract was signed May 1, 1918 and was broken, according to the plaintiff, on Nov. 13, 1919. It was the decision of the jury that Stevens was entitled to his commission on sales amounting to \$7,768,550 from Nov. 13, 1919 to May 1, 1923 plus an increased salary and a bonus.

### STUDEBAKER CUTS OUTPUT

SOUTH BEND, IND., Oct. 25—The Studebaker Corp. has temporarily curtailed its output in connection with the adjustment of winter schedules. President Erskine states that production in all plants during the fourth quarter is expected to exceed 60 per cent of the third quarter.

## New British Sunbeams Have Overhead Valves

### Changes Perfected in Engine— Vauxhall Introducing Model for Small Bodies

LONDON, Oct. 14 (*By Mail*)—The British Sunbeam cars of all sizes for 1922 will have push-rod operated valves in the head. The range will consist of the existing 16 hp. four and 24 hp. six-cylinder models (3½ x 5½ in.) with new engines and an entirely new model of 14 hp. with four cylinders 2 13/16 x 4½ in., the engine being a unit construction with the three-speed gearset, which is an innovation for Sunbeam.

Vauxhall is also introducing a 12 hp. model for small two and four-passenger bodies, the engine having a bore and stroke of 2 15/16 x 5½ in. But neither this nor the new small Sunbeam will be of a popular price, for they are both to sell with a four-passenger body at \$3,700 to \$4,000.

Standard will also supplement the successful 12 hp. overhead valve chassis by one of 8-10 hp. with a four-cylinder, 2 7/16 x 3½ in. L head engine. The new air-cooled Armstrong-Siddeley will not be at Olympia, but an example will be in London during the show; this model, by the way, will not be sold as an "Armstrong-Siddeley," but will be given another name to distinguish it from the six-cylinder cars.

Nor is the 20 hp., four-cylinder Rolls Royce to be expected at the show; in fact, it is questionable whether a new type will supplement the 40-50 hp. six for some time to come. Present indications, nevertheless, point to there being at Olympia a record number of new models by well-known makers and, without doubt, the general trend is all toward smaller and lighter cars, more economical to run, if not of low first cost.

### Firestone Loses Action Brought by Cotton Mill

CHESTER, S. C., Oct. 24—The Marlboro County Court has given the Marlboro Cotton Mills a verdict for \$121,392 in its suit against the Firestone Tire & Rubber Co. to enforce compliance with a contract for the purchase of tire fabric. The contract was made in 1919 and under it the tire company was to pay \$1.55 a pound for the fabric. When the decline in prices came, it was alleged, the Firestone company refused to accept the larger part of the fabric. This refusal resulted, the cotton mills contended, in the loss of the amount of the verdict.

The Firestone company was not represented in court and ignored the trial, claiming that the South Carolina courts had no jurisdiction in the case. It was shown at the trial, however, that the tire company has a distributing base at Columbia and a traveling representative in the State.

## Price Uncertainty Felt in California

### Prospects Fail to See Rock Bottom Reached and Adopt Waiting Attitude

SAN FRANCISCO, Oct. 24—Is the promise, freely made by some dealers to purchasers of cars, that there would be no more price cuts and that the price paid at that moment by the buyer was the ultimate, rock-bottom, absolutely final figure, acting as a boomerang and coming back to knock the business of these dealers in the head?

Many of the dealers and distributors on the Pacific Coast are beginning to think so, and many of them are referring with regret to the congratulatory words they said to buyers a few months ago, relative to the buyers having been fortunate in waiting until the "last price cut."

### Public Always Dubious

To tell the plain truth, a good many of the "wiser" dealers are of the opinion that the public has reached the point where it never will cease expecting further price cuts, and that this is one of the strongest, if not the very strongest, reasons that the prospects are not coming forward to buy new cars. It is certain that the majority of men who now own automobiles in northern California—and, probably, in southern California as well—are spending real money in repair shops to have their cars rehabilitated and kept in the best possible condition, so as to get every remaining mile out of them without buying new cars.

One man closely connected with the automotive industry, both as to passenger cars and trucks, and, to some extent with tractors, summarizes the situation at the middle of October as follows:

"I for one—and there are scores of others in the industry who hold the same belief—am firmly convinced that there will be no general automobile buying in northern California until the people are assured that the bottom in prices has been reached. When this bottom is to be reached is a matter for the manufacturers to decide and just how the people are to be convinced that it has been reached, is a difficult problem which the automobile dealers must solve."

### Liquidation Complete

Men who have to have automobiles for their business or industrial interests are buying them; others are making their present cars do. There is no doubt about this being the prevailing condition from the Tehachapi Mountains north to the northern boundary of the State, and registration figures indicate that the same condition prevails in southern California.

Indications in general throughout the State are that liquidation is virtually completed that the farmers, and consequently, the merchants and other business men in the agricultural districts, have received a large part of the money for their crops, and dealers and distrib-

## PHILADELPHIA THEFTS MAKE HIGHEST RECORD

PHILADELPHIA, Oct. 24—Motor cars valued at more than \$4,000,000 and numbering 2510 units have been stolen during the year in this city, nearly doubling last year's theft losses here. The year 1921 will stand out as a car theft record year in Philadelphia. Carelessness, police officials assert, is the largest factor in rolling up the record loss of motor cars.

During the period of Jan. 1 to Oct. 31, 1920, 1518 cars were stolen, valued at \$2,303,000.

Against the losses reported this year, the figures show 2112 cars, valued at \$3,685,348, were recovered. During the same period in 1920, 1651 cars valued at \$2,548,989 were recovered.

utors insist that sales will show a much better proportionate figure for the last five months of 1921 than they did for the first seven months. The retail districts undoubtedly are showing some improvement, but whether it be from the fact that money is coming in to the farmers and thus to other buyers, or whether it is the result of intensified selling campaigns during the preceding six months, it is hard to determine.

## Franklin Completes New Inspection Plan

SYRACUSE, N. Y., Oct. 24—The details of the H. H. Franklin Mfg. Co.'s monthly inspection plan for passenger cars are now complete and Franklin dealers are putting it into practice. The various items to be inspected are listed on an inspection report form which has been designed by the company.

No operations other than those listed are undertaken. If any repairs are found to be necessary the matter will be taken up with the owner. A post card form requesting the owner to bring his car into the service station for inspection has also been designed. Three monthly inspections are to be given free of charge after the sale of the car, but a small charge will be made for subsequent inspections.

### ATWATER CLOSES DOWN

SOUTHINGTON, CONN., Oct. 24—Practically the entire plant of the Atwater Mfg. Co. has been closed down. The plant has been on a five-day per week working schedule, but because of the small number of orders on hand it was decided to lay off the help until more orders are received. A few men will be employed to keep the machines in condition. The factory has been doing special drop forge work for the Ford Motor Co.

## Records Shattered by Goodyear Truck

### Makes Better Time Between Cali- fornia Cities Than Do Fast Trains

AKRON, Oct. 24—The Goodyear six wheeled motor truck, the first multiple wheeled motor vehicle to make a trans-continental run from Akron to Los Angeles, has shattered all motor truck records for negotiation of the distance between San Francisco and Los Angeles, according to word received here by officials of the company.

The huge six wheeler made the trip of 420 miles in 14 hours and 40 minutes, at an average speed up and down hill of 29 miles an hour. The truck carried five tons of freight on the trip. The best previous truck record for the distance was made by a 3½-ton truck which averaged 24 miles an hour.

Goodyear officials say the truck made the trip faster than the fast trains of the Southern Pacific Railroad, which take 14 hours and 50 minutes for the San Francisco-Los Angeles trip. On the trip the six wheel truck had to climb a grade of 1700 feet in the first 27 miles, and in the next 40 miles climbed to an elevation of 4230 feet above sea level.

Compared with railroad time for trips of similar distances, it is stated, the Goodyear truck on the basis of its Pacific Coast performance could carry freight from New York to Montreal and deliver it at its destination in only an hour's more time than is occupied by a fast passenger train in going from New York to Montreal.

Based on an average speed of 29 miles an hour, the Mississippi River can be brought within two days' journey by motor truck of either the Atlantic or Pacific seaboard.

The Goodyear truck on its run from Akron to Los Angeles made the distance of 2980 miles in 7 days and 35 minutes of actual running time. This is a new record for the distance. The truck rode on 8 inch tires.

## Rost Is President of Richelieu Motors

ASBURY PARK, Oct. 24—The Richelieu Motor Car Corp. announces that its officers and directors are as follows:

President, N. G. Rost, former sales manager of the Duesenberg Motors Corp.; vice president, S. A. Reeves, vice president Merchants National Bank of Asbury Park; treasurer, R. G. Poole, president First National Bank of Farmingdale, N. J.; Donald Symington, president Lock Insulator Co., Gordon Grand, president, New Jersey Registration & Trust Co. of Orange; E. H. Croft, president of the Ker-O-El, Cleveland; W. F. Quinn, president of Quinn & Quinn, Inc., and a member of the New York Board of Aldermen.

# Hoover Urges Human Touch in Business

Sends Message to Editors of Business Papers, Who Hold Annual Convention

CHICAGO, Oct. 26—Herbert Hoover, Secretary of Commerce, who has been holding monthly meetings in Washington with the editors of business papers representing all industries, suggested in a message to the editors who are holding their annual convention here this week, that industrial problems be considered from a human rather than a material standpoint. He said:

"I have appreciated the opportunity given me in the monthly meetings to express the policies of the Department of Commerce with regard to some of the pressing industrial questions before us, and I cannot but feel that if these problems are considered as human and not as material questions we can find their solution. . . . There must be in our discussion of these questions the dominating thought that the better control of economic forces is in fact simply the better comfort of the country."

The editors in a symposium on the present status of basic industries gave a vivid picture of industrial conditions.

## Steel Future Uncertain

A. I. Findlay, editor of *Iron Age*, reported that the steel industry had turned the corner in July and to-day is at 40 to 45 per cent of its war peak capacity. Since July there has been an increase from 22 per cent to 45 per cent. Prices now are 31 per cent above the 1913 average. The future of the steel industry is still uncertain, he said, but it is expected that production will reach 60 per cent of war peak capacity during 1922.

The electrical industry in certain departments, such as manufacture of motors and meters, is at 60 per cent capacity, and the average consumption of electric current this year exceeds that of 1919, according to F. E. Watts of *Electrical Record*. The sales through electrical jobbers are but 50 per cent of last year. Business has been improving in the last three months.

## Building Costs High

In the building construction field building contracts for 1921 are 83 per cent of those for 1913 and construction cost is 34 per cent below the high war peak and 30 per cent less than a year ago, W. W. De Berard of *Engineering News-Record* stated. In such public works as water and sewer enterprises, he said, September of this year was double that of a year ago. He also stated that construction costs are still 80 per cent above the 1914 price level and believes that reduction in labor costs in 1922 will greatly stimulate building.

The leather tanning industry is at 50 per cent capacity, according to James H. Stone of *Shoe Retailer*. Deflations in the leather trade started in 1919. Calf skins, that sold during the war at \$1 per pound, brought 13 cents this year. Some grades of cow hides in July, 1921, sold as low as 3 cents a pound.

An interesting angle on the agricultural situation was given by C. V. Gregory of *Prairie Farmer*, who showed that to-day 59 per cent of the farms in the country are unencumbered, and of those that are the value of the mortgage is only 29 per cent of the farm value.

David Beecroft presented a summary of the automotive industries.

F. M. Feiker, assistant to Secretary Hoover, told of the endeavors of the department to effect standardization in all industries in order to reduce living costs.

The value of the business paper to the daily press was analyzed by Glenn Griswold, financial editor of the *Chicago Journal of Commerce*, who looks to the business press for the correct summary of conditions in all industries. The daily press not only asks for such assistance but wants it. Financial editors are now quoting at length from the business press, giving conditions in most industries, and are desirous of going still further in this regard.

## Automobile Reimports Show Gain in September

WASHINGTON, Oct. 24—The importation of automobiles from foreign countries into the United States totaled 69, having a value of \$97,365, during September, according to an announcement of the Bureau of Foreign and Domestic Commerce. This compares with a total of 201, valued at \$191,707, during the same month last year. For the nine months of this year, the importations have been 399, with a value of \$698,771, against 746, valued at \$794,910, during 1920.

The reimports of automobiles show something of a gain in September of this year over the same period of last year, although this is not true of the nine-month period. The comparative figures are:

	No.	Value
September, 1921.....	443	\$695,586
September, 1920.....	302	391,170
Nine months, 1921.....	3,182	5,021,757
Nine months, 1920.....	4,390	7,196,283

## G. M. C. Remains Silent On Scripps-Booth Plans

NEW YORK, Oct. 24—Officials of the General Motors Corp. have declined to make any statement whatever concerning the action taken at their meeting in Detroit last week in reference to the future of the Scripps-Booth division. It is understood that there is a strong probability the company may be sold as a going concern instead of being liquidated. A decision is expected in the near future.

# Used Car Trades Cost Indianapolis \$193,000

Only Four Dealers Made a Profit, Aggregating \$2,300—State Conditions Similar

INDIANAPOLIS, Oct. 22—Thirty-six Indianapolis automobile dealers lost a total of \$193,000 in the trading and selling at retail of 2972 used cars since Jan. 1. Only four of 40 automobile dealers realized a profit on the handling of used cars in that same period. Their combined profits aggregated \$2,300.

That is the graphic story of the "used car situation" in Indianapolis. It is a pretty fair barometer of the used car situation in the state. In one corner of the state, New Albany, one dealer has 57 used cars on hand. No other dealer in the city has more than 10.

In Evansville, one dealer has 61 used cars; in Terre Haute several have as many as 35. Fort Wayne, Logansport, Lafayette, South Bend, Marion all report one or more merchants heavily loaded. In a few spots where the dealers have been almost 100 per cent in their association co-operation, is the used car situation good, or rather, is not menacing.

Everywhere the dealers are seeking the "answer," which seems to account for the unusual interest that is being taken in the "Indianapolis plan" of harmonizing policies in the trading of cars. One Indianapolis new car dealer had an opportunity to dispose of a used car stock. He exchanged his 14 used cars for a farm of 160 acres in Jackson County.

## Gasoline Consumption Reaches High Record

WASHINGTON, Oct. 24—A new high record in gasoline consumption was established in August when 503,000,000 gallons were used, according to an announcement by the Bureau of Mines. Although the average daily production in August of 13,921,000 gallons was 385,000 gallons more than in July, total stocks on Aug. 21 amounting to 567,645,000 gallons showed a decrease of 116,000,000 gallons during the month, according to the figures.

Exports of gasoline in August totaled 47,803,000 gallons, or 75 per cent, more than in July. Total production for the month was given as 131,577,000 gallons.

## NO CHANGE IN FRANKLIN

SYRACUSE, Oct. 26—The Franklin Automobile Co. has informed its dealers that the present model, without change, will be featured at both the New York and Chicago shows. The company states that Franklin cars on sale next spring will be of the same design as those now on the market. New York led in sales of Franklin cars for the contract year ending Sept. 1. Chicago was second, Boston third, San Francisco fourth and Los Angeles fifth.

## Factories Continue Heavy Production

Output Governed by Sales—Business, in Instances, Exceeds That of Summer

DETROIT, Oct. 25—Despite the fact that all factories are operating strictly on a sales basis, heavy production continues to be the rule, and with some companies, notably the producers of higher priced cars, business is running along as strongly as during the summer months, and in a number of instances better.

This is due in large part to the intensive selling efforts undertaken by the more aggressive factories. In these plants there is to-day a higher priced sales organization than ever before in the history of the industry.

### Follow Ford Plan

The Ford organization is, perhaps, the most highly developed, for the reason that Ford went after sales through close field analysis long before most of the other companies realized the value of it. Now, however, the Ford system is being closely followed right through to the highest class field.

Territorial representatives are making their strongest efforts to get business in shape, not so much for the balance of this year as for 1922. Investigations in the field are being carried on to indicate possibilities for next year's business and general satisfaction is expressed at the results disclosed.

Not only are the possibilities of territories being analyzed, but the dealer organizations are being studied to discover their ability to represent the factory fairly in the keen competition certain to develop in the coming year. Factories are working with might and main to strengthen their retail selling forces before the early buying starts.

Every effort at co-operation will be made by manufacturers to prevent flooding the market, but at the same time they will demand that their share of business be gathered in by every representative. No dealer will be assigned more than he can do, but each will be given the definite proposition of meeting the actual business there is for him in his field.

### Used Cars Left to Dealers

Factory officials realize that the used car situation has become acute owing to the elimination from the market this year of the usual used car buyer. With a return of better industrial conditions as promised in 1922, this condition is expected to right itself rapidly, and coping with the situation will be left for the most part to the individual dealer.

Factory executives look to the East and the South as the big sales field for 1922, with a good steady business in the Mid-West and on the Pacific Coast. More attention will be paid to the selling of first car owners than at any time in

## INAUGURATE BUS LINE FOR LONG DISTANCES

CHICAGO, Oct. 24—A new idea in long distance transportation of tourists by means of motor buses was put into effect yesterday by the T. & S. Tourist Co. of this city when it started four White 10 passenger buses and a fleet of privately owned touring cars for New Orleans.

The caravan will cover 1135 miles on the journey from the Great Lakes to the Gulf. There will be a one-day stopover at Mammoth Cave and sight seeing tours in the principal cities along the way. Entertainments by Chambers of Commerce and civic organizations will be provided in all the larger places. The caravan is scheduled to reach New Orleans Nov. 2.

the industry, producers realizing that sane progress can only be made by enrolling new owners.

### Oakland on New Schedule

Oakland Motor Car Co. will enter upon a schedule of 100 cars a day in November, after a lull in manufacturing in the last two weeks of October. During this period the factory organization has been reduced to a minimum, but officials declare that this action was taken because of factory conditions rather than a lack of business.

In restarting upon a heavy schedule, officials say that this has been necessitated by increased business in all parts of the country, the East and South leading. All models are included in the orders, with a predominancy toward the enclosed. With the scheduled business November is expected to exceed September, which had been the record month of the year.

Despite conditions in October it was said this month will show a large increase over business in October, 1920.

Packard Motor Car Co. in the two days immediately following its price reduction on the single-six model, reports shipments averaging 200 cars a day. The sales response has been general, officials declare, orders not being limited to any one section of the country. Enclosed cars are meeting with biggest demand. Of 339 cars shipped yesterday, 159 were sedans and 39 coupes.

### KELSEY INFRINGED PATENTS

DETROIT, Oct. 26—Federal District Court here has decided patents of the Universal Wheel Co. have been infringed by the Kelsey Wheel Co. The decision affects royalties on rims manufactured by Kelsey prior to 1917, according to Kelsey officials. An appeal to the Supreme Court will be taken. John Kelsey, president, says the total sum involved is nominal and has been covered by a reserve for some time.

## Says New York Thefts Are Largely Frauds

Loose Insurance Methods Blamed in Survey Made by City Official

NEW YORK, Oct. 25—The startling statement that 80 per cent of the automobiles reported stolen in this city are fictitious or were disposed of for the purpose of collecting insurance on them was made by David Hirshfield, commissioner of accounts, in a report on an investigation into automobile insurance ordered by Mayor Hylan. He declared he had discovered that automobile insurance companies made no effort to learn whether an applicant for a policy actually owned a car or whether his car was of the value stipulated in the policy.

### Companies Are Lax

Hirshfield stated that one of his agents applied for a \$500 policy on an automobile that never existed. A few days later he received the policy. This incident was followed by another of the same character in which a policy for \$700 was issued by another company. A similar plan was tried a third time with a third company with equal success, according to Hirshfield.

The commissioner asserted that although the three policies had been issued more than six weeks no official from any of the insurance companies had called on the policy holders to request an inspection of the cars.

"There was a report the other day," Hirshfield stated, "to the effect that 160 cars were stolen in this city in 12 days. My investigation convinced me that most of these cars were not stolen at all. The owners of many of them, I believe, merely threw them into the river or disposed of them in places outside of the city and then collected insurance on them. Such loose methods on the part of insurance companies are a temptation to the dishonest."

## Johnson Motors Formed Through Consolidation

SOUTH BEND, IND., Oct. 26—Consolidation of the Johnson Motor Wheel Co. of Indiana and the Quick Action Ignition Co., both of this city, as the Johnson Motor Co. of Delaware has been completed. While substantial orders for the old lines are being received, the company is developing a light twin cylinder outboard motor which will fill in between seasons.

Operations are directed by Charles Kratsch as vice-president and general manager. He formerly was manager of the Sumter division of the Splittorf Electrical Co. His chief assistant is P. A. Tanner, former secretary of the Splittorf company, for which he developed a service organization.

Albert Erickson is in charge of experimental and development work but L. J. Johnson remains as head of the engineering department.



## Orders Public Sale of Owen Magnetic

Will Be Sold in Lots If Offering  
as Unit as First Made Is  
Unsuccessful

WILMINGTON, Oct. 24—Receivers for the Owen Magnetic Motor Corp. have been directed by a court order to sell at public auction all the assets of the company at the main offices at Forty Fort, Luzerne County, Pa., at 11 a. m., Nov. 5. The sale will include land, buildings, parts and materials.

The plant consists of a one-story concrete building of saw tooth construction, 600 x 80 ft., and another of the same construction 264 x 80 ft., as well as a frame structure 109 x 46 ft. used as a stockroom. There are several smaller buildings. The machinery and tools are of the latest design and include equipment of all kinds. The inventory consists of large stocks of parts, a considerable portion of which can be used only in the manufacture of the Owen Magnetic car or one of similar design, as well as large quantities of high grade steel.

The property will be offered first as a unit, and if there are no bidders it will be sold in lots.

After the assets are sold, proceeds will be divided among the creditors at the direction of the court and the affairs of the company will be wound up.

## Locomobile Changes Personnel of Branches

BRIDGEPORT, CONN., Oct. 25—Several changes in the personnel of the Locomobile Co. have been made since the return of former executives to their old posts. They have resulted from a decision by the company to merchandise through its own factory branches.

Locomobile branches have been re-established in Los Angeles under the direction of T. D. Swayne and in San Francisco under C. A. Kingsley. C. R. Norton, who has been in charge of both these branches with headquarters in Los Angeles, has been relieved.

Similar changes have been made in the Chicago organization and W. S. Porter has returned to that city from the Boston branch, where he was general manager. He succeeds H. S. Norton.

W. S. Horner has succeeded Oscar Coolican as branch manager in Philadelphia.

## McGraw Is Readjusted with New Directorate

CLEVELAND, Oct. 27—Readjustment of the financial affairs of the McGraw Tire & Rubber Co. has been completed by the reorganization of the board of directors to include representatives of banking interests and merchandise creditors who will co-operate with the management in the conduct of the business.

The plan does not call for any change in the company personnel or new financing.

President John Morgan states that a satisfactory settlement has been made on all merchandise contracts. Indebtedness to banks and merchandise creditors has been reduced \$400,000 since the plan became operative. Discounts are being taken on current purchases and the company has ample cash to provide working capital. The McGraw plant is now operating two 10 hour shifts and it is asserted that orders on hand soon will necessitate an increase in production.

## Census Bureau Issues New General Schedule

WASHINGTON, Oct. 24—Director of the Census William M. Steuart has issued the general schedule for manufactures for the census of 1921 which was prepared in co-operation with the committee created at the July conference in Washington of trade and craft associations with Secretary of Commerce Herbert Hoover and officials of the census bureau.

Because of its simplicity the new schedule differs from past schedules and also varies with regard to the amount of information called for. As outlined the new schedule covers the following items: Names and particulars of establishments as to location and lines of products; persons employed as salaried employees, including managers, clerks, etc., and total salaries paid; wage earners, including piece workers and total wages paid; time and operation and products which will be detailed for the particular industries.

J. Walter Drake of the National Automobile Chamber of Commerce represents the automotive trade in its relations with the Department of Commerce in this activity.

## BRISCOE & STAHL ENLARGES

DETROIT, Oct. 26—The Briscoe & Stahl Co. has increased its capitalization to \$205,100 and will enlarge its consulting engineering business to include representation of foreign companies in the automotive field both as buying and selling agents. The consulting work of the company will also be extended to include other fields than automotive. The officers of the company are Benjamin Briscoe, formerly of Briscoe Motor Co., Jackson, Mich., and Rodalphe Stahl.

## WILLYS SHIPS 86 CAR LOADS

TOLEDO, OHIO, Oct. 24—Eighty-six carloads of Overland and Willys-Knight cars have been shipped from the factory here in a solid train to Los Angeles. The value of the shipment has been placed at \$547,000.

## DRUMPLEMAN LEAVES HUDSON

DETROIT, Oct. 27—W. J. Drumpleman, for three years assistant sales manager for the Hudson Motor Car Co., has been appointed assistant to Eddie Rickenbacker, director of sales, advertising and service of Rickenbacker Motor Co.

## Durant Engine Order Increases Employees

Continental Will Add 2,000 Men  
at Muskegon Through  
\$12,000,000 Contract

DETROIT, Oct. 26—Orders for \$12,000,000 in engines placed by Durant Motors with the Continental Motors Corp. will result in the addition of 2,000 men to the force at the Muskegon plant. Production on the new orders will be started at once, first deliveries being to Long Island City and later to Lansing, Oakland, Cal., and Toronto as those plants get into production. The Lansing factory begins operations in November.

Engines have been going forward to the Long Island City plant for some time on a tentative contract basis. With the Durant business and the general improvement in automobile sales, Continental expects to have the Muskegon plant on 100 per cent operation basis by summer.

The engine is a special type designed by Durant engineers which will be made to specification by Continental. These will be Fours exclusively. The Durant Six will be made by Ansted as stated recently.

## Automobile Shortage Is Seen in Australia

WASHINGTON, Oct. 24—Recovery has been made in automotive exports in several sections of the world, according to Gordon Lee, chief of the automotive division of the Bureau of Foreign and Domestic Commerce. Because of present demands, he states, there will be a shortage of automobiles in the district served by Melbourne, Australia, as an automotive distributing center.

Lee also states that there is a recovery in South Africa where gradually improving conditions are being reflected in car sales both to dealers and users, and where conditions are reported as approaching normal. Comment is also made on the fact that that automotive exports to Mexico of passenger cars for the first eight months of the current year totaled 4,753 as against 1,955 for the corresponding period of last year.

## Hoover Asks Industry for Advisor in Strike

DETROIT, Oct. 27—Secretary of Commerce Hoover has asked the automotive industry to designate a representative to act as his adviser in connection with the mobilization and allocation of motor trucks in the event of a railroad strike. It is understood that Roy D. Chapin, president of the Hudson Motor Car Co., and an officer of the National Automobile Chamber of Commerce, may accept the appointment as a patriotic duty to assist the nation as was done during the war.

## Prices of Hupmobile Return to Old Level

### General Cut Made in May Followed by Partial Reductions in September

DETROIT, Oct. 26—A downward revision has been made in Hupmobile prices by the Hupp Motor Car Corp. A general cut in prices was made last May and in September there was a further reduction in the coupe and sedan. The reductions are as follows:

	Old Price	New Price
2 passenger.....	\$1,485	\$1,250
5 passenger.....	1,485	1,250
Coupe .....	2,200	2,100
Sedan .....	2,250	2,150

With this revision prices are now down to the 1917 level.

### BRITISH FORD DROPS

LONDON, Oct. 4 (By Mail)—For the second time within a few months Ford prices are down, this time from £5 to £65, the average rate being £30. While this step is approved by the public and ultimately by dealers, the latter are affected through its not being the Ford practice to credit dealers with these reductions on unsold stock. The price of the Fordson tractor was recently cut to £205 from £225.

### COLE IS \$65 LOWER

INDIANAPOLIS, Oct. 24—The Cole Motor Car Co. announces that effective Oct. 27 its model No. 870 touring car will sell for \$2,485. This is a reduction of \$65. The prices on all other models have been reduced accordingly.

## Federal Price Cuts Average 22 Per Cent

DETROIT, Oct. 25—Price cuts running as high as \$850 are announced by the Federal Motor Truck Co. The average is about 22 per cent on all models and the reduction is the fourth within the last two years. The prices follow:

	Old Price	New Price
1 ton.....	\$2,500	\$1,800
1½ ton.....	2,775	2,175
2 ton.....	3,025	2,425
3½ ton.....	3,950	3,150
5-6 ton.....	5,350	4,550

Reductions of \$600 and \$800 have been made on the light and heavy duty tractors.

### NEW THOMART PRICES

KENT, OHIO, Oct. 24—The Thomart Motor Co. has reduced its price on the Akron Multi truck, model 20, capacity 1½ tons, from \$1,995 to \$1,695.

### HART-PARR REDUCES

CHARLES CITY, IOWA, Oct. 26—Effective Nov. 1, the Hart-Parr Co. will make a substantial reduction in the price of both models of its tractors. The price

of the Hart-Parr "30," which for the past year has retailed at \$1,595 f.o.b. factory, is now listed at \$1,295, cash, f.o.b. factory. The Hart-Parr "20," which was reduced June 1 from \$1,195 to \$995 cash, is now listed at \$945 cash, f.o.b. factory. These prices are the lowest at which these Hart-Parr tractors have ever been sold.

## 6-Cylinder Packard Makes \$625 Reduction

DETROIT, Oct. 24—The Packard Motor Car Co. announces a reduction of \$625 in the prices of all models of its six-cylinder car, effective to-day. The prices follow:

	Old Price	New Price
2 passenger touring...	\$2,975	\$2,350
5 passenger touring...	2,975	2,350
Coupe .....	3,750	3,125
Sedan .....	3,975	3,350

When the single six was brought out a year ago the price was \$3,640. This was reduced to \$2,975 on Nov. 1, 1920. The new price therefore represents a reduction of \$1,290 in less than a year. The price of the sedan was reduced on July 5 last from \$4,250 to \$3,975.

No change has been made in the price of the twin six models.

### DIAMOND T CUTS

CHICAGO, Oct. 25—Price reductions announced by the Diamond T Motor Car Co. on all its models are as follows:

	Old Price	New Price
1 ton.....	\$2,500	\$1,975
1½ ton, model F S.....	2,960	2,525
1½ ton, model T.....	2,650	2,250
2 ton.....	3,285	2,650
3½ ton.....	4,675	3,750
5 ton, model E L.....	5,400	4,325
5 ton, model S.....	5,650	4,500

### STERLING REDUCES

MILWAUKEE, Oct. 25—The Sterling Motor Truck Co. announces the following price reductions:

	Old Price	New Price
1½ ton.....	\$3,200	\$2,885
2 ton.....	3,500	3,085
2½ ton.....	3,650	3,290
3½ ton.....	4,600	4,325
5 ton, model 5W.....	5,500	4,950
5 ton, model 5C.....	6,000	5,500
7½ ton.....	6,500	6,000

### REDUCE HAL-FUR TRUCKS

CLEVELAND, Oct. 24—The Hal-Fur Motor Truck Co. announces the following downward revision in its prices:

	Old Price	New Price
1½ ton.....	\$2,350	\$2,200
2½ ton.....	3,250	3,000
3½ ton.....	4,250	4,000

### ATLAS PRICE DOWN

YORK, PA., Oct. 24—The Atlas Truck Corp. announces a reduction in its 1-ton model from \$1,550 to \$1,185.

### G. W. W. TRUCK REDUCED

HENDERSON, IOWA, Oct. 26—The Wilson Truck Mfg. Co. has reduced the price of the G. W. W. truck, 1½-tons, from \$2,100 to \$1,950.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

During the past week the local money market has shown signs of marked ease. The week's range for call money was 4 per cent to 5½ per cent in comparison with a range of 5 per cent to 6 per cent for the previous week. Renewal rates ranged from 4 per cent to 5½ per cent with 4½ per cent ruling, and accommodations were arranged in the "outside" market at as low as 3½ per cent.

There was also an easier undertone in time money, 60 and 90 day paper being quoted at 5½ per cent to 5½ per cent, as against a uniform rate of 5½ per cent in the previous week. The longer maturities up to six months were quoted at 5½ flat as against a range of 5½ per cent to 5½ per cent in the previous week. The market in general continued quiet with few, if any, important transactions recorded. Prime commercial rates remained unchanged at 5½ per cent to 5½ per cent.

The Federal Reserve Bank statement as of Oct. 19 showed that both the Federal Reserve System and the New York institution have strengthened their positions materially, each showing large gains in gold reserves and contractions in bill holdings. The Federal Reserve System showed a total reserve ratio of 70.3 per cent as compared with 68.5 per cent the week before. Total gold reserves stood at \$2,772,721,000, an increase of \$43,799,000 over the figure for the previous week, and the high point for the year, the low having been \$2,080,262,000 on Jan. 7.

Federal Reserve notes in circulation decreased \$35,449,000, the actual amount in circulation as of Oct. 19 being \$2,440,862,000, the low point for the year. Total bills on hand showed a decrease of \$79,723,000 from the previous week, while bills discounted secured by United States obligations amounted on Oct. 19 to \$459,671,000, the low point for the year. Total earning assets at \$1,577,900,000 showed a decrease of \$102,303,000, a record low for the year, and a decrease of 53 per cent below the total reported about a year ago.

The total gold reserves of the New York Federal Reserve Bank increased \$74,735,181 to \$1,033,149,181. Total earning assets decreased \$89,000,000, and the total of bill holdings declined to \$272,619,000, a contraction of \$71,347,000.

### ARGENTINE OUTLOOK BRIGHTENS

BUENOS AIRES, ARGENTINA, Sept. 28 (By Mail)—The American Chamber of Commerce here feels that a great improvement has taken place in general business conditions during the last two months. In discussing the present situation, M. T. Meadows, manager of the Chamber, said: "Frankly, I feel that the corner has now been turned and at last we are in a position to expect a slow but steady return to satisfactory business conditions."

## MEN OF THE INDUSTRY

George Drake Smith has been appointed general sales manager for trucks by the Steinmetz Electric Motor Car Corp. of Baltimore. To accept this position Smith has resigned as vice-president, director and general sales manager of the Winther Motor Truck Co., Kenosha, Wis. For several years he was with the General Vehicle Co., which manufactured electric trucks, and later was with the Edison Storage Battery Co. at Orange, N. J., as manager of its electric vehicle department. He has an acquaintance which extends from coast to coast. It is expected that the Steinmetz truck, after two or three years of development, will be in production about Dec. 1. It is said to be lighter than any similar truck on the market and to have unusually high speed, as well as simple design.

Richard H. Magoon has joined the sales department of the Leach Biltwell Motor Car Co. of Los Angeles as assistant to Charles Hagenios, sales manager. T. A. Heindol, for a number of years assistant manager and purchasing agent of the Miller Engine & Foundry Works of Los Angeles, has joined the Leach organization in the capacity of assistant purchasing agent. The Miller plant and organization was recently taken over by the Leach company. Forrest P. Richardson, a director of the company and purchasing agent, recently was named assistant general manager of the company, but will continue to head the purchasing department.

Ralph D. Mock, vice-president and former comptroller of the Hydraulic Steel Co., Cleveland, has become vice-president associated with sales. Mock, prior to his nine years of service as finance executive for the company, had a broad experience in sales work. Harry W. Kranz, former superintendent of the Cleveland Welding & Mfg. Co. of the Hydraulic company, has been appointed manager of the welding plant. Charles S. Holden, formerly in the sales department of the Cleveland company, has been named sales manager of the welding plant.

Brock Mathewson, one of the veterans of the automotive industry, has taken up his duties as vice-president and sales manager of the Reynolds Spring Co. at Jackson, Mich. He has abandoned his original plan of building up a manufacturers' representative service in Detroit. Mathewson came into the automotive industry back in the bicycle days. During the war he was connected with the automotive division of the Savage Arms Co. in an executive capacity.

F. E. Badger, for the past ten months a member of the sales-engineering staff of the Detroit Steel Products Co., manufacturer of Detroit Springs, has been appointed sales manager of the chassis spring division of that company. For eight years Badger was plant manager of the Standard Parts spring plant, at Flint. Following the war he was general manager of the spring plant at Canton, Ohio.

E. E. McCleish, formerly director of publicity and publications for the Willys-Overland Co., who recently built up an advertising and sales copy business of his own, has combined his business with that of the United States Advertising Corp., of which Ward Canaday is president. McCleish came to Toledo from the Curtiss Aeroplane and Motor Corp. in Buffalo.

Richard B. Mann has been appointed general manager of the Packard Motor Car Co. of Missouri, with headquarters at St. Louis. Alvan Macauley is president, suc-

ceeding P. S. Russel who resigned; and Dr. H. H. Hills is vice president. Mann has been connected with the Packard in Newark and New York.

E. W. Hlatt has joined the organization of the A. B. B. Sheet Metal Works, Milwaukee, in the capacity of factory manager. Hlatt was formerly with the Maxwell-Briscoe Co., serving as superintendent in the body and steel metal department. More recently he was connected with the Dort Motor Car Co. in a similar capacity.

N. T. Norton, Jr., who recently resigned as chief engineer of the Motor Transport Division of the Quartermaster Corps, U. S. A., is now designing a new line of truck axles to be marketed by a company that is now being formed. Norton's offices are in the Monadnock Building, Chicago.

Ben G. Campbell has been named southwest sales manager of the Anderson Motor Co. of Rockhill, S. C. For eight years Campbell was connected with General Motors. Since 1919 he has been analyzing trade territories west of the Mississippi for a number of concerns in the industry.

Hans Renold of Birmingham, England, who is one of the large chain manufacturers in that country, is now calling on bicycle, motorcycle and truck builders in the United States. It is understood he contemplates starting an American factory to make roller chains.

Harry Tipper, business manager of AUTOMOTIVE INDUSTRIES, will address the students of the engineering classes of Purdue University at Lafayette, Ind., the afternoon of Oct. 31. He will speak to the Lafayette Rotary Club earlier in the afternoon.

M. B. Loomis, advertising manager of the Sparks-Withington Co., Jackson, has returned from a three weeks' trip covering eastern jobbers. He finds business good, with jobbers clearing their stocks and buyers buying.

LeRoy Kramer has been elected president of the Rochester Motors Corp., Rochester, N. Y., and C. J. Symington, president of the T. H. Symington Co., has been named chairman of the board of the Rochester corporation.

Allan C. Chambers, formerly sales manager of the Russel Motor Axle Co., Detroit, has been appointed sales manager of the Hartford Automotive Parts Co., Hartford, Conn., with headquarters, for the present, in Detroit.

William N. Freeman, for some time secretary of the Flisk Rubber Co., Chicopee Falls, Mass., has been made assistant sales manager of the company's Federal division with headquarters in Cudahy, Ohio.

C. A. Thurston, export manager for Earl Motors, Inc., has sailed for England, where he will visit the Olympia Show. He also plans a trip to various countries of the Continent.

O. W. Williams, for the last four years in charge of material and costs with the United States Motor Truck Co., has been appointed to the position of purchasing agent with the company.

Wilson S. Porter has returned to Chicago as manager of the Locomobile Co.'s branch, succeeding H. S. Norton. Porter recently was Boston branch manager.

C. J. Morrison, for the past two and a half years executive assistant to the president of the Atlas Tack Corp., has resigned.

John T. Turcott has been appointed general superintendent of Stevens-Duryea, Inc., Chicopee Falls, Mass.

W. H. Herbert has been appointed sales manager of the Denby Motor Truck Co., Detroit.

## FINANCIAL NOTES

Durant Motor Car Co. of Canada, Ltd., soon will offer to the public \$1,250,000 of \$10 par value stock. W. C. Durant and his associates already have taken \$750,000 of the \$2,000,000 authorized stock. The shares will be convertible in Aug., 1924, into capital stock of the parent company on a basis of \$30 for the United States stock and par for the Canadian. It is expected that production in the Toronto factory will commence by the end of the year and that the first cars will be marketed in the Dominion about March 1.

Russel Motor Car Co., Toronto, profits for the year ended July 31 were \$158,124 compared with \$339,453 the previous year. Business was uneven among the various subsidiaries and on the whole the company experienced the uncertainties of present conditions. The balance sheet shows a reduction in bankers' advances from \$500,000 to \$120,000. Accounts and bills payable have also been reduced, standing now at \$89,947 against \$416,025 a year ago.

Stewart-Warner Speedometer Corp., net profits for the quarter ended Sept. 30, before provision for Federal taxes, were \$552,894, against \$801,278 a year ago, and for nine months totaled \$755,967, against \$2,271,426 in the corresponding period of 1920. Inventories now have all been marked down to market. The corporation declared the regular quarterly dividend of 50 cents a share, payable Nov. 15 to stock of record Oct. 31.

Stanwood Rubber Co.'s plant at Elizabeth, N. J., has been sold in Chancery Court at Newark for \$360,000, thus terminating the receivership. The reorganization plan calls for issues of \$175,000 8% pfd. stock, \$151,000 8% 2nd pfd., 500,000 shares no-par common. Creditors' \$600,000 claims will be paid 50% in non-interest bearing debentures and 50% in common stock of \$2 par.

Durant Motor Co. of Indiana, with a capital of \$3,000,000, has been incorporated at Indianapolis. It is to manufacture the Durant Six in Muncie, in the Sheridan plant, purchased from the General Motors Corp. three months ago. The company will have 800 men employed by Jan. 1 and ultimately expects 4,000 on its payroll.

Sinclair Motors Corp., Springfield, Mass., will pay a dividend of 3 per cent to all creditors through an order by Referee in Bankruptcy Charles W. Bosworth. This is the first dividend declared since the company was adjudicated a bankrupt.

Ford Motor Co. of Canada will pay a cash dividend of 15 per cent on Nov. 15. The disbursement will total \$1,050,000 and will be the second cash dividend of that amount paid by the company in the last six months.

Briscoe Motors Corp. of Jackson, Mich., has filed an amendment to its charter, which was issued in Delaware, changing its name to Earl Motors, Inc., and increasing its capital from \$21,500,000 to \$41,500,000.

Lee Rubber & Tire Co. has declared its regular quarterly 50 cent dividend, payable Dec. 1 to stock of record Nov. 15.

## PORTUGAL HONORS CASE

RACINE, WIS., Oct. 24—Information has been received by the J. I. Case Plow Works Co. that the Portuguese Farmers' Association has bestowed its gold medal and first honor prize for the best agricultural machinery group at the Lisbon exhibition upon Monteiro Gomes Limitada, handling the distribution of Case implements in Portugal and Spain.

## INDUSTRIAL NOTES

New England Tire & Rubber Co., South Holyoke, will start production this week in its new plant, and expects to attain an output of 300 pneumatic and cord tires a day within two months and have 200 employees at work. Capacity of the factory is 1,000 tires and 1,500 tubes daily. Up to the present the company has had its product made under contract by a Brooklyn concern, and has produced \$1,000,000 worth of tires in the last year. A factory branch has been opened in Washington, in addition to the branches previously established in New York, Newark and Boston.

United Automobile Body Co. will begin production early in November in the plant at Danville, Ill., formerly occupied by the Moore Motor Vehicle Co. The general offices will be opened with the transfer to that city of R. M. Hawn, chief engineer; E. W. Windsor, sales production manager; and William R. House, sales manager. It is the intention of the company to divert all production to the main plants at Danville and Springboro, this policy decreasing the overhead and supervisory expense. Later, if conditions warrant, the other branches may be given more activity.

Perfection Tire & Rubber Co. stockholders attended a mass meeting at Peoria, Ill., to allow President Preston E. Roberts and General Manager James Rosenthal an opportunity to give first hand information concerning the activities of the company. It was stated that \$2,000,000 of Peoria money, invested in the company, was secure, and that the plant at Fort Madison, Iowa, is operating upon full time. Following the statements confidence was expressed in the policy and methods of the executives.

Mirrorlike Mfg. Co., is moving to its new plant, Queensboro Boulevard and Buckley street, Long Island City, which has been especially constructed for the manufacture of the company's products. The plant will permit of a ten-fold increase in business. Additional land will allow further facilities as needed. The company has added a special department for the manufacture of greases, soaps, motor oils, etc.

The Morand Cushion Wheel Co. has bought a 20-acre site in Chicago upon which it expects, as soon as local building conditions permit, to build a new factory to cost in the neighborhood of \$1,000,000. The new plant will be modern and complete in every respect, embracing rubber making, woodworking and foundry departments. Business with this company is reported good and the future very bright.

Glenwood Motor Co. has made arrangements to locate its main plant at Findlay, Ohio. It is a Cleveland concern and was organized three years ago. Work on a new factory building on a 25-acre site in North Findlay will start soon. The Greater Findlay Corp., capitalized at \$100,000, has been formed by local capital to provide housing accommodations for the men employed by the motors corporation.

El Dorado Motor Device Co., which has been incorporated with \$100,000 capital stock, will maintain a factory at El Dorado, Ark., for manufacturing anti-kicking devices, and attachments for motor and gasoline engines. J. G. Pratt is the president; Ed. Combs, vice-president; O. A. Heath, secretary, and G. M. LeCroy, treasurer.

Commercial Car Co., of Detroit, has purchased the plant and properties at Knoxville, Tenn., of the Southern Valve & Gear Co., for

conversion into a truck manufacturing plant. The deal was consummated by F. E. Fitzgerald of Detroit general sales manager for the company.

Columbia Tire & Supply Co., Lafayette, Ind., has changed its name to the Columbia Automobile Supply Co. and has removed to larger and more complete quarters. The changes do not involve any alteration in the personnel of stockholders or management.

New Britain Machine Co., New Britain, Conn., will shortly begin the production of motor cycles, according to a statement by company officials. Nothing definite is said as to the type that will be manufactured. Business in the tractor department is quiet.

Porter Rubber Co.'s plant at Salem, Ohio, has been sold to L. W. Hicks, Pittsburgh, for \$73,000, the sale including the entire equipment. The plant was sold to satisfy a judgment for \$85,000 entered in the Common Pleas court of that city in favor of Hicks.

Kelly-Springfield Motor Truck Co. force at Springfield, Ohio, is being gradually increased with skilled men. Orders are coming in from dealers and the outlook is growing more encouraging. James L. Geddes, chairman of the board of directors, states.

S. F. Bowser & Co., manufacturer of oil tanks and pumps, which has been operating on part time during the summer will resume on full time Nov. 1. A wage cut amounting to from 10 to 15 per cent will be put into force.

Robert H. Hassler Co., Inc., of Indianapolis is planning the construction of a two-story brick and steel building which will be used as an addition to its plant for the manufacture of automobile shock absorbers for larger cars.

Easthampton Cork Co., Easthampton, Mass., has opened a shop for the manufacture of cork sheets for automobile gaskets, starting with contracts that assure the operation of the plant for a year and a half.

Fisk Rubber Co., Chicopee Falls, Mass., has made a reduction of 100 in the night shift of its tube department for the reason that tube production has been running ahead of tire work.

Lightning Chain Auto Wheel Corp. has purchased property in Rochester and will begin manufacturing the Roblin demountable rim retaining device by Nov. 1.

Paragon Motor Co., Cumberland, Md., has awarded a general contract for the superstructure of its new plant. Foundations for the plant have already been laid.

The Buda Co. announces that the office of the eastern sales manager has been removed from 33 West 42nd street, New York to 30 Church street.

Non-Explosive Appliance Co., Fort Wayne, has created a sales and advertising department, which will be headed by W. H. Minchin.

## JOHN BOYD DUNLOP DIES

NEW YORK, Oct. 25.—A dispatch from Dublin says that John Boyd Dunlop, known as the inventor of the pneumatic tire, died there yesterday at the age of 81 years. His invention, first introduced in 1888, made bicycling popular and was a forerunner of passenger automobilism. Dunlop, who was a veterinary surgeon, was led to develop the pneumatic tire through his devotion to his invalid mother who was compelled to use a wheeled chair. He hit upon the use of inflated rubber tubes around the wheels of his mother's chair to make it more comfortable for her.

## METAL MARKETS

In view of the U. S. Steel Corporation's loudly proclaimed \$7 cut in its rail price, those steel producers who are constantly essaying price advances would at first blush seem to be hopelessly out of step. The facts in the case, however, serve to modify this impression. The cut in steel rail prices was one of those brilliant moves which the master hand that guides the Corporation's destinies can always be relied upon to make when opportunity offers to improve the Corporation's relations with the public.

Choosing the psychological moment when labor's balking at unavoidable wage cuts threatened to dislocate the nation's business, Judge Gary resorted to this step so as to impress upon the American people the readiness of the country's largest corporation to "take its medicine" with a smile. Market-wise, however, the announcement was as devoid of significance as it was important from a public affairs point of view.

Rails have always been considered apart from other steel products and for upward of a dozen years before the war has sold at the quasi-stabilized price of \$28. When the downward revision of steel prices began last December, it was commonly understood that the reason no change was announced in the price of rails from the \$47 quotation, which had been inherited from the Industrial Board's price schedule, was that the railroads were in no position then to place orders for rails and that readjustment of the rail price could well wait until the carriers were once more financially on their feet.

The \$47 rail price was generally recognized as an unmeaning nominal figure, so that its lowering by \$7 must not be interpreted as signifying even in the remotest manner a tendency on the part of the leading producing interest to put into effect other price reductions. In fact, there is at the present time in evidence a total absence of the determined leadership that characterized the steel market in its heyday. The largest producing interests appear to have their misgivings as to the possibility of maintaining any sort of price policy and seem perfectly willing to have some of the more aggressive "independents" try their luck with advances as a means of bringing out orders at the old prices and "sugaring" averages.

Pig Iron.—Buying and prices are tapering off, many consumers holding off in the expectation of early cuts in freight rates. Steel mills are again sellers of surplus production of pig.

Steel.—Non-integrated sheet mills have been buying modest tonnages of sheet bars for which they have had to pay higher prices. The sheet market is irregular. Passenger car builders are buying odd tonnages of cold-drawn and strip steel to piece out what stocks they have on hand so as to maintain their production schedules over the year's remaining two months. Bolts and nuts are moving in a routine way only.

Aluminum.—As intimated in previous market reports, German interests have advanced their prices on sheets to the extent of 2 cents per lb., regular selling agents now quoting 30¢ @ 31¢ base on flats and coils and 33¢ on circles. No ingots are offered by the Germans. The Aluminum Co. of America has reduced its price for sheets about 4¢ a pound, bringing flat sheets 18 gauge and heavier to 35¢ and coil to 30¢.

Copper.—The flurry in the copper market has apparently spent itself and bargains are once more offered and spurned.

# Calendar

## SHOWS

- Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.
- Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.
- January—Chicago, Automobile Salon, Hotel Drake.
- Jan. 7-13—New York, National Automobile Show, Madison Central Palace, Auspices of N.A.C.C.
- Jan. 28-Feb. 4—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.
- Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.
- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

- Nov. 4-12—Car Show. Nov. 28-Dec. 3—Motorcycle Show.
- Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.
- Nov. 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.
- Nov. 12-27—Buenos Aires, Annual Motor Show, La Pabellon de las Sosas, Automovil Club Argentino.
- Nov. 26-Dec. 3—Shanghai, China, Automobile Show.
- March, 1922—Santiago, Chili, Annual Automobile Show.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

- Oct. 28—New York, American Iron and Steel Institute.
- Nov. 1-4—New York, Industrial Relations Association of America.
- Nov. 3—Indianapolis, Meeting of Friction Drive Engineering Society.
- Nov. 14-19—Chicago, Annual Meeting and Business Exhibit of Automotive Equipment Association.
- Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.
- Nov. 21-23—Atlanta, Third Annual Convention of American Farm Bureau Federation.

Dec. 6-8—Chicago, Second Annual Meeting of American Petroleum Institute.

Dec. 10—New York, American Institute of Mining and Metallurgical Engineers.

Dec. 20—Philadelphia, American Society of Mechanical Engineers.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 17-20, 1922—Chicago, American Road Builders Association.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

Detroit, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.

New York, Jan. 11-14, 1922—Annual Meeting.

Chicago, Feb. 1

Minneapolis, Feb. 8—Tractor Meeting.

## Ready to Produce New Maxwell Series

### Frame Is Stronger and Redesigned —4-Cylinder Engine Little Changed

DETROIT, Oct. 24—The Maxwell Motor Car Co. is about to enter production on its new series. The changes are principally in the larger and more substantial bodies and a stronger and completely redesigned frame. The same four-cylinder engine is employed with only minor changes. In exterior appearance, the car has been substantially improved. The radiator is higher and larger.

The bodies have been refined from one end to the other and mechanical improvements include the adoption of Alemite chassis lubrication, easier clutch and brake action, longer springs, new mounting of starting motor on the bell housing and new type of tire carrier.

Probably the outstanding feature of the new series is the superior trim and fitting of the new bodies. Real leather upholstery is used in the open cars and special broadcloth in the closed. The seat and back cushion springs are greatly improved. All doors are provided with pockets and the side curtains open with the doors on solid rods and supports. There is a plate glass window in the rear curtain of the open cars and the equipment now includes the drum type of headlamp, motor-driven horn, better set of tools and better body hardware. The new 31 x 4 cord tire is employed which helps to make the car lower. Prices have not yet been fixed.

## Wills-Sainte Claire Line Gets Sedan Addition

MARYSVILLE, MICH., Oct. 24—C. H. Wills & Co. is now making deliveries on

a sedan which is the latest addition to the Wills-Sainte Claire cars. There are two auxiliary seats that fold flush with the back seat so that the sedan accommodates seven. The model has four doors. A glass partition between the front and rear compartments can be furnished if desired.

The interior woodwork is of walnut and the hardware of special design with satin silver finish. The windows are crank operated and are provided with silk shades. The fittings include a vanity case containing mirror, memorandum books and silver topped bottles, double ash tray and match holder, corner reading lights, dome lights and robe rail.

## Cooler Weather Helps Philadelphia Business

PHILADELPHIA, Oct. 24—According to Charles C. Bulkeley, executive secretary of the Philadelphia Automobile Trade Association, the automobile industry has improved notably since the cooler weather set in. He expresses the opinion that sales will steadily increase and that the automobile show, to be held in January, will begin one of the best years the industry has experienced.

Automobile dealers here generally state that business has improved decidedly since Oct. 1. Increases over September sales are estimated at from 10 to 40 per cent, by a majority of the large distributors here.

## CITIZENS AID WAYNE TIRE

ORRVILLE, OHIO, Oct. 24—Citizens of Orrville have pledged \$50,000 towards a fund of \$75,000 asked by the Wayne Tire & Rubber Co. to make necessary improvements in its plant. The company is said to have liquidated its indebtedness and proposes to increase the capacity of its factory to keep up with demand which is now running in excess of production, although the plant is being operated 24 hours a day.

## Britain Increases Imports in Tires

### Receipts and Shipments of Automobiles Show Falling Off During September

LONDON, Oct. 16 (By Mail)—September is a comparatively slack month for the British automobile trade, and this year it has well maintained the tradition. Compared with August there was a drop of \$427,790 in imports of vehicles and chassis and of \$47,950 in parts, but a most remarkable increase of \$941,315 in tires.

British automobile exports showed a drop of \$38,420 for vehicles and chassis; of \$20,865 for parts, and an increase of \$192,460 for tires, compared with August's values. Thus, although the trade has been quiet, it showed a good increase under both heads, imports and exports being respectively \$465,575 on imports and \$122,175 for British exports.

Considering the imports, the number of cars was 565 (1264), trucks 48 (804), and chassis 310 (1231), and motorcycles and tricar 1557 (105)—the figures in brackets being the corresponding month's figures in 1920. The value of imported vehicle parts and components was \$661,815 (\$6,982,715) and of motorcycle and tricar parts \$75,215 (\$82,245), and tires (value) \$2,924,565 (\$2,909,730).

British export of cars numbered 29 to British India (103), 6 to New Zealand (58), and 80 to other countries (304)—total 115 (465); trucks to British India 4 (32), to New Zealand none (7), and to other countries 27 (72)—total 31 (111); chassis to British South Africa none (1), to other countries 47 (452)—total 47 (453); motorcycles and tricars (destination not scheduled) 425 (2815). Parts valued \$457,345 (\$883,835), motorcycle and tricar parts \$94,205 (\$317,649), and tires \$826,735 (\$257,430).



# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

Vol. XLV  
Number 18

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, NOVEMBER 3, 1921

Thirty-five cents a copy  
Three dollars a year

# **Champion** Dependable Spark Plugs



Establishing the Southern speed record, a Lark model Lexington Standard car equipped with Champion Dependable Spark Plugs, recently defeated the Dixie Flyer from Atlanta, Ga., to Jacksonville, Fla.—a distance of 374.6 miles.

**Champion Spark Plug Co.**  
Toledo, Ohio

## Another Victory

### Pike's Peak Hill Climb

On Labor Day, Sept. 5th, a Lexington Special No. 7 was piloted to victory in the event for cars of 183 to 300 cubic inches displacement.

"We attribute no small share of our success to the fact that your Champion Spark Plugs were used, and are very pleased indeed to most heartily endorse same, as our exhaustive dynamometer tests have proven, to our satisfaction, that there is no better plug on the market."

**Lexington Motor Co.**

Champion two piece construction with 3450 insulators and patented gaskets again prove their dependability.



# WALTHAM SPEEDOMETERS AND AUTOMOBILE CLOCKS



*The only  
Air-Friction  
Speedometer  
in the world*

**A**IR-FRICTION? Just what is "Air-Friction"? It is a new principle for use in speedometers developed and perfected by the Waltham Watch Company.

*Explained briefly* — The dial indicator is hung on a shaft in a jewel-bearing and driven by the friction of air generated within the instrument according to the speed of the car. The dial indicates every speed with absolute and instantaneous accuracy.

The safety and satisfaction of the car owner are often seriously affected by the irregularity and unreliability of speed-recording.

A Waltham Speedometer avoids all of these disadvantages. It records every variety of speed instantly and accurately. It is not affected by climatic or temperature changes.

More and more of the leading automobile manufacturers in this country are specifying Waltham Speedometers as standard equipment for their cars. Among such cars are the Cunningham, Daniels, Fergus, Lafayette, Leach-Biltwell, Lincoln, Packard, Pierce-Arrow, Renault, Rolls-Royce, Stevens-Duryea, Wills-Sainte Claire, and others.

Why not make it a special point to visit the agencies representing any of these cars which are equipped with this truly wonderful Speedometer. A demonstration will prove to you the instant accuracy of the Waltham Speedometer.

Waltham Watch Company, Waltham, Mass.

*Service Stations in all leading cities*

# WALTHAM

*The Speedometer of Instantaneous Accuracy*

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, NOVEMBER 3, 1921

No. 18

## The Meaning of Service to the Automotive Industry

Service means taking care of the owner; keeping him satisfied. Service and parts will ultimately be handled by whatever agency can do the job most economically. Service industry growing.

By Clyde Jennings\*

**I**T seems rather difficult to get all persons concerned to realize exactly what service means to the automotive industry. Two definitions of service that are very far from the correct one appear to be accepted in many quarters. These definitions, stripped of camouflaging words, are:

1. An opportunity to make money on the person who bought the vehicle.
2. Another name under which the vehicle owner forces you to give him something.

The fact is, that the person who holds either of these definitions to be even approximately correct, has not caught even a part of the spirit that must be put into the service department of the industry.

A proper definition of service does not appear to have been written. Some of the components of service are definitely known. A few of them are:

1. Service must be to the industry what the shoe repairer is to the shoe manufacturer. As long as repairs are more profitable to the owner than new vehicles, they must be supplied at a reasonable price and in workmanlike manner.
2. Service must become a perfectly legitimate business and after the 90-day guarantee period service work must be self-supporting.

3. Service business must necessarily grow with the number of cars in use, which will be at a greater rate than the increase in number and financial importance of the vehicle manufacturing industry. This follows as certainly as the percentage of sales lessens in proportion to the number of cars in use.

4. Efforts to improve service must be to the improvement of all service, for no one manufacturer can ever hope to have enough service stations to care for his vehicles, and they must, if the owner uses his car to the best advantage, at times be at the mercy of the independent service man. It is best that this service man know as much as possible about this car, so that he can send the owner on his way in a fairly cheerful frame of mind.

Recently there has been a rather energetic discussion as to who should distribute the parts to be used for service—the maker of these parts or the assembler of the truck. There are various reasons advanced pro and con—but in the main, the chief reason that would appear to be involved has been little mentioned. From a merchandising standpoint there is but one question to be asked—

Who can distribute these parts to the best satisfaction of the vehicle owner?

\*Managing Editor, *Motor Age*.

There are some interesting angles to this discussion. Most men of to-day can remember—if they can't, their fathers can—when the stove repair question was a serious one in the household. Stove manufacturers prided themselves on making a stove that was unlike any other stove in every material part. The lids, bolts and what-not of one stove could not be used for another. If you burned out the lid of a stove, and the local merchant had quit handling that particular stove, the family purse had to be drawn upon for the extraordinary expense of sending to the factory for another. Transportation was as poor in those days as in 1920 and perhaps the stove was out of commission for days.

### Parts Standardization

Then some one had a bright idea. It was this—the province and business of the stove manufacturer was chiefly to manufacture and sell to the people stoves that would cook the food, keep them warm for the longest time possible. Also to best perform these functions, it was quite necessary that repairs be made as quickly and efficiently as possible. So a good many parts of the stove were standardized. Bolts, plates and other parts became of similar size. The parts business, which had been a source of trouble, was forgotten and “stove parts dealers” appeared in many cities. These men advertise that they have parts for any stove, and usually they have.

The result is that the gossip among people as to the makes of stoves and service has ceased and failures are no longer the cause of people advising their neighbors not to buy a certain stove because they cannot get repair parts. The stove business is more prosperous than ever before.

Just think what would be the result if Mr. Douglas would announce that no pair of Douglas shoes could be repaired unless the leather was bought from his parts department?

Service is, and must be, considered an important function in selling. How many repeat sales will the car manufacturer make if he treats his owners only as a source of profit for parts and repairs? A study of the history of the farm implement business in this regard would be illuminative. The companies that have survived are those which tried to supply service. It has been largely a case of the survival of the fittest.

It is well worth considering how long the manufacturing industry can control the service industry, or whether the manufacturing industry has not created a Frankenstein industry in service. The number of service shops in the United States is estimated all the way from 21,000 to 45,000, according to the definition given of the term “service shop.” For the purposes of this article, however, suppose there are 33,000 such shops. The most conservative estimate of the average number of employees in these shops is five. From five the figure ranges upward to seven and even more. Let us put the figure at a compromise and say that there are six in each shop. That seems like rather a small average, when you stop to consider the number of very large shops. With an average of six men to each service shop, we have a total of almost 200,000 men engaged in the servicing of automotive vehicles. As we understand these figures, this does not include the men in the private shops, which would include the shops conducted by a

number of large fleet owners, so the number must run even higher. It is to be regretted that there is not at hand a definite statement of the number of men engaged in this particular work.

The Census Bureau in its report on manufacturing activities in 1919 stated that there were 15,486 automobile repair shops and that the value of the products was \$2,387,833,000. These figures compare with 3273 shops in 1914, with a product value of \$503,230,000. A request to the bureau for a definition of an automobile repair shop brought this reply:

“The census of manufactures includes automobile shops only when they use power-driven machinery and partake of the nature of a machine shop. An establishment storing, washing and making minor repairs on a car is not included. The shop must be so equipped as to be capable of manufacturing new parts if necessary or it does not come within the scope of the manufacturing census, which is confined to factories. If a concern stores and sells cars and also maintains a repair department of sufficient importance to come within the census, a segregated report is required and only the statistics for the repair department are included.”

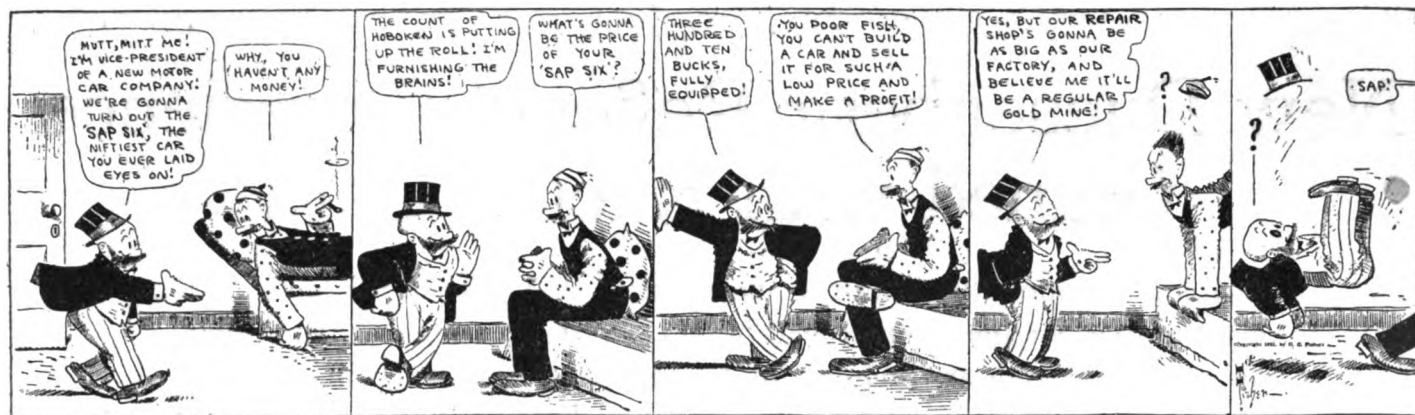
The National Automobile Chamber of Commerce has estimated that there are 300,000 men engaged in the manufacture of automotive vehicles. This estimate, as we take it, is one made when the industry was running at a rather high rate, so according to the present figures the industries are about on par.

The future is vastly different. According to the registration figures, the service man was called upon to handle an increase of 30 vehicles dur-

ing the year of 1920. There will be another increase in 1921. It is the belief of all those engaged in the automotive industry that the number of vehicles registered from year to year will grow constantly for a good many years. In fact, the only possible limit put upon registration is the introduction of a better vehicle than the automotive vehicle. It is also a fact that the employment in the manufacturing end of the industry will not be as heavy in 1921 as it was in 1920, so it will probably fall below the 300,000 point. During the year it would appear that the service industry is somewhat at least as large as to number of men employed as the manufacturing industry.

A rather unusual question enters here. It seems that vehicle manufacturers want to draw a line through the service business, and the place of this line is not at all well defined. The manufacturers have permitted in recent years certain of the parts makers to establish chains of service shops. Battery and bearing makers are notable examples of the direct service. Vehicle manufacturers, as a rule, have been quite glad to get rid of this part of the service and have advised the owners of their vehicles to patronize the special service plants for these repairs. A man needs be quite expert in definitions to tell on which side of the line service should come.

Present service troubles are largely the result of human weaknesses and a lack of fundamental organization. Often where the organization has been started with good intentions, the human weaknesses have swamped the organization. It is natural for the ma-



This cartoon was drawn as a joke—Shall the industry make it a fact?

(Reprinted from The World)

majority of men to attempt the short road to wealth. Many men think this road is along the route of getting all you can and getting it quick. So many service people have not been able to see that a well conducted, day in and day out business is better than one where you charge all that the traffic will bear and do just as little as possible.

This theory has been the mainstay of the maker of unreliable parts. He is able to turn out a part that will serve for the time being. Neither he nor the service man to whom he sells is much concerned as to how long it will last. Perhaps the service man may have a good enough idea of business to want to do a good job, but a smooth salesman from the unreliable parts maker has convinced him that this cheaper part will do the work just as well. Perhaps the sample was good, but the question is as to the run of the factory. A service man may be honest and still not have the facilities for judging the parts shipped to him. If he has not these facilities he must deal only with reliable firms. Some independent parts manufacturers have established themselves as makers of reliable parts and frequently they supply parts of slightly different design or material from the original that supply a choice in making changes or repairs in the vehicles. It can be said, in truth, that some car makers have at times been entirely unable to supply parts for their own cars and these cars have been kept on the road by independent parts makers and no objection has been found to the parts.

An engine maker not long ago received a complaint from a service man (who enjoys an excellent reputation) that a lot of bearings he had bought were not giving proper performance. The engine maker had the bearings shipped to his factory. The factory men saw at once that these bearings had never been in their stock and it later developed that they had been shipped to the service man by the truck assembler. The assembler bought them (apparently in good faith) thinking they were entirely satisfactory.

A long time is required to build up an industry of the size of the automotive service industry to the point where it will function with reasonable certainty. A new industry always attracts adventurers and promoters. There was a time when the service industry was made up almost wholly of this type of men. Fortunately this day has gone. The personnel of the service shops to-day is of a much higher grade than a few years ago. There are many men in the service business who see in it an opportunity for a just and fair business. They look to the future confidently and their hope is to establish a business that can be handed from father to son. The same can be said of manufacturers of independent parts.

It is on such men as these that the future of the service business depends. There is, unfortunately for quick

action, much in this new industry that depends upon co-operation with factories and with engineering. Where these men are directly connected with factories they get co-operation, but in the main they do not get co-operation unless they are "authorized," and in most cases that means connected with the selling of the vehicle.

One of the great needs of the service industry to-day is the elimination of secrecy and mystery. In some cases this secrecy and mystery has been due to manufacturing imperfections. As time goes on, there will be less of this in the factories, and the service man will get a better understanding of the product on which he is working.

The importance of service is coming to be recognized to an increasing extent in design work. The car and truck designer in many plants consults intimately with the factory service manager in working out new models. In certain instances, factory service managers have worked out methods of keeping in touch with owners and service stations, so that future designs can have immediate benefit from service experience.

The service factor is entering into design, also, because it is recognized that a larger percentage of buyers every year are replacement buyers. The man who owns a car for the first time may not consider seriously the service phase of car ownership, but the man who is buying his second or third car will look into that phase carefully. The manufacturer is responsible for keeping the owner satisfied. When the service organization functions efficiently, service becomes a real help to future sales.

The manufacturer is often in a position to investigate methods and equipment in a way not possible for the individual service station. Some manufacturers, for example, have gone so far as to test out and investigate service station machinery and to recommend certain types of tools for use in their service stations.

Standardization is making for great progress in the service industry. It will go even further. To-day qualities of drop forgings and similar articles that go into practically all cars are carried by supply houses, such as hardware supply stores.

More and more men each year are gaining an understanding of the new transportation vehicle, for it is new despite the seeming public familiarity with it. The changes in manufacture have been rapid. No one man could keep all of these changes in mind. The mechanic who is a competent worker on one make of car is better equipped to work on all cars than was the man with so restricted an experience a few years ago.

Service is not hopeless, by any means. It needs more time, more patience and more conscientious effort and less selfishness.



# New Duesenberg Reflects Experience Gained with Racing Cars

Striking engineering features characterize the latest product. An eight-in-line engine, four-wheel brakes, overhead camshaft, and tubular connecting rods are included in design. High pressure oiling is employed. Drive shaft and front axle are tubular. Semi-elliptic springs used.

By J. Edward Schipper

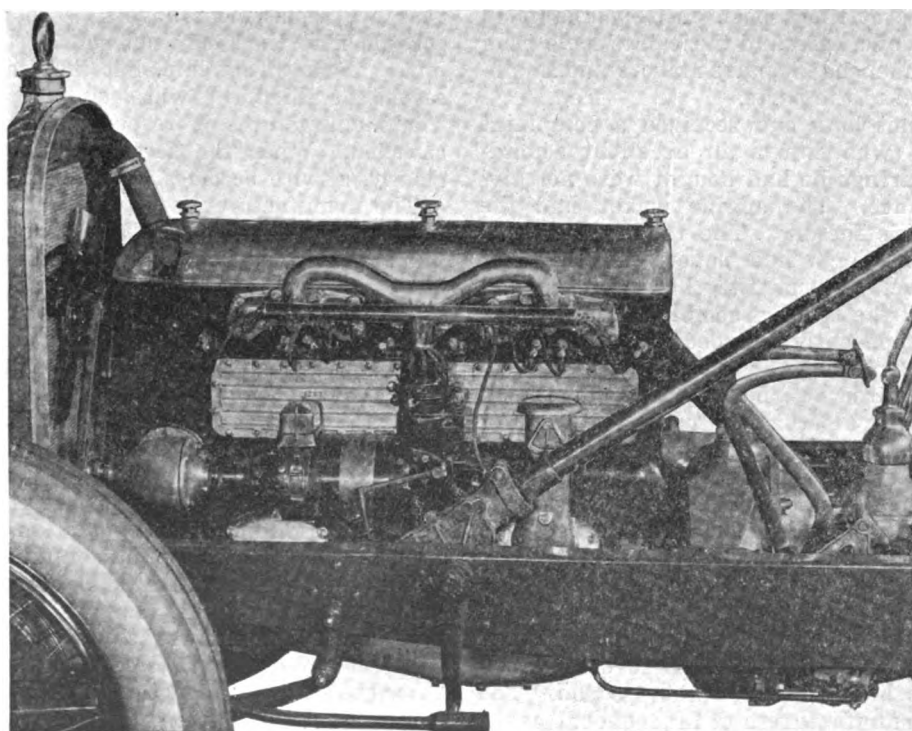
**I**NCORPORATING such features as an eight-in-line engine, hydraulically operated four-wheel brakes, overhead camshaft, tubular connecting rods and a weight of only 3200 lb. in spite of a wheelbase length of 134 in., the new Duesenberg presents some very interesting engineering features. This car is one of the most direct interpretations of racing experience which has ever been offered the public. Its engine is identical in many respects with the 183 cu. in. engine of the Duesenberg racer which recently won the French Grand Prix race. With a bore of  $2\frac{7}{8}$  in. and a stroke of 5 in., it has a displacement of 260 cu. in. and develops from 90 to 100 hp. An output of 1 hp. per 2.6 cu. in. of piston displacement with a compression of 80 lb. per square inch gage gives a good idea of the characteristics of the engine. The upper half of the crankcase and the cylinder block containing the eight barrels are cast as a unit. The cylinder head is removable and incorporates the overhead camshaft and rocker arms. The valve and spring mechanism are inclosed by a detachable cover plate and the lower half of the crankcase and the oil pan are a unit aluminum casting, removable while the engine is in the frame.

The pistons are magnalite, although cast iron will be supplied if desired. They are of flat-top design,  $3\frac{1}{8}$  in. in length, with three  $\frac{1}{8}$ -in. rings. The tubular connecting rods are  $9\frac{3}{4}$  in. in length, machined all over and equipped with annular cooling ribs at the lower end. The piston pin is held in the upper end of the connecting rod by a lock screw, the

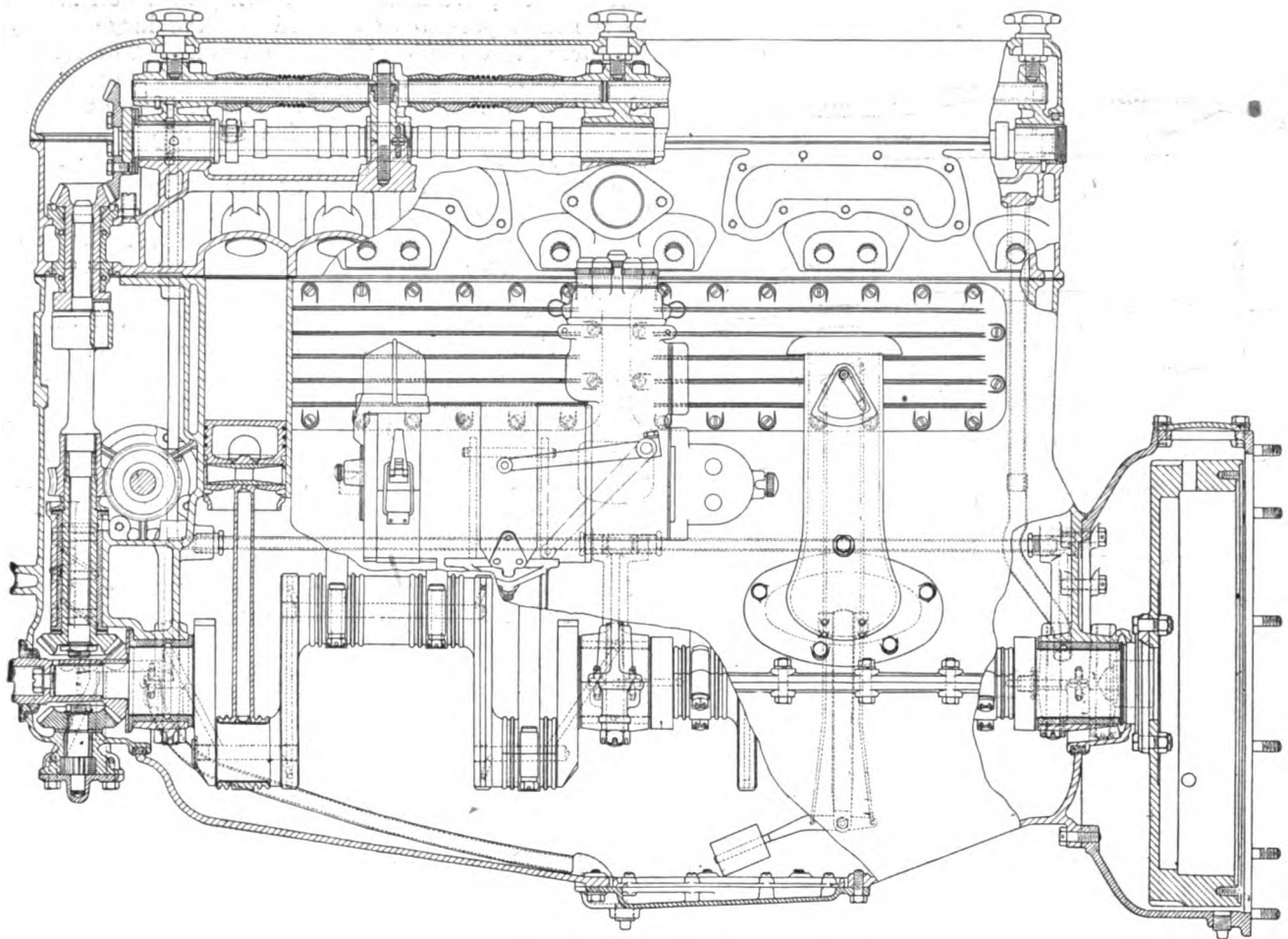
bearing being held in the piston.

Three main bearings support the one-piece crankshaft. The crankshaft diameter is  $2\frac{3}{8}$  in. at all main bearings, and the bearing lengths are  $2\frac{1}{2}$ ,  $2\frac{1}{2}$  and 3 in., front, center and rear. The lower connecting rod bearings are all 2 in. by  $1\frac{7}{8}$  in. It has been found that the use of a smaller diameter at the end of the throw than at the main bearing is a material factor in assisting balance of the crankshaft. Spiral bevel gears and a vertical shaft are used for driving the one-piece, hollow camshaft which is mounted on five bearings. There are two valves per cylinder, each actuated by a forged alloy steel rocker arm, and two concentric springs. The valves open downward directly into the spherical combustion chamber, which is polished to prevent carbon collection. The vertical drive shaft is made in two pieces so that the head can be removed and replaced without changing the valve timing, the driving lug on the vertical shaft being offset so that the head can be replaced in only one way.

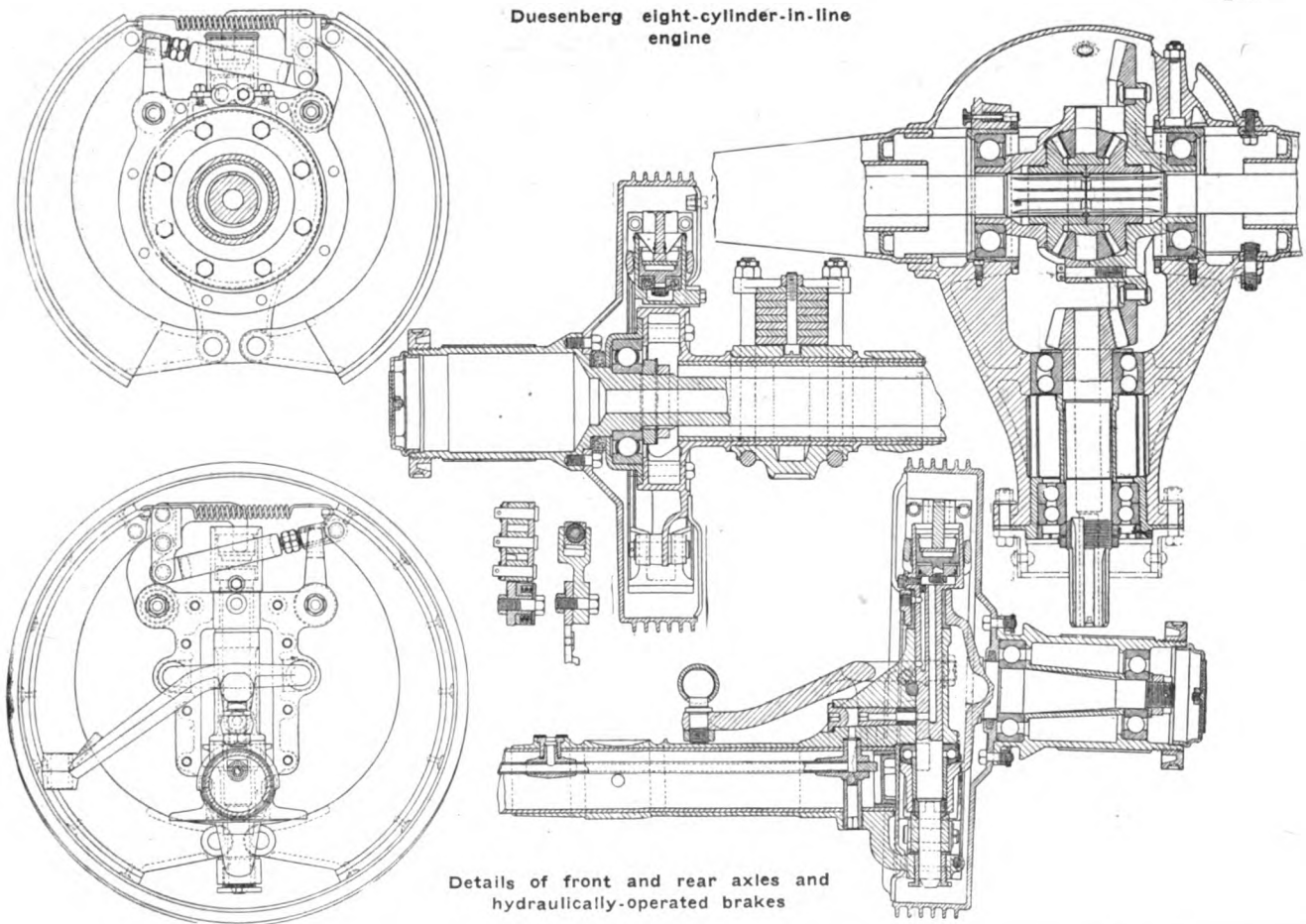
High-pressure oiling is employed, the oil pump being driven directly from the crankshaft. This is a gear pump capable of delivering a maximum pressure of 250 lb. per square inch. The oil is led through the drilled crankshaft to all of the main bearings under pressure and also to the hollow camshaft and hollow rocker arm shaft. The pressure feed, therefore, is directly to the camshaft bearings and also to the rockershaft bearings, from which the oil feeds to the valve driving contact points. The mechanism underneath the



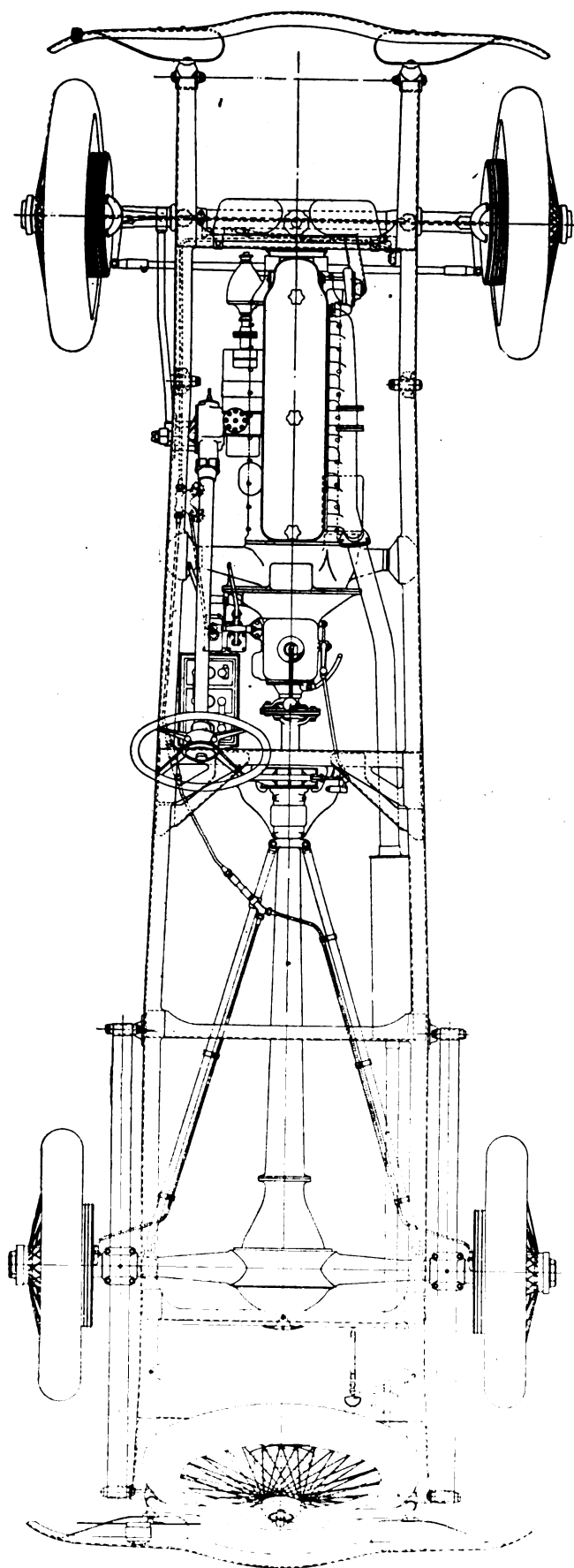
Forward part of Duesenberg eight-in-line chassis



Duesenberg eight-cylinder-in-line engine



Details of front and rear axles and hydraulically-operated brakes



Plan view of chassis.

valve cover plate is really operating in an oil mist, due to the high pressure employed and the large supply of oil forced into the head by the oil pump. The oil return passes over the camshaft driving gears, keeping these supplied with a bath of oil. The breather pipe is on the left rear end of the engine and has a hinged cap. It acts as the oil filling passage, and upon the front of the breather pipe is the oil level indicator gage.

The water pump is a centrifugal impeller type driven by a cross-shaft which receives its drive from the vertical camshaft drive shaft. The cross-shaft terminates at the water pump on the right and on the left delivers the drive through a set of bevel gears to the auxiliary shaft. The fan pulley is in front of the bevel gearcase and behind it the drive is transmitted through a flexible coupling to the generator and distributor, the latter being mounted on the rear end of the generator. An interesting feature in connection with the cooling system is that the water enters the block at the lower right in front and leaves it at a point just above the point of entry. The circulation is controlled by internal baffles.

Gasoline is fed from a 20-gal. tank located at the rear of the chassis to a Stewart vacuum tank mounted on the dash. The 1½-in. Stromberg carbureter is located on the right side of the engine, the gas flow being vertically upward to a hot-spot contact with the exhaust manifold, which is located on this side of the block. From this point the gas is taken through a straight passage between the two center cylinders across the block to the left side of the engine, where it enters the aluminum intake manifold, which is of ramshorn design. This distribution system for the gases is clearly shown in the left-side view of the engine herewith.

#### Suspension System

The flywheel is a steel forging, machined all over, with the starting gears cut in the periphery. The clutch is housed in the flywheel, which latter is inclosed in a bell housing which carries the side arms for two points of the engine suspension system. The third point of suspension is at the front end, where there is a patented trunnion, giving a three-point flexible mounting. The clutch is a single dry plate type and the gearset a three-speed unit, providing ratios in the gearbox of 4.016 to 1 on reverse, 3.167 to 1 on first, and 1.1654 to 1 on second. The rear axle ratio is 4.6 to 1. The drive to the rear axle is through a double flexible joint and a tubular drive shaft, which is inclosed in a torque tube. The thrust of propulsion is also taken on this torque tube, which carries a yoke at its forward end hinged to the center cross-member of the frame. In addition, there are two radius rods which run from the extremities of the rear axle to the front end of the torque tube. The rear axle housing is of molybdenum steel, in one piece, and reinforced. The pinion shaft is mounted on two double-row annular ball bearings. The differential consists of a forged steel case inclosing the spider arm, four bevel gears and two side gears splined for the axle shaft. The hollow axle shaft is of molybdenum steel, the shaft and hub being in one piece. The wheels are Rudge-Whitworth design and are mounted on annular ball bearings.

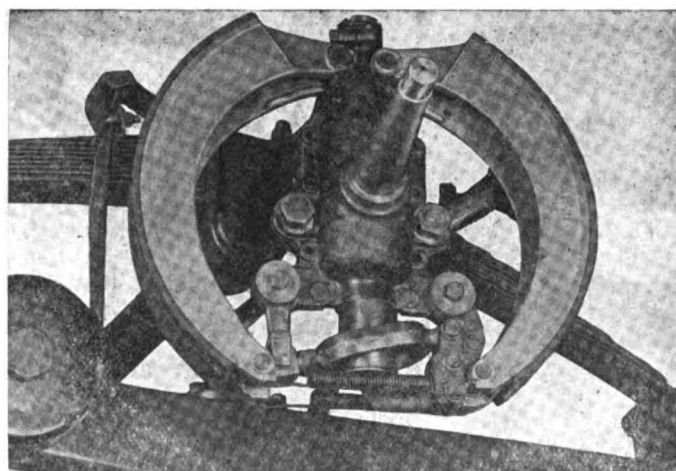
The front axle is also tubular and the axle ends and steering knuckles are of molybdenum steel. The front axle, which is shown in section herewith, is claimed to be more than 25 per cent lighter than the usual type of front axle and at the same time more than 25 per cent stronger. The axle is so designed as to incorporate the passages for the brake operating fluid.

The brake drums are forgings 16 in. in diameter and are fitted to all four wheels. In order to obtain a perfect

braking surface the drums are ground. Circumferential fins are machined on the outer edges to provide strength with lightness and radiating surface. The four brakes are operated by hydraulic pressure. A master cylinder is connected to the brake pedal and the liquid is forced through the lines running to the four wheels by a piston in the master cylinder. A small cylinder in each of the four brakes has a piston which is forced upward by the liquid entering the cylinder. The piston at the brakes operates a toggle arm which, in turn, expands the two brake shoes in each brake. All four of these brakes are operated simultaneously by the service brake pedal. An interesting feature of the brakes is the fact that, owing to the floating arrangement of the piston and toggle, the brakes are self-centering and, consequently, self-equalizing. Once the brakes are applied, they provide equal pressure against each drum. Water is used as the brake-operating fluid in summer time and an anti-freeze solution in winter.

#### Four-Wheel Brakes

In a demonstration given the writer in one of these cars on the roads around Indianapolis, the braking power of four-wheel brakes was thoroughly demonstrated. On roads which corresponded in surface to the ordinary gravel roads, the car was stopped in approximately its own length from a speed of 30 m.p.h. There was no skidding tendency whatever, and one of the points demonstrated was the ability of the driver to maintain a high average speed on a winding road, because of the quickness with which it is possible to slow down on coming into a curve. An interesting point brought out was the fact that during the time all four brakes are applied the car loses much of its responsiveness to the steering wheel because of the tendency to go into a front-wheel skid with the front-wheel brakes applied. A driver soon becomes educated, however, to releasing the brakes on



Hydraulically-operated front wheel brake

manipulating the steering wheel. The hand brake operates on a drum at the forward end of the propeller shaft.

The car is mounted on semi-elliptic springs, the front being  $2\frac{1}{4}$  in. wide by 40 in. long and the rear  $2\frac{1}{2}$  in. wide by 59 in. long. The springs are equipped with Watson "stabilators." Chrome nickel steel is the frame material, the channels being  $6\frac{7}{16}$  in. in depth by  $2\frac{1}{8}$  in. in width. There are five cross-members. The car has a clearance of  $11\frac{1}{2}$  in. under the front axle and 10 in. beneath the engine. The rear axle clearance is  $10\frac{1}{2}$  in. The bodies are of aluminum with steel fenders, and the equipment includes bumpers and a spare wheel carried at the rear of the car with a three-point mounting. The tires are 33 by 5 in. all-around. Chassis lubrication is by the Alemite system. The price of the car will be between \$6,000 and \$7,000.

## A Constant Compression Engine Cycle

ONE of the chief disadvantages of the conventional throttling four-stroke cycle engine is the fact that its economy falls off rapidly as it is throttled for part-load operation. At light loads the fuel consumption per b. hp. is sometimes three or four times that at full load, yet the average passenger car engine operates most of the time at less than one-third load. Various attempts have been made from time to time to overcome this disadvantage by the use of some constant compression type; that is, an engine in which the compression pressure remains constant regardless of the load. In such an engine it is customary to localize, at least to some extent, preferably in the vicinity of the spark plug, that portion of the charge containing the fuel and to admit through another valve sufficient air to fill the remainder of the cylinder, thus preventing the formation of a mixture too lean to burn.

Patents covering a "cycle" or method of operation of this character have been granted to W. L. Dempsey. In this case a third valve of the automatic type is applied to an engine of conventional four-stroke type. The third valve is located near the base of the cylinder, so that the port to which it is connected is uncovered by the piston at the end of the suction and power strokes. The valve does not open, however, unless the pressure in the cylinder is below atmospheric. It admits only pure air, which, it is assumed, does not mix intimately with the remainder of the charge, but forms a strata next to the piston. The quantity of air taken in is dependent

in part upon the extent to which the engine is throttled, the greater the depression in the cylinder the greater the quantity of air drawn through the automatic valve and the greater the proportion of pure air in the total charge. The carbureter is set to give an over-rich mixture, which is taken in through the main inlet valve, but the air taken in later is sufficient to dilute the total mixture so that it is of correct proportions for complete combustion, or on the lean side.

Considerable increase in economy and other advantages are said to result from the application of small automatic valves to existing automobile engines, but authoritative data in this regard has not been furnished, nor, so far as we are informed, has an engine designed with particular reference to operation on the so-called "Dempsey cycle" been constructed to date.

AN improvement in spring drives for electric starters has been patented to S. W. Rushmore. It consists in making the helical spring used with such drives of tapering section, so that it may be comparatively light or flexible when first beginning to wind up and become sufficiently stiff before the engine is broken loose to prevent abutting of the starter pinion against its stop. It is claimed that when the spring is made of uniform thickness throughout, in order to get sufficient flexibility, the spring is sometimes made so light that it cannot withstand the shock of abutment and breaks.

# Novel Type of Suspension Interests British Car Manufacturers

It is said to have merit of low cost as well as to improve riding qualities. Two-leaf spring attached at two points to chassis frame by rubber blocks runs full length of car and is bolted fast to both front and rear axles.

By M. W. Bourdon

**A** PROMISING new spring suspension system has recently been introduced in England by the Cowey Engineering Co. About a score of British motor car manufacturers are now either testing it on cars of their own make adapted to utilize it or are going carefully into its possibilities. Eight experimental cars have already been fitted up with the system, and one prominent maker has definitely decided to adopt it for his cars which will be produced when his present batch is completed—say about the middle of next year.

The system is simplicity itself and no lengthy explanation is needed to supplement the accompanying drawings. There are two inverted half-elliptic springs, one at each side of the chassis and running without break from the front to the back axles. Each unit consists of two leaves only with, in the case of cars of 15-hp. and over, a wood strip between them over approximately half their length. Each spring is connected to the chassis by two brackets, but is not held rigidly in them, rubber blocks being interposed above and below. Between the brackets a clip encircles each spring, and serves as a means of adjusting the frictional effect between the leaves and the wood strip. The latter is provided to increase the frictional effect, on medium sized and large cars, along that portion of each spring where it has been found desirable to do so, or that is between the frame brackets. Both leaves of each spring are rigidly attached to the rear axle, but one only, the lower, is secured to the front axle, the upper leaf being either cut off 2 or 3 in. short or allowed, if of full length, freedom to move longitudinally over the other.

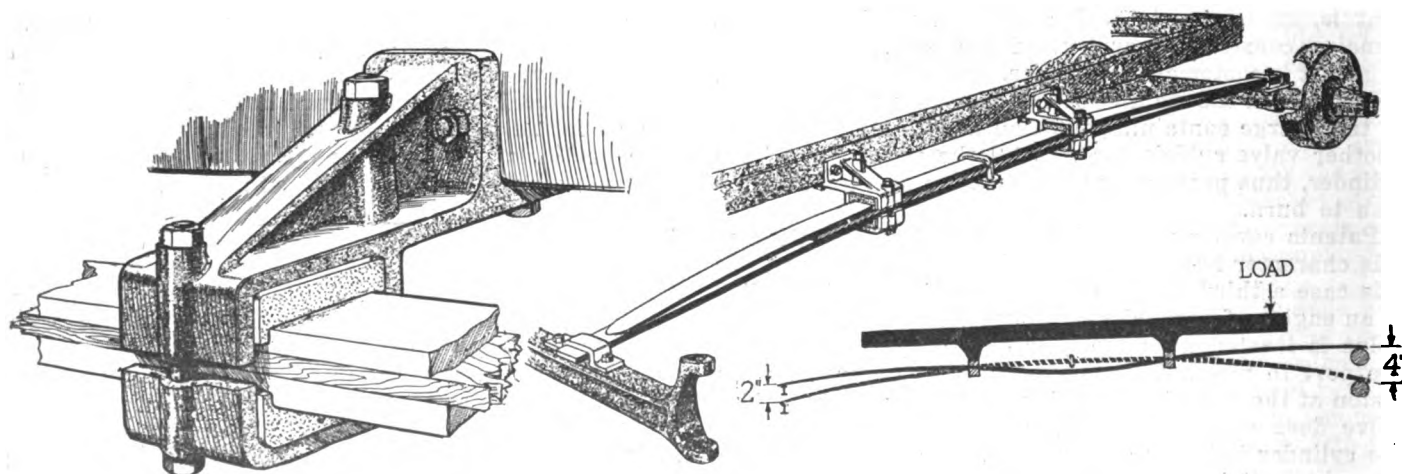
There are several advantages derivable from this system of suspension. In the first place, it has the low cost

of quarter elliptics front and back without the drawback of imposing localized stresses of considerable magnitude on the side members of the frame where the brackets occur. Then, it has no details requiring lubrication, which obviously means a lower cost as compared with systems requiring greasers, oilers and oil-less bushes, and is a feature which cannot fail to appeal to users by simplifying maintenance.

But where the chief advantage of the system lies is in its behavior on the road. Dimensioned and arranged to suit the individual car, it can have an unusual degree of flexibility without giving rise to a tendency for the car to roll or bounce. It can have a very low period and in some cases this is as low as 55 per min. without drawback in other directions. Further, fore and aft plunging is almost entirely eliminated on roads which encourage that action with ordinary suspensions.

The merit last referred to is due to the "sympathetic" deflection of the opposite end of each spring from that which receives the initial shock. When, for instance, the back axle is lifted relative to the frame by a bump on the road surface the front end of the spring is also affected, a fact which is demonstrated by loading up the back of the car, which has the effect of deflecting the front end to an extent equalling approximately 50 per cent of the deflection at the rear. The accompanying diagram illustrates this point and shows the peculiar curvature which the spring assumes as a result of initial deflection occurring at one end.

The purpose of allowing the springs to float within rubber blocks in the brackets and of securing the top leaf rigidly at the rear end only is, of course, to allow the



The Cowey spring suspension, showing method of attachment to chassis frame and axles. The diagram shows the curvature assumed (heavy line) when one end is deflected 4 in. The other end of the spring is then said to have a "sympathetic" deflection of 2 in.



top blade to move over the other when the spring is deflected at either end. It will be realized that this latter necessitates that the top leaf shall be free to move longitudinally to a limited extent within the brackets and that the lower one shall be able to "roll" within them when its curvature is varied, for the brackets are rigidly bolted to the frame and have no trunnion bearing. Both these movements are permitted by the rubber blocks, but the latter do not vary their position relative to either the blades or the brackets; there is merely a movement within the body of the rubber. When an experimental suspension has been dismantled after being in use for several months, the rubbers have been found firmly adhering to the metal above and below them and have shown no signs

of wear. For this reason the rear ends of the springs are able to take both torque and drive, for the thrust from the latter does not, as might be expected, cause the springs to be pushed bodily forward in their brackets.

The absence of rolling with this suspension is ascribed to the thickness of the individual leaves of the springs, which it is maintained exert greater resistance to torsional stresses such as exist when rolling tends to occur. As an indication of the dimensions of the blades, it may be said that on a heavy car, one weighing say 4000 lb. unladen, each blade is  $2\frac{1}{2}$  in. wide and 1 in. thick.

The Cowey system is being tried out by makers of British cars of almost all sizes, from a 10-hp. two-seated runabout to a seven-passenger car of 30-hp.

## A New Gear for Motor Truck Axles

A RECENT development is a double helical bevel gear for motor truck axles. The outstanding feature of this gearing is the double strength which is claimed to allow the use of very small bevel pinions so that it can give sufficient reduction and still have sufficient strength and road clearance for motor trucks, where it has heretofore been impossible to use bevel gears, and manufacturers have had to resort to the worm or double reduction gearing.

The inventors claim that two 8-tooth, 5-pitch bevel pinions are strong enough for use with a 4-by-5, four-cylinder motor and standard transmission, giving an  $8\frac{1}{2}$ -to-1 reduction with 13.6-in. ring gears, thus allowing 10½-in. road clearance with a 2-ton truck fitted with 36-in. drive wheels. An axle for a 1-ton truck with a  $3\frac{3}{4}$ -to-1 reduction utilizes 10¼-in. ring gears with an 8-tooth, 5½-pitch pinion.

Another advantage claimed by Penrod and Wissel of Cincinnati, the designers, is a complete herringbone balance of all gear thrusts caused by the helical angle of all gears and also complete balance of the separation thrusts on the ring gears, allowing the use of cheaper bearings, a lighter case with at least as high efficiency as where only one set of helical bevels are used.

The two ring gears and bevel pinions are interchangeable and the two spur gears are equal but of opposite inclination of the teeth. For trucks it is cheaper to make two helical bevel ring gears than one of the same strength, as the two and the elimination of gear thrusts

allow the use of much cheaper bearings and case. It is claimed that the loss of power and extra wear from going through one more gear than the single-bevel axle is more than compensated for by the elimination of gear thrusts and the consequent lessened strain on case bearings.

Regarding adjustment of this axle, the inventors state that it is entirely unnecessary after it is correctly assembled, as it will remain in adjustment, due to the balance of all gear thrusts. The ring gears may be ground to the correct thickness after they are heat-treated and hardened.

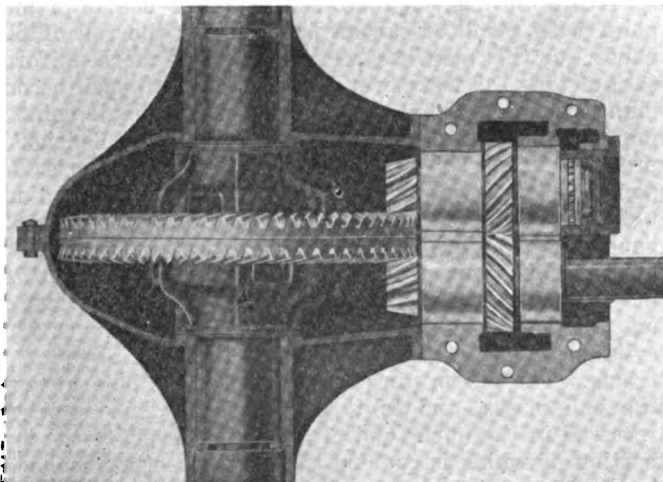
## Depreciation and Its Relation to Cost

A N interesting paper on "Depreciation—Its Relation to Costs and Financial Statements," was read recently by C. A. Porter, comptroller of the Hardinge Company, at a meeting of the New York section of the Industrial Cost Association.

There are four main factors, Mr. Porter said, to be taken into consideration in making up depreciation schedules—length of life, cost of repairs, obsolescence and inefficiency. A perpetual inventory of the physical assets of any plant was recommended. This record, commonly called a plant register, should contain an individual sheet for each building, each machine and each major piece of equipment. Small tools should be listed on one sheet for each department.

This plant register should show, among other things, the date a machine was installed, location, description, builder, original cost, cost of installation, total cost, anticipated life, rate of depreciation, depreciation to date and the disposition, if any.

While Mr. Porter's paper was interesting and practical from many standpoints, the question of obsolescence, which is most important to the automobile manufacturer, was not thoroughly gone into. A discussion of the subject, following the paper, brought no tangible solution to this perplexing problem. Several members of the association pointed out that too great an allowance for obsolescence could not be made in writing off depreciation because the Government would not permit it in income tax returns. Others contended, however, that if a body of manufacturers agreed that a certain tool or machine was likely to become obsolete, or superseded by a newer and better machine within a few years, the Government officials were tolerably lenient in this respect and would allow the factor of obsolescence to appear in the depreciation items.



Installation of Penrod double spiral bevel gear for rear axle reduction

# A New British Traction Dynamometer

A description of a recording instrument designed especially for use in tractor trials, registers drawbar pull, time, and distance covered. It requires little attention from observer over several hours' operation.

**A** NEW draw-bar dynamometer outfit designed by G. W. Watson, engineer to the organizers of the British Tractor Trials, was demonstrated in practical use at the recent trials near Shrewsbury, England. Eight instruments were in constant use for several days, every competing tractor having one interposed in its coupling to the plow for six consecutive hours.

The complete testing outfit consists of three units:

- (1) The draw-bar dynamometer unit, which is intended to be coupled in series between the tractor and plow, etc.
- (2) A small case carried on the tractor containing a dry-battery and clock mechanism provided with electric contacts, and
- (3) A depth measuring attachment, which is intended to be secured to the frame of the plow, cultivator or other implement.

It is claimed that neither the main unit nor any detail of the outfit is a laboratory instrument, but that the whole outfit is a commercial testing apparatus of robust construction, and calculated to stand the severe conditions of service in the field or on the road in the hands of semi-skilled attendants. Previous units of this kind which have been supplied by the National Physical Laboratory, Teddington, England, for use at British tractor trials have, on the other hand, required careful handling and

skilled attendants and necessitated the latter being constantly at hand. Nor have they been composite units, the recording apparatus being carried by one of the men in charge walking alongside the plow coupling.

The Watson dynamometer unit can be coupled up to the tractor and time clock, loaded with a roll of paper, and left to its own resources during six hours' continuous plowing at an average speed of  $2\frac{1}{2}$  m.p.h., the limitation of time being merely concerned with the length of the roll of paper carried.

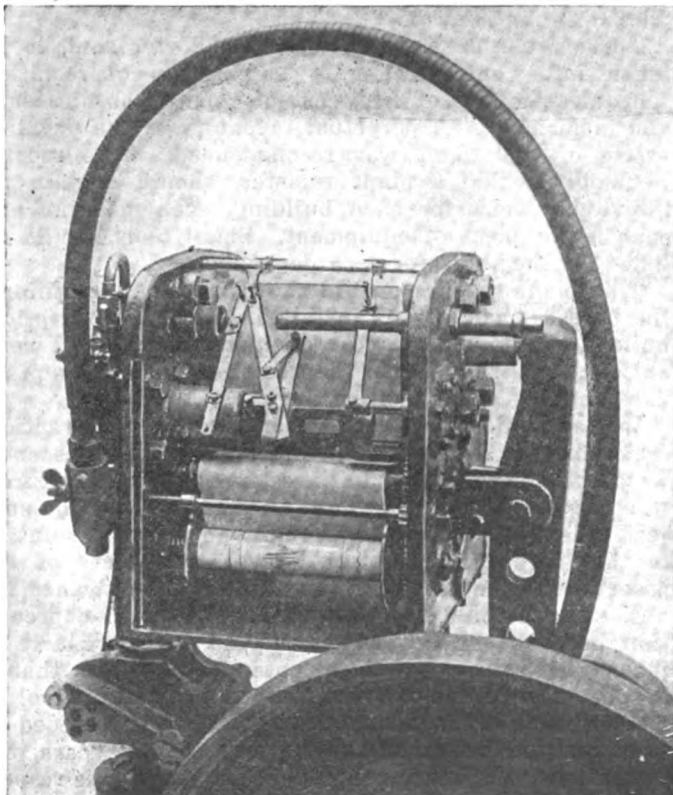
The main unit is mounted on a tubular T-shaped frame and runs on two cast iron wheels, one, of considerably larger diameter than the other, serves to rotate the paper rolls by means of bevel gearing and a flexible shaft.

The base and end plates of the recording instrument are carried by a pivot post attached to the single member of the tubular frame in such a manner as to allow the axle to swing sideways or vertically and to accommodate itself to inequalities of ground surface. Part of the weight is supported by a pair of leaf springs acting as shock absorbers and keeping the wheels in contact with the ground, while the pivot post end is connected to the tractor draw-bar by means of a semi-rigid coupling so that approximately half of the weight is actually carried on the draw-bar, but as the whole outfit weighs only 60 lbs., this is not a serious matter. The rear end of the draw-bar unit can be connected by chains, etc., to the implement which is being hauled.

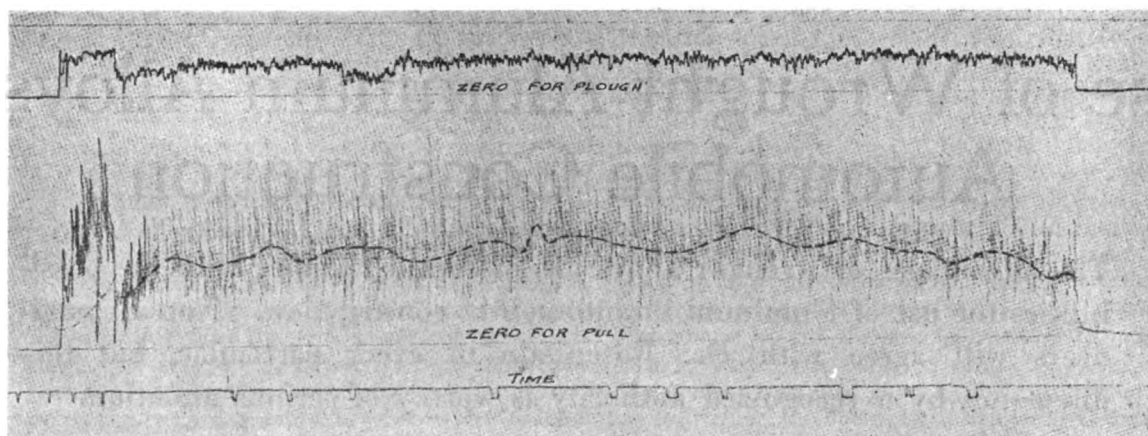
Applying to the paper roll are three stylus points, the central one indicating the draw-bar pull, another the elapsed time by diversions from the straight line at intervals of half a minute, and the third the plowing depth. The time stylus is controlled by the time clock already referred to, while the depth recorder is actuated by the movement relative to the plow frame of a small castor wheel running on the unplowed land and carried by means of a bracket and hinged fork attached to the plow frame.

Of the various methods by which the stylus can be made to record, it has been decided to make use of a metal point with a roll of carbon paper under the roll of plain paper, for this plan has been found to be more uniformly satisfactory for tests over long periods; a pencil becomes blunt, an inking pen may dry up and a metal point for marking on metallic paper has also proved deficient in practical use. The draw-bar unit therefore carries four paper rollers, two of these being for unused and used plain paper and the other two for unused and used carbon paper.

The main unit frame is built up of two stout end plates and a base plate, supporting between them the main hydraulic cylinder and piston, the end flanges of the cylinder being securely bolted to the end plate of the frame. The piston pin projects through a hole in one of the end plates, and to it applies a hardened steel ball recessed in the upper end of a rocking lever, to the lower portion of which is coupled the chain or other connection to the plow. But in order to ensure that no distortion of the dynamometer frame shall occur in use, this rocking lever is pivoted to the rearwardly extending ends of two



Close up view of main unit of Watson recording dynamometer showing three stylus levers and other details



Sample of record from Watson dynamometer. Perforations not visible indicate distance covered

tension links, which pass with clearance through the frame at both ends and are secured at the front to the pivot post of the instrument. But for this arrangement the whole of the frame work of the recording apparatus would have to be made far more substantial, and would then possess a great disadvantage in excessive weight. The lower portion of the ball-ended lever is provided for two holes, the lower one being intended for use when coupling up to implements with a draw-bar resistance up to 3,000 lbs., and the upper one for draw-bar effort up to 6,000 lbs. When a pull is applied to the lower end of the lever, the ball at its upper end presses on the exposed end of the hydraulic piston, but the maximum pressure at any time created by the loads mentioned does not exceed 500 lbs. per sq. in.

The main hydraulic cylinder is connected to a smaller cylinder and piston, the latter operating the stylus in the same way as a steam-engine indicator. The total range of this smaller piston is only  $\frac{3}{8}$  in., but by means of multiplying levers, the stylus point has a range of 3 inches on the chart, and by a special system of linkage the actual movement of the stylus point in either direction is practically a straight line. The indicating piston is forced out of its cylinder against the resistance of a calibrated spring, which yields in direct proportion to the pressure created in the main cylinder. By thus limiting the movement of the small piston and spring to  $\frac{3}{8}$  in., the inertia effect becomes practically negligible. Positive stops are provided for the indicator piston, so that the stylus levers never carry any portion of the load.

The rate of paper feed is determined by passing it half round a feed roller with pin projections, this roller being driven by the flexible shaft and gearing from the measuring wheel which bears on the ground. The feed of the paper is therefore directly proportionate to the travel of the dynamometer and is approximately  $1\frac{3}{8}$  in. per 100 ft. of travel. The pin projections in the feed roller perforate the paper and are so spaced that the distance be-

tween any two perforations represents 25 feet of travel. The rollers which receive the chart and the used carbon paper are friction driven from the feed roller, so that, as the diameter of these rollers increases with the amount of paper rolled on them, slip can take place and damage to the chart is avoided.

The time indicating stylus normally inscribes a continuous straight line, but at each half minute a kink is made in the line by the stylus being moved laterally by an electro magnet.

With regard to the depth indicator mechanism, the fork which carries the small castor wheel running on the unplowed land is actually a bell-crank lever, and once the vertical position of the pivot of this bell-crank lever has been adjusted to suit the plow, it remains constant throughout the test. As the plow shears and the frame to which they are attached sink in proportion to the depth of plowing, proportionate movement is given to the bell-crank lever, the short end of which exerts a pull on a Bowden wire coupling with the recording instrument, and thus allows the lighter of two springs to force the stylus lever sideways to indicate the depth of furrow. When the depth of plowing decreases the stronger spring is more or less released; it therefore compresses the light one and forces the stylus lever back towards zero.

It will be noted from the foregoing that the depth recorder indicates the average depth of the two or more furrows being plowed and not the depth of individual furrows, but obviously the latter is not required to be known in taking a record of the total work done by the tractor. The records produced by the instrument can be easily integrated to obtain average pulls and depths, and from the markings of time and distance the speed can be plotted.

Every moving portion of the outfit is completely enclosed, with provision for adequate lubrication, and a dust cover with transparent sides is provided to encase the paper rollers and stylus pins.

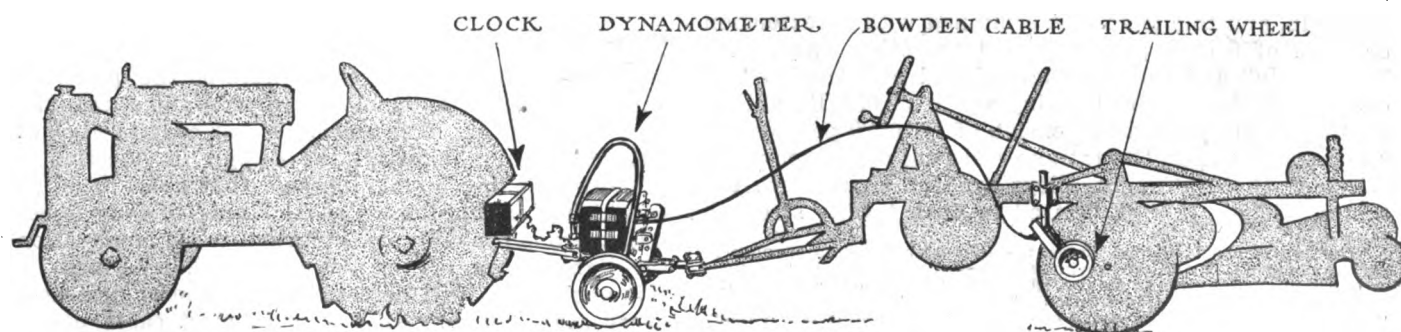


Diagram showing how the units of the Watson drawbar dynamometer outfit are coupled up to or carried by tractor and plow

# Use of Wrought Aluminum Alloys in Automobile Construction

The advantages of wrought alloys are discussed together with the possibilities for use of aluminum in automobile construction. Not all engineers will agree with Dr. Rosenhain in every particular, but this discussion by a recognized authority is worthy of serious attention.

By Dr. Walter Rosenhain, F.R.S.

**W**HILE it is undoubtedly the function of the designing engineer to select the materials which are to be employed in the construction of his machines, he is yet dependent upon the metallurgist for those materials and, in the first instance, for his knowledge of their properties. Particularly is this true where materials of a more or less novel kind are concerned. Therefore, the metallurgist who is well acquainted with them is in a position to offer suggestions which may prove of value to the designer. It is in this spirit that the question of the utilization of aluminum alloys in automobile construction is treated in this article.

Light alloys of aluminum are, of course, already used to a very considerable extent in various ways in existing automobiles and an attempt has been made to produce an "all aluminum" car. Yet in the majority of designs steel predominates and light alloys are only used for special purposes, such as the aluminum piston which has been discussed in considerable detail, and for more or less subsidiary castings, such as crank-cases, gear-boxes, etc. In the latter cases the principal, if not the sole, reason for employing aluminum alloys is the desire to save weight. Indeed, apart from the pistons and cylinders, where thermal conductivity enters so largely into the problem, the saving of weight is the main advantage to be gained by the use of aluminum. The principal question is, how far this can be pushed with advantage.

The majority of engineers have hitherto confined their attention to the use of aluminum alloys in the form of castings. The advantage in the use of wrought material, however, makes itself felt in several ways. In the first place the wrought alloys now available afford material of very much greater strength. Taking tensile strength as a rough measure, ordinary castings rarely exceed a figure of 30,000 lb. per square inch and even the best modern heat-treated castings of the alloy now coming to be known as "Y" only attain a maximum of 45,000 lb. and this is at best combined with an extension on 2 in. of 5 or 6 per cent. On the other hand, both "duralumin" and rolled or forged and heat-treated "Y" can readily be obtained giving up to 60,000 lb. with a ductility that shows an extension of 18 or 20 per cent on 2 inches. Further, the fatigue-resisting and other properties of these wrought alloys are far superior to the best castings. If it is desired to push tensile strength

to its highest limits, values as high as 88,000 lb. combined with an elongation of 12 per cent on 2 in. can be obtained in alloys which are quite satisfactory if thoroughly protected from corrosion.\*

Quite apart from their very much greater strength, particularly in regard to shock and fatigue, the wrought alloys possess a most important advantage over the cast material in regard to reliability. Even the best of castings are apt to be, at times, more or less unsound and it is often difficult, if not impossible to discover the existence of defects. In wrought material, on the contrary, serious unsoundness is substantially impossible. In the first place, material intended for rolling or forging is always cast into simple ingot forms in which soundness can be readily achieved, since they are free from the serious difficulties which occur in complicated castings where thick and thin portions are expected to solidify together. Further, should a defective ingot be produced, it generally shows signs of the defect during the forging or rolling operations—these operations, in fact, constitute a severe and thorough test of the homogeneity of the material, particularly in aluminum alloys in which the first stages of "breaking down" from the cast condition are always delicate and somewhat difficult. It would seem, therefore, that wrought material is in many ways superior to cast.

One consideration which must, of course, affect the designer's judgment on such a point is that of the relative cost of the two types of material. This can, in the long run, be decided only when actual market prices of castings and forgings or built-up parts are actually available. At the present time wrought material is not yet widely available and in many cases its price is high owing to the fact that heavy royalties on patented alloys have to be covered. The extension of our knowledge of the range of available alloys should soon overcome this difficulty, while the question of available manufactures is simply one of demand.

## Parts in Which Alloys Can Be Used

The next point of interest centers on the question for what parts of an automobile can wrought aluminum alloys be employed. The answer is not easy to give without considering in detail the design in question, but, broadly speaking, it may be said that apart from parts in which great hardness and resistance to wear is essential, there is probably no limitation to the application of the light alloys. It is not suggested, of course, that this application will necessarily be wise or desirable in every case, but only that it is in most cases perfectly possible. It is obviously impracticable, in the limits of

\*The figures briefly quoted above, together with full details concerning the composition and treatment and general properties of the alloys in question, will be found in the Eleventh Report to the Alloys Research Committee of the Institution of Mechanical Engineers, London, 1921. Since this report occupies more than 250 pages, it is obviously impossible to reproduce the details in the space of the present article, but readers interested in them can readily refer to the report.—W. R.

the present article, to go into any great amount of detail with a view to showing how such an adaptation could or should be made. All that can be attempted is to take a few typical examples by way of illustration and suggestion.

The aluminum alloy piston—by which is meant the cast piston—is already in extensive use and gives considerable satisfaction. Yet even here the use of forged material would offer undoubted advantages, particularly from the point of view of soundness and reliability. A good many existing pistons are, of course, of a shape which could not be readily produced even by considerable machining from any reasonable forging or pressing. It may be suggested, however, that these designs are perhaps needlessly complicated. The internal ribs, for example, are mainly a concession to the supposed weakness of the material; if the piston were made of forged material of considerably greater strength, these ribs could probably be eliminated and—if necessary—replaced by slight thickening of the piston wall.

Very satisfactory piston designs have, in fact, been produced which can be made quite cheaply and easily from a simple forging. This is of the form of a cylindrical block having a central depression or hole. This leaves a wall-thickness great enough to allow the bosses for the gudgeon-pin bearings to be left when the forging is machined internally. Ultimately, however, it may be found possible to press the pistons, not in the form of a nearly solid cylindrical block, but in the shape of a fairly thick-walled cup made from a thick flat disk of rolled alloy—much as a cartridge case is pressed from a strip of sheet brass.

#### Difficulties Encountered

The piston is an example which presents, by comparison, somewhat considerable difficulties. A complicated object such as some of the intricate crank-cases and cylinder blocks now employed would present even greater difficulties, and in those cases it is no doubt a very open question whether the use of wrought material would be in any sense worth while. It would probably imply the use of built-up parts which would require a considerable amount of machining and fitting together. An appreciable saving in weight could probably be secured but whether the built-up article would be as thoroughly satisfactory as present day castings is doubtful.

Before leaving the engine mention must be made of connecting rods and crankshaft. So far as the latter is concerned, the use of anything but steel cannot as yet be regarded as a practical possibility. It is true, of course, that at first the use of an aluminum alloy even for a piston was regarded as entirely impossible, but in the case of a crankshaft even preliminary experiments have yet to be made. In regard to connecting rods, however, the matter stands in a very different position. Engines have been run successfully and under severe conditions with aluminum-alloy connecting rods. In some of the trials these were made of precisely the same dimensions as the steel rods which they replaced and yet they operated with entire success. This is perhaps asking rather too much of any light alloy, but with a suitable increase in dimensions—while still leaving a considerable margin of reduced weight—there is no reason to anticipate anything but the best results. The use of these lighter rods will further improve the running of the engine, so that here there would seem to be a fruitful field ripe for an early advance.

Perhaps the most important application of wrought aluminum alloys in automobile construction will be found in the construction of the chassis or under-frame.

Here there is the possibility of a very appreciable and important saving in weight with all its concomitant advantages—saving in engine power, in wear on tires and particularly in the power expended and lost in frequent starting and stopping and in rapid changes of speed on the road. Here there can be little doubt as to the practicability of replacing steel by a suitable light alloy. Attempts have, indeed, been made to produce a satisfactory cast-aluminum chassis and the resulting object has given remarkably good performance. None the less, the general considerations stated above in favor of wrought material apply with very special force to the chassis. The shape of the object, to begin with, renders it difficult to cast satisfactorily, and if it has to be built up there is no advantage in using cast rather than forged or rolled parts. The only difficulty at the moment is that suitable sections of rolled aluminum alloys are not commercially available, but here again it is entirely a question of an adequate demand.

#### No Technical Difficulty

There is no serious technical difficulty in the way of the production of any desired section in a light alloy if the same section can be produced in steel. The difference is that steel-makers have for long years been accustomed to producing heavy sections and forgings of considerable size, while hitherto manufacturers of aluminum alloys have had no occasion to deal with such objects. It thus becomes a matter for enterprise on both sides and for co-operation between two industries which may well become to that extent interdependent.

The question of the relative dimensions of a part made of wrought aluminum alloy as compared with steel is not easily settled. The actual working stresses in such parts are not really known with any degree of accuracy, particularly in regard to shock and fatigue. The dimensions of the steel parts themselves are, in the majority of cases, determined by judgment, based on experience, rather than by exact calculation, so that it is never very certain whether they are just strong enough or actually very much stronger than is essential. Taking the existing steel construction as a guide, however, it may be borne in mind that the best of the wrought aluminum alloys have about the same tensile strength as a mild to medium-hard steel. So far as "static" strength is concerned, therefore, it would seem safe to replace such steel with aluminum alloy of the same dimensions. Unfortunately, however, the light alloys have not as great a resistance to fatigue stresses as mild steel, and where such stresses are mainly operative it would seem wise to allow something like double the dimensions, or, rather, one-half the working stresses which are allowed in steel.

It must, of course, be borne in mind that by increasing the dimensions of a part acting as a beam, for instance, its stiffness is increased much more rapidly than its strength, and where fatigue stresses are mainly due to vibrations set up in the structure itself this increased stiffness must be taken into account, since it will serve to reduce the alternating stresses arising from vibration.

The question of stiffness raises the interesting point as to the application of light alloys in springs of various kinds. Here the lightness of the material and its relatively low elastic modulus—about one-third that of steel—suggests very promising applications. Some rudimentary experiments in that direction have given promising results, and it seems probable that in this particular field there is an immediate possibility of an important advance. In springs made of wrought light alloys it will, of course, be necessary to keep the working stresses relatively very low, but this necessity is more



than counterbalanced by the lightness of the material and its low elastic modulus, which allows, on the one hand, of the use of very much larger springs and at the same time permits considerable amplitudes of deflection without high working stresses.

Without having in any way exhausted the various possible applications of wrought light alloys in automobile construction, the examples which have been given will perhaps be sufficient to indicate the lines upon which application of these materials is suggested. It is, of course, a process which will require watchful care on the part of the designer and in the factory, but the possibilities of advance are very considerable and it is a course which is already being actively pursued in various quarters. The "all-aluminum car" may not yet be an achieved practical success, but it is likely to be so before long.

#### Question of Corrosion

There is, however, one point which demands serious consideration and that is the question of corrosion. There is no doubt that all aluminum alloys are more or less easily corrodible, but, after all, so is steel. In the case of steel we have learned to afford it fairly efficient protection. Our enamels and paints and other protective coverings are not perfect, but they suffice to give our structures a very good length of life, provided that they are efficiently maintained. There is no doubt that the same degree of permanence can be attained in regard to aluminum alloys. The real difficulty in regard to these materials arises from the fact that at one time it was widely supposed that aluminum was practically incorrodible. This idea no doubt arose from the fact that a brightly polished aluminum article left exposed to ordinary air, but not to rain, etc., remains bright for a very long time. Unfortunately, this power of resisting atmospheric corrosion does not measure the

power of resisting more severe conditions. Alloys are known which will stand for many years exposure to the air in a room, but which will literally fall to pieces if immersed for a few hours in sea water.

Now the question arises, which of these two types of conditions as regards corrosion have we to meet in the parts of an automobile? It is, of course, obvious that these are not exposed to anything even remotely so severe as continued immersion in the sea. On the other hand, they are liable to be exposed to rain and even, at times, to sea air. Actually, even the more corrodible aluminum alloys show very little deterioration if exposed entirely unprotected on an automobile. Yet such unprotected exposure is not essential or even desirable in the important working parts. A large proportion of these parts in any case becomes coated with oil from the engine, gear-box, differential, etc., and this oily coating in itself affords very good protection from corrosion. At the same time there is no reason at all why any exposed aluminum alloy—other than in ornamental fittings—should not be well coated with protective varnish, paint or enamel. Such coatings, if well applied and of suitable composition, afford complete protection from anything to which an automobile is likely to be exposed.

But it is or will shortly be possible to go considerably further than this, as chemical processes have recently been worked out and in certain cases patented for covering aluminum alloys with a protective coating of a very perfect kind. One of these coatings is said to consist of a mixture of the sulphide and oxide of molybdenum which adheres very firmly and serves as an excellent protection, although possibly not entirely resistant to the direct action of sea water. It may, therefore, be safely suggested that the corrosion difficulty, in so far as it exists in regard to automobile work, can be satisfactorily dealt with by these means.

## A Rubber Compound Battery Box

**R**UBBER compound battery boxes to replace those of wood containing hard rubber jars are now being manufactured by Rub-Tex Products, Inc., of Indianapolis. Many attempts have been made to make boxes of hard rubber, but it has been found that these boxes are too brittle and do not stand up under the freezing test. The Rub-Tex compound is made from a secret formula and it is claimed both these points have been overcome. In addition, it is claimed that these boxes overcome the difficulties encountered with pin-holes, blow-holes and other forms of leakage, which are common with hard rubber products.

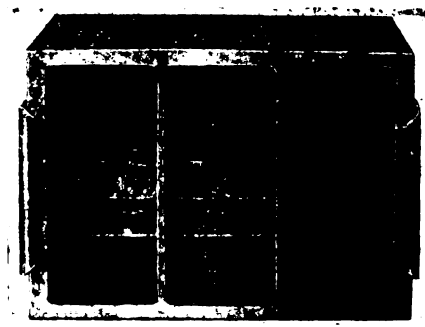
In order to overcome these defects the Rub-Tex box is made by building the battery box up by hand, thereby laminating each piece of rubber and overlapping each piece at the corners. The boxes are then cured under very high pressure.

Battery manufacturers have been making tests on this type of box and, according to the Rub-Tex company, the box has stood up under a number of very difficult tests, among which is the following:

A box with the elements installed was placed in a refrigerator at 26 deg. below zero and left for a period of 48 hr. After this period the box was examined and found to be in an entirely satisfactory condition.

Another test was to install the elements in a box and place it upon a bumping machine. The box was given one million bumps, after which the elements were re-

Battery box built up by hand and moulded under high pressure



moved and the bridges at the bottom of the cells are claimed to have shown very little if any wear.

A further test was made at the Detroit Testing Laboratories of Detroit, which gave the box a heat test for a period of 16 days ranging from 65 deg. Fahr. to 175 deg. Fahr., upon which a certificate was issued to the effect that there was no change in the color of the acid or in the consistency of the material. The box is claimed to have a dielectric strength of in excess of 26,000 volts.

The compound of which the box is made, it is claimed, has the ability to resist absorption of water or acid. The jars and box are combined in one unit, which gives it considerable structural strength besides that imparted by the physical qualities of the material.

# Investigation of Tooth Wear With Automobile Gear Steels

Steel with a minimum of 0.45 carbon that is capable of treatment giving a scleroscope hardness of 75 or over is recommended for oil treating. The specification limits should be close enough to insure uniform results from a standard heat treatment. Various steps in the tests are described.

By E. R. Ross\*

**F**URTHER investigation is needed to establish reliable data relative to the various factors that determine the smooth operation and life of gear trains. The research work could be divided under three headings, as follows:

1. An investigation to establish the most suitable material for use under given conditions, the allowable stress, allowable pressure, resistance to abrasion, and elasticity being found for different materials.
2. Investigation of methods of manufacture, with an

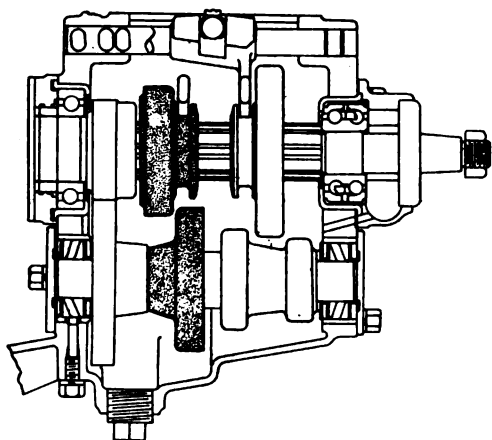


Fig. 1—Outline drawing of Warner transmission on which tests were made

attempt to define the degree of error permissible with various grades of workmanship.

3. A determination of the influence upon the life and quiet operation of gears of such variables as peripheral velocity, load per unit of width, number of impacts, ratio of reduction, grade of workmanship, heating and disposition of metal in the gear rims and arms. Methods of gear mounting to absorb vibration, and the lubrication of gears also would receive attention.

It will be agreed that successful research along these lines would provide dependable data for the design of gears to meet any conditions in regard to load, speed, quiet running, life, etc. Alone, the Lewis formula can be used only to ascertain the maximum permissible load to insure freedom from tooth breakage, and unfortunately with many gears this is the only point

checked by the gear designer, with the result that gears are transmitting excessive pressure so that backlash and noise develop in a very short time.

With this outline before us in compiling the data of our tests, we have attempted to solve, in a measure, some of the most important problems that face the gear manufacturer to-day. The work we are now doing has been confined largely to the selection of materials best suited for the purpose of automobile transmission gearing, the selection being upon the basis of resistance to abrasion or wear. Two of our standard transmissions (Fig. 1) were used, which were checked over very carefully. We then proceeded with the tests by alternating the two, preparing the one while we were testing the other. All parts were checked carefully after tearing down the transmission; likewise all new parts were carefully checked before assembling.

This transmission has 6/8 pitch gear of 3/4-in. face and is well adapted to the needs of a medium weight and medium powered passenger car or light weight truck. The test was run on the second speed gears, or the third and fourth of a train of four gears (shaded in Fig. 1). This pair was selected because it is the most used of the speed reductions in passenger car service, and also on account of the difficulties presented by the manufacture of a sliding gear with internal clutch teeth. It is frequently used with a very high percentage of the full motor torque. These are "clash gears," and accordingly a portion of the face width has to be sacrificed in rounding the corners at one end of the teeth. As compared with the other reductions, a higher pitch line velocity is here combined with lower maximum torque.

In order that we might duplicate the conditions of individual tests, constant torque and constant speed were first considerations, and for this reason, standard dynamometer equipment was used.

Fig. 2 shows the set-up for the tests. The transmission is mounted on a suitable test stand which carries a stand-

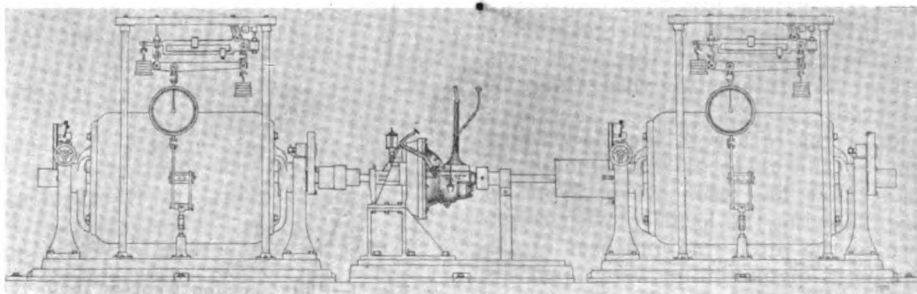


Fig. 2—Test set-up

\*Experimental engineer, Warner Gear Co. Article is slightly condensed from paper presented at Rochester meeting of American Gear Manufacturers' Association.

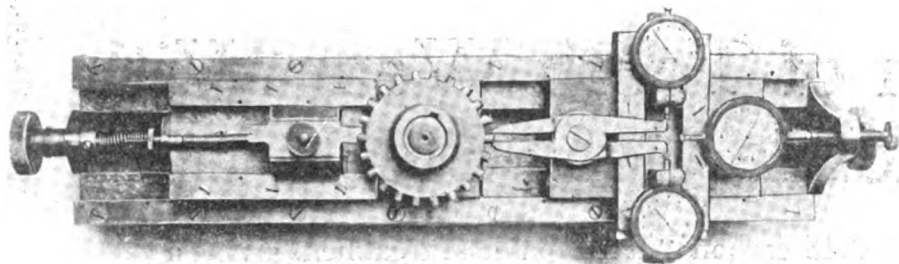


Fig. 3—Tooth profile indicator

ard bell housing and flywheel and is fitted with large roller bearings. Power is supplied to the transmission by a Sprague dynamometer, so the torque and speed can be accurately checked at all times. At the rear end the transmission connects to a second Sprague dynamometer by which the amount of power transmitted through the transmission could be checked.

A standard grade, heavy transmission oil was used both in the transmission and on the bearings in the test stand, new oil being used on each test. A thermometer inserted in the filler cap and extending down to the countershaft gear in the lower part of the case, indicated the temperature of the oil in the transmission.

#### Tooth Profile Indicator

To be able to properly classify our results, it was necessary that very careful measurements be taken of both the new and worn tooth, and for this purpose we developed a tooth profile indicator, (Fig. 3).

The gear is mounted on a stud in the center of the instrument. At the left, and pressing against the top and side of a tooth, is a stop which is held in this position by the spring behind the block. This holds the gear rigidly in position. Diametrically opposite this stop on the gear there are two fingers carrying points over the edge or profile of the tooth. At the right are two dial indicators, one for each of the points, which operate through a 1:1 lever. To the right of these and in the center is a third dial indicator. This is used to determine the depth or distance in from the point of the tooth to the points of the indicating fingers. The indicating fingers carry sharp points so that their leverage does not change from the 1:1 ratio and the indicators give a true indication of the contour of the gear tooth.

From the readings, plots of the gear teeth were made on a  $7\frac{1}{2} \times 10$  curve sheet, with an enlargement of 25. With this magnification, when the base circle and pitch line are located, when corrections are made for variation in the diameter of the gear blank and the curvature of the pitch line, several very interesting things may be observed.

Referring to Fig. 4, the shaded portion of the tooth is the amount of metal that has been worn from its face, showing the location with reference to the pitch line and base circle. The point of maximum wear upon the gear represented in the lower left hand corner was 0.012 in. deep and

from 0.010 to 0.020 in. above the pitch line.

Since the wear is often unequal and we are unable to predict before the test just where it will be greatest, we select for measurement the tooth that shows the most wear. Fortunately, the chamfered end of the mating gear leaves an unworn portion which can be measured after the run, enabling us to compare it with the worn portion of the same tooth. The plot is a comparison of the original outline with readings taken

in the center of the worn portion of the tooth.

Plots (Fig. 4) are from the second speed sliding gear (below) and the countershaft second speed gear (above), the material used in Test No. 6 being S A E No. 2345, having a hardness of 70 scleroscope. The gears were of 6-8 pitch and 20 deg. pressure angle, having 20 and 22 teeth respectively. The teeth had a  $\frac{9}{16}$  in. width of face in contact at the pitch line. The analysis given with limits is the standard specification for the material used, the figures in parenthesis giving the actual analysis of these gears. The heat treatment given this set of test gears consisted in heating to 1380 deg. F., followed by quenching in oil and drawing in oil at 400 deg. for 20 minutes. From the main drive gear to the countershaft drive gear the reduction is in the ratio of 27:15 or 1.8:1; from the countershaft second speed gear to the second speed sliding gear it is 20:22 or 1:1.1, making a total reduction of 1.636:1. A 50 hp. load was applied to the transmission by the dynamometer (175 lb.-ft. torque at 1500 r.p.m.) continuously for six hours. This represents an overload for this particular set of gears, being quite beyond anything to which they would be subjected in service. Preliminary runs demonstrated, however, that some such overload was necessary if we were going to have any measurable amount of wear in a test of reasonable duration. The six hour test would represent, in a car having 32-in. wheels and a  $4\frac{1}{4}$  to 1 axle ratio, running on the

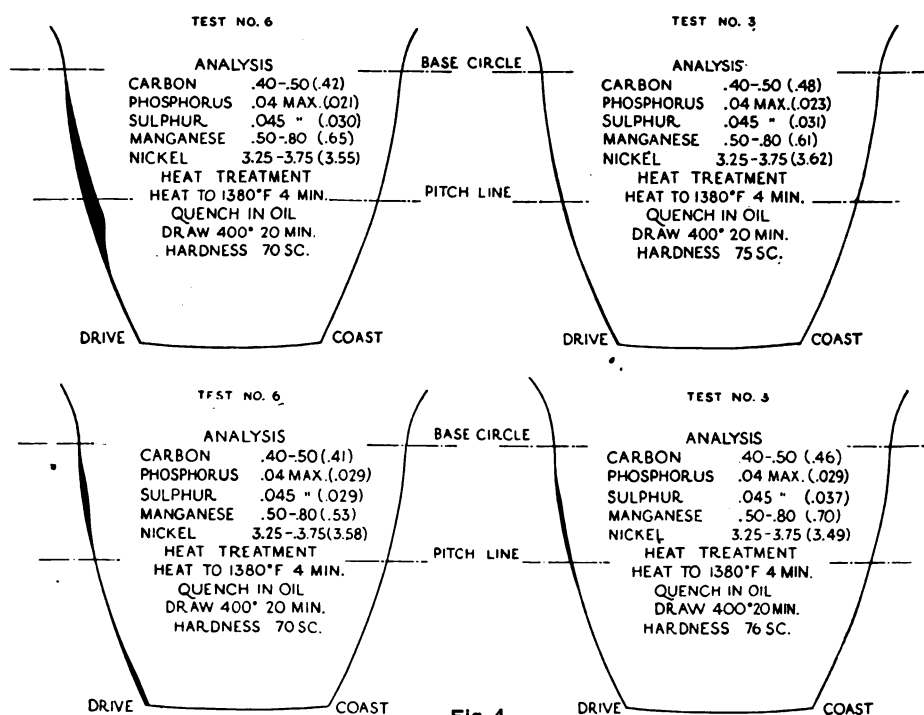


Fig. 4—Plots showing wear of tooth faces of driving (above) and driven (below) gear of S. A. E. No. 2345 steel drawn to scleroscope hardness of 70 (plots on left) and 75 and 76 (plots on right)

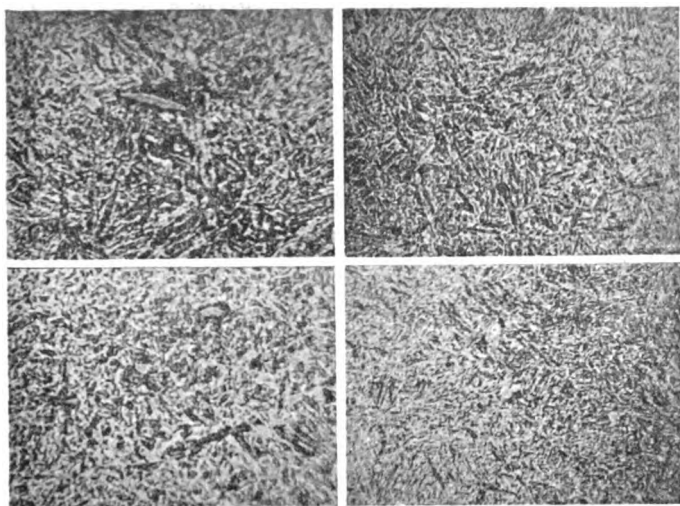


Fig. 5—Micrographs of steel in the gears of the plots (Fig. 4) showing finer grain structure of the harder steel

intermediate at a speed of 19 m.p.h. for a total distance of 114 miles. The transmission lubricant used was an oil designated as No. 1 heavy.

The test was conducted by holding the speed and torque of the driving dynamometer constant for the 6 hours, readings being taken of oil temperature, mechanical efficiency and room temperature at one minute intervals for the first five minutes, ten minutes after the start of the test, and at ten minute intervals thereafter till the end of the test. A given amount of the new lubricant was placed in each transmission when "set up" for the test and this was not changed during the test.

#### Minimum and Maximum Wear

Fig. 4 represents the best and worst conditions of wear on the oil treated gears tested. Both are of S A E 2345 steel, heat treated in the same manner and produced by the same cutter, but in Test No. 6 (at the left in Fig. 4) both the gears had a scleroscope hardness of 70 while in test No. 3 (at the right) the scleroscope hardness was 75 for the countershaft gear and 76 for the sliding gear. Note the variation in the analysis of these gears, as well as the relation between the carbon content and the amount of wear. In the latter connection it will be noted that the wear is greatest upon the driving gears, even though it may contain slightly greater carbon. This is a condition which would be expected when the action of the gears under load is analyzed. If the two gears had no backlash, any movement of the driving gear would correspond to an equal movement of the driven gear. In actual gears there is a certain amount of backlash to allow for lubrication, slight inaccuracies in the cutting of the teeth and warpage from heat treatment. Any increase of backlash due to wear permits an uneven or slightly intermittent velocity, which, once started, rapidly destroys the contour of the tooth. This action is more rapid on the driving gear, because it absorbs the variations in load and velocities resulting from the breaking down of the curvatures of both the driving and driven gear.

#### Gears from Same Cutter Compared

In order that we may get a representative test of the wearing properties of the steel and not a premature breaking down of the tooth curvature due to intermittent velocities or interferences, great care must be exercised in the selection of the cutters used for the gears to be tested, and for the other gears in the gear train under load at the same time. In order to eliminate all possible variation of the load in being transmitted through the

first pair of gears in the train, new gears were used for each test. The heat treatment used was either that recommended by the manufacturer of the steel or what we had found by experience best suited to the steels used.

Fig. 5 shows micrographs of the gears of Fig. 4, left and right respectively. The coarser structure of the two steels at the left will be readily seen, and the relative proportions of martensite and troostite. Each steel had a scleroscope hardness of 70, the carbon content being 41 for the upper micrograph, and 42 for the lower. The two steels on the right are of a finer grain, of 65 and 76 scleroscope hardness, and have a carbon content of 46 for the upper and 48 for the lower micrograph.

A collection of 325 separate analyses of S A E 2345 steel shows that the carbon averages between 0.43 and 0.47, the manganese between 0.56 and 0.68 and the nickel between 3.36 and 3.50 per cent. The S A E limits on this steel are so wide that it is difficult to get a uniform structure from a common heat treatment in quantity production.

#### Effect of Carbon Content on Wear

Fig. 6 gives the analysis of the S A E 2345 steels used in tests Nos. 6 and 3. The average analysis is shown as the shaded portion between the dotted lines. It will be noted that the gears of test No. 3, which had the least amount of wear and the higher hardness, show a higher carbon content, a higher average manganese, and about the same average nickel as compared with the gears of test No. 6 which were softer and wore more rapidly. This will also be explained in a measure by the difference in the structure as shown by the micrographs of Fig. 5. The presence of more troostite in the gears having the low carbon may be accounted for when we consider that when a heat is used that is correct for the steel having the higher carbon, it is not high enough for the one having the low carbon content.

The gears of Fig. 7 are of the same material, with a difference in hardness of only three points. Here is very clearly illustrated the point mentioned before in regard to the importance of using gears cut with cutters having as nearly correct outline as possible. The gears of test No. 10 were cut with the same cutters as those of tests Nos. 6 and 3, but during the interval the cutters used for the countershaft gear had cut 240 gears and had been ground eight times, while the cutters used for the second speed sliding gear had cut 142 gears and had been ground five times. This change in the cutter gave an interference which was noted before the gears were tested. When this condition had been removed by getting the proper

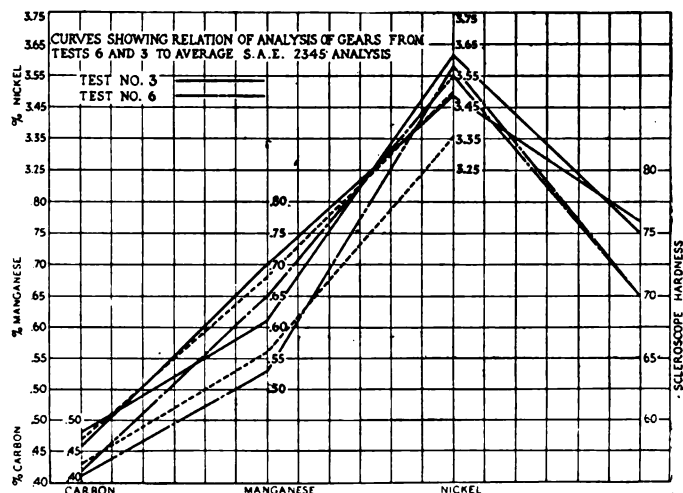


Fig. 6—Analysis of S. A. E. No. 2345 steel used in Tests Nos. 6 and 3

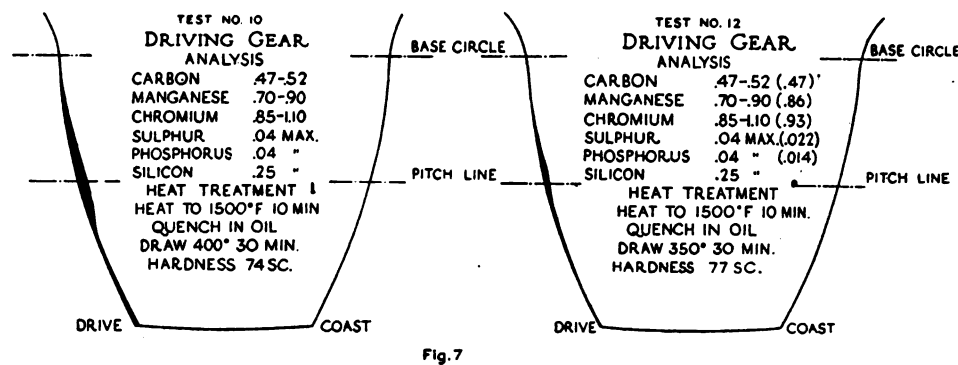


Fig. 7

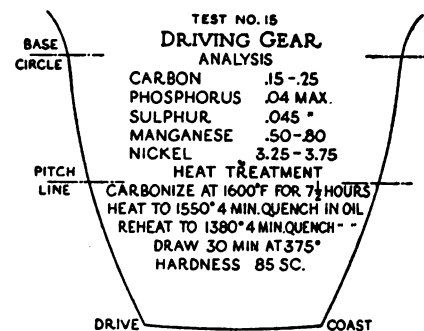


Fig. 8

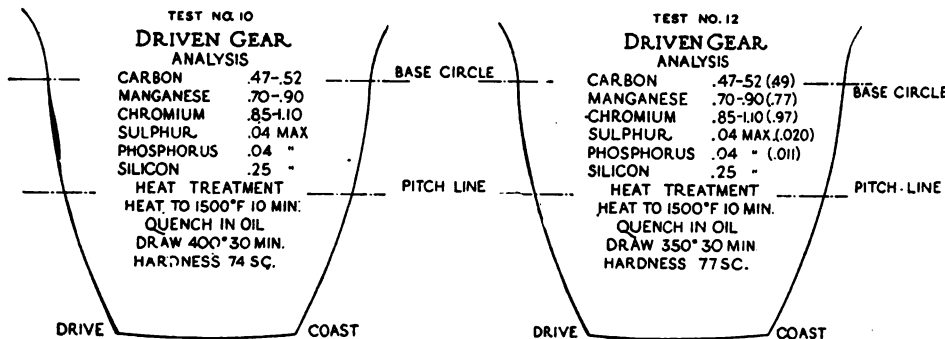


Fig. 7—Plots of tooth wear from gears produced with worn cutters

Fig. 8—Wear plots from case hardened nickel steel gears

curvature, the steel showed up very well, as will be noted from test No. 12.

#### Prevalence of Pitting

A comparison was also made between Test No. 12 and Test No. 3, both on gears of S A E 2345 steel. As before stated, the tooth showing the most wear was selected and indicated as representing the wear of that particular gear. In this instance the wear of the countershaft gear of Test No. 12 was measured on the only tooth that showed any particular breaking down. Three other teeth showed a very slight pitting, and the remainder of the teeth had bright burnished surfaces, scarcely having the tool marks worn from the gear face. The gears showed the following proportions of the whole number of teeth "pitted:"

Test No. 12 second speed sliding gear, no teeth pitted  
countershaft second speed gear, 18.18 per cent of pitted teeth.

Test No. 3 second speed sliding gear, 17.65 per cent of pitted teeth and countershaft second speed gear 84.2 per cent of pitted teeth.

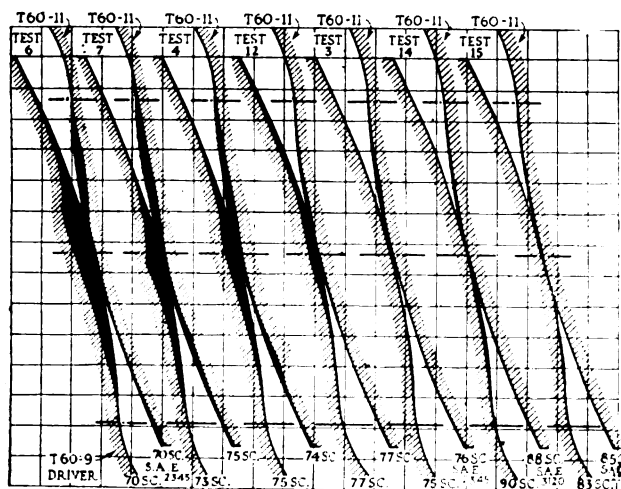


Fig. 9—Assembly of driving and driven faces

The steel used in Test No. 12 was a very "clean" steel and could be machined very much faster than S A E 2345. The latter steel has a great number of slag and cinder inclusions, which I believe to be a large factor in accounting for the pitting of this steel as compared to the steel used in Test No. 12.

A steel in all respects the same as used in Test No. 12 (48 to 51 points carbon and 77 scleroscope hardness) was tested by breaking two teeth out of the gear. The fracture in either case showed no tendency to be brittle but, on the other hand, was extremely tough, the teeth being broken out with considerable difficulty. The blanks as machined had a scleroscope hardness of 34 to 38 and a corresponding Brinell hardness of 207 to 228. No difficulty was experienced in machining this steel.

#### Oil-Hardened vs. Case-Hardened Steel

Fig. 8 shows test results obtained with S A E 2320, which is a case hardening steel having the same nickel content as S A E 2345 used in Test No. 3 (Fig. 4). Here again most of the wear comes on the driving gear. S A E 2345 has been substituted for 2320 largely because distortion in heat treatment causes it to be more noisy than an oil treated gear. An oil treated gear is not subjected to as high heats, and the length of time the gear is at high temperature is very short, which tends to decrease the distortion. The machine marks were still upon the S A E 2320 gears after the test and the gears showed no pitting whatever.

Fig. 9 is an assembly of the driving and driven profiles of seven tests ranging from the condition of the most wear as shown by Test No. 6 at the left, to the condition of minimum wear as shown by Test No. 15. The driving gear is the one at the lower left of each combination. This gives some idea of the relation of wear to hardness.

Here we may also study the progression of wear. Attention is called to the small worn portion of the driving gear of Test No. 15 at approximately 0.040 in. above the base circle, and also to the worn portion near the top of the tooth. Conditions in Tests Nos. 12, 13, 7 and 6, show how this action progresses, the destructive action having moved from slightly above the base circle up toward the



top of the tooth. Once this action has started on the faces of a gear, it progressively grows in intensity.

### Oil Temperatures and Efficiencies

Fig. 10 shows the oil temperatures, mechanical efficiencies and room temperatures of test No. 15 on the S A E 2320 gears. As before stated, readings of oil temperature (from a thermometer inserted in the filler cap in the side of the case), readings of power output and room temperatures were taken at one minute intervals for the first five minutes, again ten minutes after the start of the test and at ten minute intervals thereafter. At the start of the tests the oil temperatures and room temperatures were the same and ranged from 60 to 80 deg. F. The oil temperature rose very rapidly for the first hour and had become practically constant at the end of the second hour. The maximum temperature reached during a test was 370 deg. F. The mechanical efficiencies averaged 96 at the start and had become practically constant at end of an hour.

The average maximum efficiency for the tests shown was 98.7 while the absolute maximum was 98.9. This is a power loss of 1.1 or 0.55 hp. for a 50 hp. load on the transmission. Properly constructed and properly lubricated, the automobile transmission is a very efficient unit.

Where the wear had been very great, the mechanical efficiencies rose gradually and fell off shortly before the end of the test, but did not give any marked indication of the wear, as is shown by the rise in oil temperatures which were practically without exception proportional to the amount of wear.

Considering that at this speed the tooth picks up its load more in the nature of an impact blow, especially when slightly worn, we have another interpretation of the tests in the order the load is transmitted to each gear of the train in the table following.

From a careful study of these figures and curves, which are representative of the tests we are making on steels

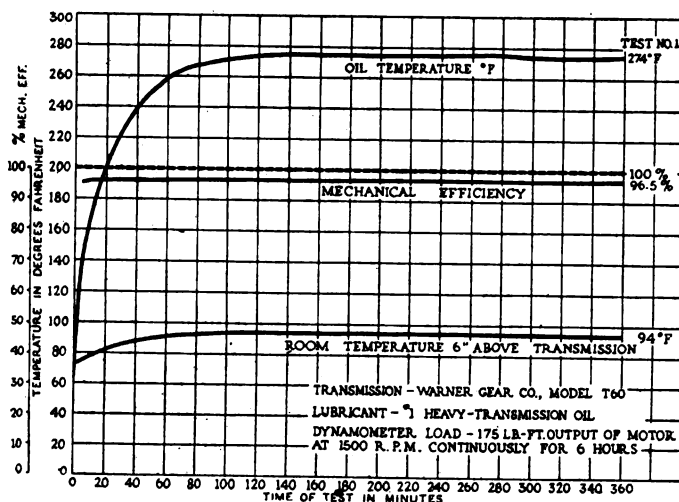


Fig. 10—Oil temperature and efficiency of transmission

Order of Gear in Gear Train	Number of Teeth in Gear	Speed in R.P.M.	Pitch Line Velocity, Feet per Minute	Load at Pitch Line, Lb.	Load in Lb. per inch of face (assuming 1 1/2" face)	Total Number of Impacts on each Tooth
1	15	1500	982	1680	2986.66	540,000
2	27	833.3	982	1680	2986.66	300,000
3	22	833.3	800	2063	3667.55	300,000
4	20	917	800	2063	3667.55	330,120

for gears, we would recommend for oil treating, steel with a minimum of 0.45 carbon, that is capable of treatment giving a scleroscope hardness of 75 or over without brittleness and is as clean as it is commercially practical to make it; specification limits should be close enough to insure uniform results from a standard heat treatment.

## Advertising in South America

**A**N observer of South American conditions had occasion recently to remark that the advertisements in newspapers and magazines of that country lacked any distinctive style, and, in fact, poor styles predominate.

For the most part, he said, the advertisements are mere announcements that merchandise has arrived by such and such a ship. Or they are translations of exotic advertisements.

There is need for a distinctive style of advertising for South America; a racial style; something that smacks of the soil; a style of advertising that will be as effective with the South Americans as certain national advertising campaigns have been in the United States.

There are two main sources from which racy South American advertisements may be developed. The first is to be found in the literature and history of Spain and Portugal and in the literature and history of Spanish and Portuguese-speaking America.

The man who is to write South American advertisements that pull should study "Don Imjate" as the Pilgrim Fathers studied the Bible. In "Dom Imjate" may perhaps be found the subtle thread that will give the clew to Spanish character. In the *Lusiadas* of Camoens, the epic poem of Portugal, may be found many a side light on Portuguese character. In the history and literature of Brazil, Argentina, Chile, Peru, Colombia and Venezuela there is reflected, as in a mirror, the changes

Spanish and Portuguese character has undergone in the New World. The advertising man should catch these characteristics from their history and literature and make his propaganda appeal to them.

The other source from which aid may be obtained in the creation of an original style of advertising for South America, is in the study of modern business science as expressed by Spanish writers. These are now appearing in Spanish and are widely read in South America. These publications, in many cases are adaptations of works issued in the United States. But they are not mere translations. They are transpositions and express the Spanish psychology.

The export departments of our manufacturers should have these books in their export library. A careful study of them by export advertising managers and export advertising managers' assistants will be a rather powerful influence in the creation of a proper expression for South American advertising.

A masterful dominating style of advertising for South America that has the touch of genius about it would aid American manufacturers as much as anything else in keeping their place in the trade of the Southern continent.

**T**HE import duties on automobiles entering Sweden have been increased 100 per cent for the period from June 6, 1921, to July 1, 1922.

# Copper Tube Extrusion and the Manufacture of Radiator Cores

How seamless tubes are formed from solid stock by cold extrusion, shaped with hex ends and baffles, tested under pressure and finally assembled and soldered into complete radiator cores. An apparatus for determining the relative efficiency of various types of cores is also described.

By Herbert Chase

**T**HE advantage of seamless tube for use in radiator construction has long been appreciated, but the expense involved in making a radiator of the honey-comb type from such tube has until recently been too great for such radiators to be extensively used in this country, although some are used on European cars. It is difficult to make a thin walled seamless copper tube except by rather expensive drawing processes unless cold extrusion methods are employed, and this process has only recently been perfected. It was used extensively during the war for the production of tubes for cartridge shells, but has recently been adapted to the production of tubes of extremely thin walls well suited for use in manufacture of radiator cores. The process employed for making tubes and complete cores here described has been developed by the United States Cartridge Company, which is now producing both tubes and assembled cores in large quantities.

The material used for making the extruded tubes is practically pure copper. The process starts with solid cylindrical pieces of copper about  $\frac{1}{2}$  in. in diameter by  $\frac{5}{8}$  in. in length. These pieces are either punched from rolled copper sheets or cut from round bars. In the first operation a punch is forced into the cylindrical piece of copper so that the latter is rendered cup-shaped with rather thick walls and bottom. A second similar operation converts the cup into a thick walled tube or hollow cylinder with one end open and the other closed in whole or in part by a very thin flash. These two operations are performed in ordinary punch presses, the cylinders or cups being fed

to them from a revolving table similar to that used in connection with the extrusion press (see Fig. 2) on which the next operation is performed.

After the hollow cylindrical pieces are formed they are conveyed to the extrusion press, the feed side of which is shown in Fig. 2. The cylinders are there placed on a revolving table from which they are fed by the star-shaped wheel shown at the left of the cut. Each press carries two dies and two punches. The dies are stationary, but the punches are carried on transverse reciprocating slides, A and B. When A is at its inner position the punch which it carries is directly over the center of the die which it enters on the downstroke of the press. At the same instant the punch carried by slide B is in its outer position and is picking up from the revolving table one of the hollow cylinders of copper. On the upstroke of the press slide B and the punch attached to it move to their inner position, the punch carrying with it the copper cylinder which it has just picked up. At the same time slide A moves to its outer position and on the downstroke picks up another cylinder. On the same downstroke the punch on slide B moves downward, forcing the copper cylinder into the die. The punch then becomes a piston which upon further downward motion forces the copper through the annular opening between the lower end of the punch and the hole in the lower portion of the die. Since the shank of the punch fits the die closely the copper is positively forced out through the annular opening and comes out in the form of a straight tube about  $9\frac{1}{2}$  in. long and having a wall thickness of 0.005 to 0.006 of an inch. Since the

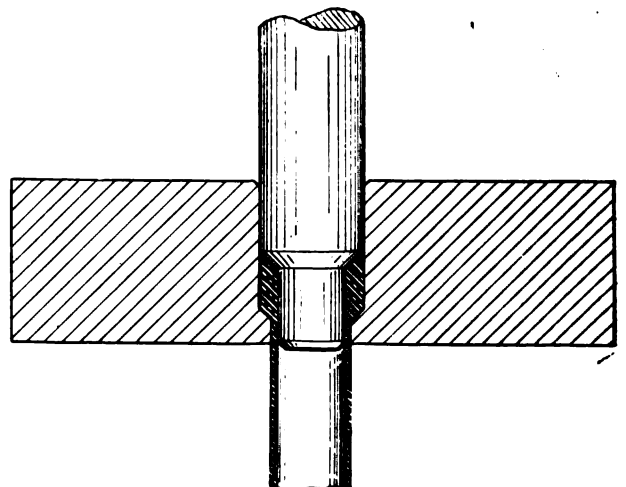
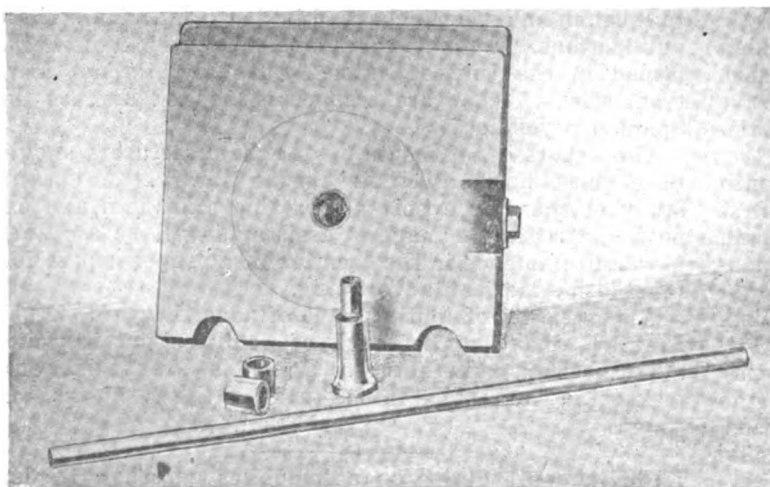


Fig. 1—(Left)—The extrusion die and punch. The copper cylinder is formed into the thin walled tube,  $9\frac{1}{2}$  in. long in a single operation lasting  $\frac{1}{40}$  part of a second. A sectional view of the punch and die is shown at the right

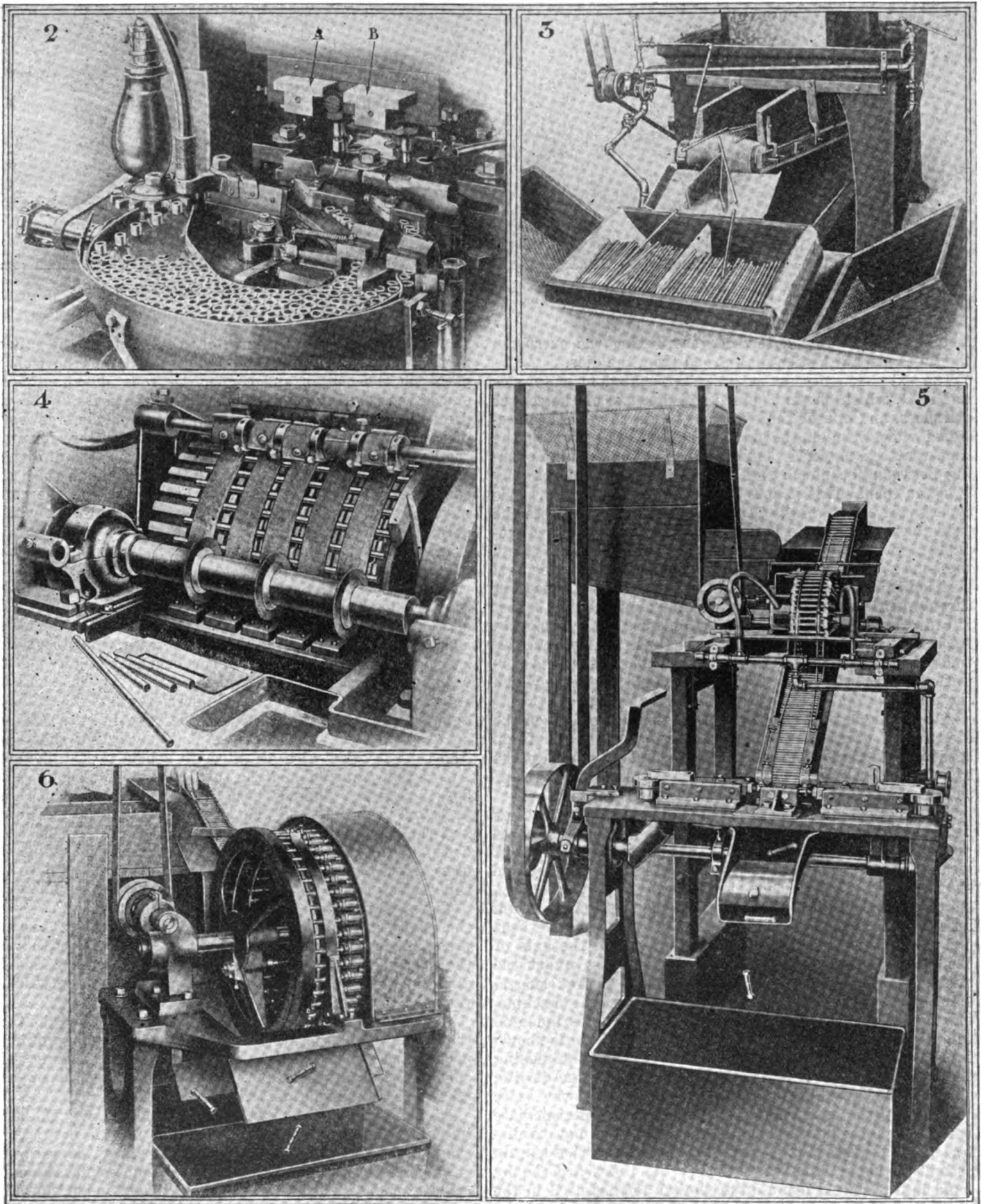


Fig. 2—The feed side of the extrusion press. The punch on slide A has just picked up a copper cylinder and is about to force it through the extruding die, while the punch carried by slide B is about to advance and pick up from the revolving feed table another cylinder which on the next down stroke of the press it will extrude from the second die. Fig. 3—Delivery side of the extrusion press. Tubes drop from the dies onto the endless belt and are discharged into boxes. Fig. 4—The high speed saws which cut the tubes to the desired length as they pass around the slotted drum. Fig. 5—The combined annealing and forming machine. This machine has a capacity of 250 tubes per min. Fig. 6—The machine which tests the tubes under 15 lbs. air pressure and automatically rejects any which leak

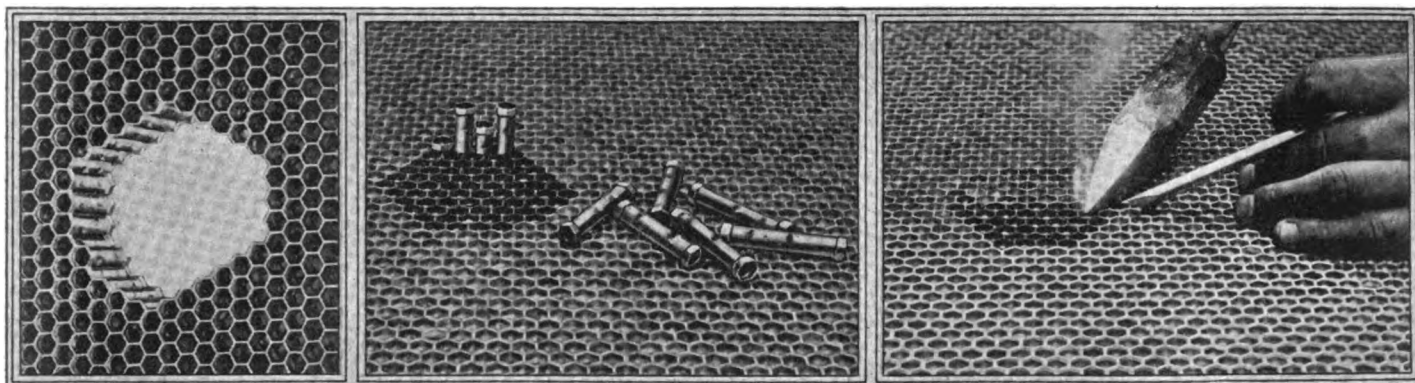


Fig. 7—Steps in the repair operation. At the left part of core with damaged tubes removed. Center—New tubes inserted. Right—New tubes being soldered in place

metal is heated only a few degrees during the extrusion the tubes are hard when discharged from the dies.

The extrusion process is best appreciated by reference to Fig. 1, which shows a punch and die, two of the copper cylinders, and one of the extruded tubes, as well as a sectional view through the punch and the die. During the time that the copper is flowing through the annular opening between the punch and the die the punch moves only  $\frac{5}{8}$  of an inch. This it does in  $\frac{1}{40}$  part of a second. The capacity of each press is 120 tubes per minute. Since the tubes have an average length of  $9\frac{1}{2}$  in. the machine produces approximately 100 ft. of tube per minute. Should the punch tend to move slightly out of its true central position in the die the greater friction of the metal passing through the narrower side of the annular space will deflect it centrally and thus maintain a uniform wall thickness. As the hole in the die or the punch itself wears the wall thickness will change slightly. The wall thickness is permitted to increase from 0.0055 to 0.0065 in., after which the punch or die bushing or both are renewed.

A continuous stream of lard oil is allowed to flow on the die, the oil being collected, passed through a centrifugal separator to remove metal particles, and returned to the extrusion machine. The press used is of the conventional crank type built by E. W. Bliss & Co.

As the tubes drop from the die they fall on an endless belt, as shown in Fig. 3, and are discharged into boxes provided for the purpose. They are then washed free of lard oil and are conveyed to the high speed sawing machine shown in Fig. 4. Here they are fed onto a slowly revolving, slotted drum. As the tubes fall into the slots on the drum an air-stream, issuing at high velocity from a nozzle near one end of the drum, moves them parallel to the axis of the drum against stop, after which they pass under the straps shown in cut and are sawed to the desired length.

The tubes are then ready to be fed to another machine, on which the hex ends are formed and the sides indented to give the desired baffling action. This machine is shown in Fig. 5. It performs the double function of annealing the ends of the tubes and of forming them to the desired shape. The annealing must be done in such a way as to soften only the ends of the tubes, while the intermediate portion remains hard, partly because the tube may be distorted in the dies if it is made soft over its entire length. It will be noted from the cut that the tubes are fed by hand into a slotted drum quite similar to that used in the sawing machine. As they travel around with the drum the ends of the tubes pass over a series of gas flames so adjusted as to anneal the ends of the tubes. They are then discharged into a slide and as they pass through the slide to the forming dies they are cooled by a stream of water. The forming dies are made in five parts. Two of these are punches of hexagonal sections but with rounded ends.

The punches are moved parallel to the axis of the tubes, being carried by guides and reciprocated in a horizontal plane by the cranks and connecting rods shown at each end of the forming head. The other three parts of the die are so arranged as to make indentations on the side walls of the tubes at the same time that the punches are forming the hexagonal ends. As the tubes drop from the dies they fall by gravity into suitable containers in which they are conveyed either to the assembly benches where the complete cores are built up or to a testing machine in which defective tubes are rejected.

All tubes which are shipped to radiator manufacturers to be built up into cores or to repair stations for use in radiator repair work are tested in a special machine shown in Fig. 6. The carrying element of this machine is a slotted drum which rotates slowly and into which the tubes are fed by hand. As the drum rotates a wheel carrying a series of cylinders with rubber headed plungers moves with it. At the proper angular position air is admitted successively to each of the cylinders, forcing the plunger against the end of the tube and the tube in turn against a rubber gasket at its other end, thus sealing the tube. The tube is filled with air through a hole in the plunger. Air is then shut off and the tube is gripped as long as it does not leak. Should there be a leak in the tube the pressure within it and the corresponding cylinder drops and the plunger lets go, rejecting the tube. If the tube does not leak it is carried further around and mechanically disengaged, dropping into another container. Following this testing operation the tubes are ready for shipment.

Tubes which are to be assembled into complete cores at the plant are not put through this automatic testing process, but are tested after assembly and dipping; that is, the entire core is then tested under air pressure and if any tubes are found to leak these are easily and quickly removed and replaced.

At the core assembly benches girls are employed to stack the tubes by hand, the latter being quickly placed in a proper position to form a true honeycomb. During this operation tubes which may have defective ends or are otherwise seen to be defective are rejected.

In the flat tube or ribbon type of honeycomb radiator individual tubes are continuous from top to bottom, so that there can be no flow of water across the radiator from side to side. With the individual tubular type of radiator the water can flow either vertically or horizontally, consequently, it is necessary to supply sheet metal side members for the vertical core. This is done by using a piece of crimped copper having a width equal to the length of the tubes and so formed as to fit the side of the honeycomb section. This member is formed by simply running a sheet of copper of the desired width through crimping rolls having teeth of half hexagonal section. When the



core is assembled a crimped strip is placed at each side of the core between the outer and the second row of tubes. With this construction the outer row of tubes, which is usually hidden behind the casing of the radiator, does not come in direct contact with the water but acts as indirect cooling surface. The tubes outside the crimped sheet can be slightly flattened or otherwise distorted without injury to the rest of the core if the core itself does not exactly fit the casing. They also tend to prevent injury in transit.

After the core tubes are assembled they are clamped in a wooden frame and are conveyed to the shipping room, where the frame with the tubes is laid on a face-plate to bring the ends of the tubes into a true plane.

The ends of the honeycomb core are then dipped in a special soldering flux which is said not to change strength with use. The entire length of the tube is not treated with flux, the depth of dipping being determined by adjustable screw stops on the frame. The bath of solder, which is arranged in a tank adjacent to the flux bath, is kept at the desired temperature (as measured by a thermo-couple) by a gas flame. The honeycomb is dipped into the solder bath in precisely the same way as it is dipped in the flux, only the ends of the tubes coming in contact with the solder. First one side and then the other side of the core is dipped. The core is shaken to remove excess solder immediately after dipping each face.

Following the dipping operation the cores are thoroughly washed to remove all traces of flux. They are then ready for the top and bottom plates to be attached. These may if desired be of a temporary nature suitable only for testing purposes. In any case each core is tested under an air pressure of 15 to 20 lb. per sq. in. and if any leak is found a new tube is easily inserted.

In order to demonstrate the facility with which damaged tubes can be replaced in doing repair work, the writer, who recently visited the plant, was requested to deliberately damage a core with a hammer. The tubes within a circle of about two inches were thus broken and the core turned over to a repairman. All of the broken tubes, twenty-four in number, were removed in 6½ minutes. This was done by inserting in each end of the tube a soldering iron with hexagonal ends. Then, tapping the tube gently until it could be easily pulled out with pliers. The broken tubes were then replaced by new ones, a soldering iron being used to apply enough solder to hold the first few in place. The last four or five tubes were easily tapped in place by using a hammer, after which a small gas torch and an iron was used to apply solder at the joints between new tubes and between the new and old tubes. The entire repair job

was completed in approximately 24 minutes.

In order to make the most efficient radiator possible with the construction employed it was necessary to determine what form of baffling produced best results. The experimental testing apparatus shown in Fig. 8 was used for this purpose as well as to compare cores made by the process described with those of other makes. By use of the baffles now employed it has been found possible to increase the cooling efficiency of the radiator over one without baffles approximately 25 per cent at air speeds up to about 60 miles per hour.

The testing apparatus is constructed as follows: A motor-driven blower is mounted on top of a closed air chamber into which the blower discharges. The only outlet to this chamber is through an air tunnel 1 ft. square in section and 10 ft. long. The joint between the tunnel and the air chamber is made by a rubber band in order to prevent vibrations of the blower and blower motor from causing the radiator to vibrate, since this was found to have an appreciable effect upon the results of the test. The outer end of the air tunnel is fitted with a shallow box with a gasket against which the sample core for testing is placed. When the core is in place it is connected to the water circulating pump and a gravity tank by rubber hose as shown in the diagram. Water drawn from the tank below the radiator is circulated through a gas water heater and discharged into a tank above the radiator. From this tank it flows into the radiator through a valve and flexible hose. From the bottom of the radiator water flows into another tank through another regulating valve.

A small float is placed in the upper chamber of the radiator, and the water circulation is so regulated by the valves that this float remains at a constant level. The thermometers are arranged to measure the temperature of the water entering and leaving the core and of air passing into and out of the core. A Pitot tube is arranged to measure the air velocity by the use of an inclined anemometer. After an equilibrium condition has been established the rate of flow is determined by measuring the time required for a given weight of water to flow into the tank on the platform scales. The air velocity through the tunnel is varied by adjusting the slide which covers a part of the blower inlet. The apparatus is not intended to exactly duplicate service conditions, but is said to give true comparative results.

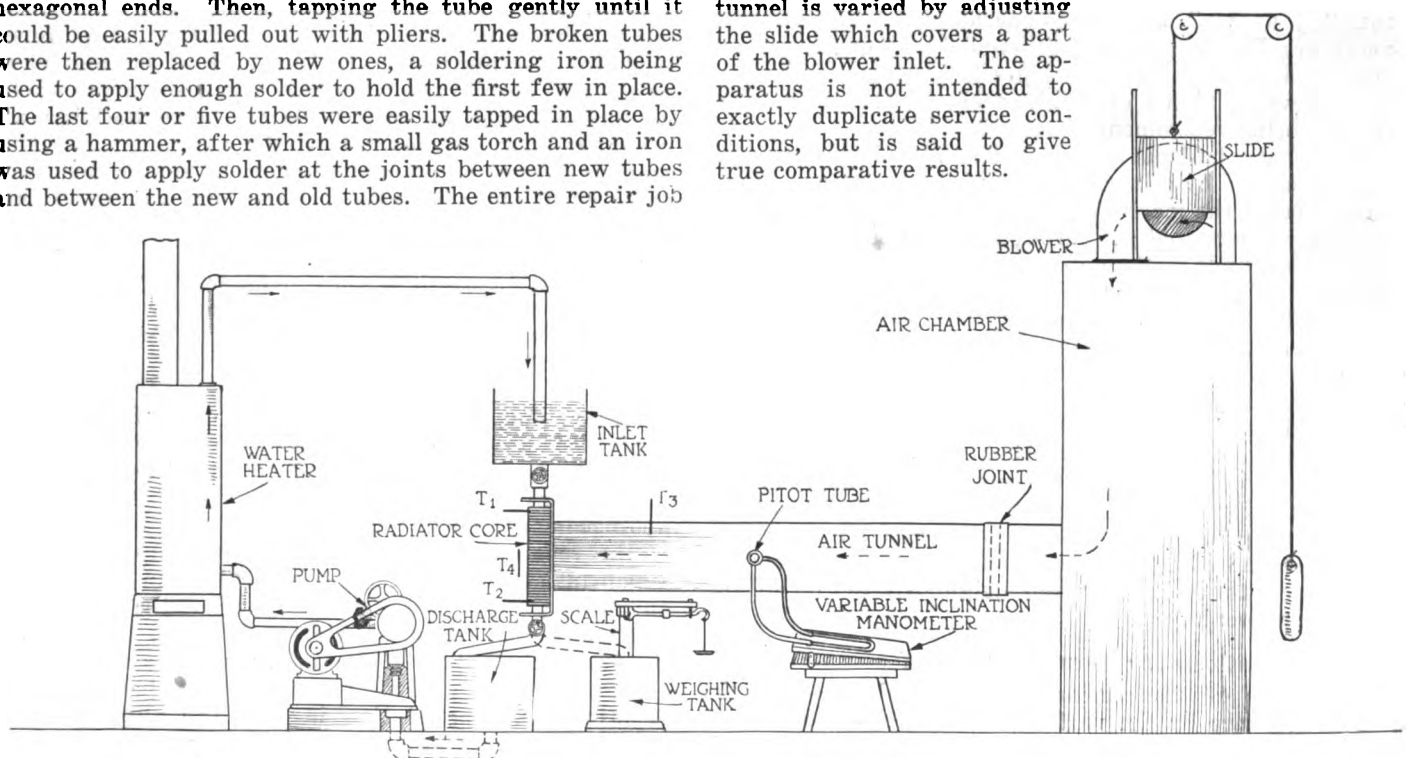


Fig. 8—Diagrammatic view of the apparatus used for comparative tests of radiator cores



# Relief Methods Recommended at Unemployment Conference

Emergency measures looking to the solving of the present situation were adopted, but a program designed to prevent a recurrence of conditions as they are was suggested by the delegates. Adjustment of railway rates and completion of tax and tariff legislation were among important proposals.

**P**RESIDENT HARDING'S conference on unemployment has resulted in recommendations affecting practically all the major industries of the country. If they were put into effect to the extent that is obviously possible, they would go a long way toward permanent relief of the situation. The closing of the conference did not result in a flare of trumpets and the announcement that within a week the United States Government would be in a position to see to it that every unemployed man would have work, but rather there was a quiet agreement among the delegates as to the measures to be taken, and how they should go about the important task of putting the idle to work.

No big concerted action was agreed upon, but every city in the United States was allotted the task of solving its own situation along the lines developed at the conference. Vital matters were brought to the attention of Congress so that the members of that body could see how the measures they are deliberating upon would affect the situation, and the need for quick action was impressed upon them.

Actual, immediate and tangible results from the conference can only be accomplished through the co-operation of various cities and civic bodies throughout the country, as well as the co-operation of all industry. Secretary Hoover of the Department of Commerce, and chairman of the conference, pretty well expressed this feeling when, in his closing speech, he said in connection with the recommendations offered:

"You have laid out a plan. The plan has been willingly accepted by a large section of the country, and you have erected the machinery to pursue that work, and we will see if we cannot get through this crisis without calling on the funds in the public purse for support and subsistence of our unemployed. Whether or not we succeed in that will depend greatly upon the co-ordination and co-operation that we can figure from industries and civic bodies of the United States. That this is a problem for voluntary organization is consonant with American spirit and American institutions. If we cannot secure its solution in that direction, we shall have made a distinct step backward in the progress of this country. It is, therefore, vital that you who return for a term to your own sections of the United States should insist, in season and out of season, that this is a problem that rests upon the voluntary and neighborly action of the American people."

## Recommendations for Permanent Relief

Many of the recommendations submitted to the conference by the various committees were of particular interest to the automotive industry, as well as to the country as a whole. Increased production, naturally, was one of the most proposed methods of

alleviating unemployment, and just as naturally, increased production cannot be accomplished unless certain other things have been accomplished first. The general recommendations of the entire conference for measures looking to permanent recovery of employment seemed to strike at the bottom of the production situation.

There were eight of these recommendations, as follows:

1. Readjustment of railway rates.
2. Speedy completion of the tax bill.
3. Definite settlement of tariff legislation.
4. Settlement of financial relationships between the government and railways.
5. Limitation of world armament.
6. Minimizing fluctuations in foreign exchange.
7. Elimination of waste and a program of more regular employment in seasonal and intermittent industries.
8. Speedy adjustment of the inequalities in deflation.

All these subjects have been discussed at great length in connection with almost every problem that comes up. They affect not only the unemployment situation, but many other situations, and many of the others revert back to unemployment. It is a sort of endless chain effect, and despite the temporary measures urged by the conference, such as road building, home building and other projects designed to meet the emergency, little can be done toward permanent recovery of employment until these vital issues have been settled one way or another. Opinions may differ, it is true, as to what form the tariff bill should take, but either its enactment in any form or its definite failure of enactment, would prove a helpful factor, for then industry would know what to expect and prepare to meet conditions. It is the uncertainty of the thing that retards progress.

The readjustment of railway rates is recognized as a necessary step toward readjustment of conditions. The conference proposed that the rates be adjusted to a fairer basis of the relative value of commodities, and asked that special consideration be shown in fixing the rates upon primary commodities. This was in line with one of the recommendations of the agricultural committee, which insisted that the rates both on farm produce and on goods shipped to the farmer were entirely too high. The conference, however, did not overlook the fact that the financial stability of the roads should be safeguarded. Certainly lowering of railway rates would have the effect of stimulating production in that the purchase price would be lowered and sales would increase.

The tax and tariff measures are those which affect every industry and individual in the country. The con-

ference did not specify what tariff should be enacted, neither did it specify the tax rate, except to urge reduction of taxes, but it did point out that the measures must have something done to them in order to speed up a return to prosperity. Industry cannot prosper when it has no clear vision into the future. Until the clouds are removed from the political horizon there can be no rapid speeding up of production. Clouds are pretty good forecasters of a storm, and the good seaman will attempt to navigate around that storm. If it is blown away then so much the better, but if it is to come all industry is hoping that it will come soon, for afterward the skies will be clear and smoother sailing will lie ahead.

Aside from a lowering of their rates, the railways could perform other necessary duties that would tend to lessen the number of unemployed for all time. The present status of financial relationships between the railroads and the Government is such as not to inspire any too great confidence in the former's future. A settlement of these difficulties would obviously bring about increased railway employment and stimulate general employment. Immediate settlement of these relationships would provide immediate relief in that maintenance and betterment work could proceed, and when enlarged business comes the railways would be prepared to handle it.

#### Armament and Foreign Exchange

The prosperity of the United States depends not alone upon its own prosperity, but, especially since the war, upon the prosperity of other nations. A decrease in the tax burden of other nations would release more money from those countries for the purchase of American goods, and, conversely, a decrease of America's tax burden would allow the purchase of more goods abroad. One way of decreasing these tax burdens would be the reduction of world armament. Besides the economic benefits to be derived from such a move, there is the human side. Peace and tranquillity would be more nearly assured, and, after all, the human factor has a fundamental effect upon economic trends.

The decrease in taxes of all nations, and the consequent buying and selling between countries, would also have the effect of reducing the fluctuations in foreign exchange, another recommendation by the conference. The Committee on Foreign Trade, in its report to the conference, went into this situation quite thoroughly and pointed out some of the difficulties facing American business as a result of the fluctuations and suggested a few remedies. As the conditions stand, no merchant can well afford to take the risks of shipping his goods to a foreign nation with the knowledge that he cannot determine the delivery cost of any international shipment. The Committee on Foreign Trade pointed out as causes of the fluctuations the unbalanced budgets of many foreign countries, and the "unregulated demands of the German Government for foreign currencies in order to complete reparation payments."

This committee, in offering a remedy for these conditions, called on Congress to enable the administration to deal with the funding of foreign debts owed to the United States Government in such a way as to avoid injury to our foreign trade and our employment. It was also urged that the United States be effective in the deliberations of the Reparations Commission and other agencies, so that its influence may be exerted toward a reasonable control of the present unregulated payment of reparations by Germany.

A definite program of action that will lead to elimination of waste and more regular employment in seasonal and intermittent industries, in order that the drain upon

capital may be lessened and the annual income of the workers may be increased, was another recommendation of the conference. The coal industry was pointed to as one into which seasonal employment enters, and the conference urged measures of relief taken in that industry at once. The Committee on Mines, in its report, suggested that railroads maintain at all times along their lines a supply of bituminous coal sufficient to last for five months. This suggestion should not apply only to the railroads, but to every other industry that uses coal as well.

Finally, the conference recommended a speedy adjustment of the inequalities in deflation. In comparing present price levels of various commodities and services with those of the pre-war period it was shown that agriculture has reached an unduly low plane, while transportation, coal and some branches of the construction industries are of the highest. An entire disproportion between the price of the primary commodities and the ultimate retail price was also declared to exist, and the reasons given for these increases were declared to be increased costs of transportation, enlarged profits, taxes, interest, labor and other charges.

"If the buying power of the different elements of the community is to be restored," said the recommendation, "then these levels must reach nearer a relative plane. For example, the farmer cannot resume his full consuming power and thus give increased employment to the other industries until either his prices increase or until more of the other products and services come into fair balance with his commodities and therefore the reach of his income."

All these recommendations may seem far away from the man who wanders the streets in search of a job. They appear, on the surface, to be connected with matters pertaining to government and politics, and, in fact, they are. These recommendations were made, however, after a careful study of the unemployment situation, and they were framed to correct the fundamental current evils. As far as being emergency measures is concerned they probably do not amount to much, but other methods were undertaken to care for the immediate needs. The methods discussed go farther than the present. They look to the establishment of permanent good business and prevention of a recurrence of present conditions.

#### The Business Cycle

The conference went to the extent of recommending an exhaustive investigation into the causes and remedies of periodic business depressions. Business depressions of other years were discussed in a report along this line, and it was declared that the long succession of business crises does not prove that the problem of controlling the business cycle is a hopeless one.

"The business cycle," said this report, "is marked by peak periods of boom between valleys of depression and unemployment. The peak periods of boom are times of speculation, over-expansion, extravagance in living, relaxation in effort, wasteful expenditure in industry and commerce, with consequent destruction of capital. The valleys are marked by business stagnation, unemployment and suffering. Both of these extremes are vicious and the vices of one beget the vices of the other. It is the wastes, the miscalculations and the maladjustments grown rampant during booms that make inevitable the painful process of liquidation. The most hopeful way to check the losses and misery of depression is, therefore, to check the feverish extremes of 'prosperity.'"

The best time to act is at a fairly early stage in the growth of the boom."

This report went on to recommend that industry put aside financial reserves, to be provided in times of prosperity, for the deliberate purpose of improvement and expansion in times of depression. Such action, the report said, would not only lessen the depth of the valleys in the business cycle, but would also lower the heights of the peaks.

The emergency measures adopted by the conference are pretty generally known. As was pointed out, each community is given the burden to bear so far as the situation affects that community. Exchanges are being organized whereby a city with a shortage of labor can immediately be informed as to where the class of labor it desires is available. Employment agencies are busily engaged in securing and compiling information on employment opportunities throughout the country. If ship builders and operators are carrying out the recommendations of their committee there has been an elimination

of overtime work for stevedores and men engaged in allied work. Rather there has sprung up a split-time basis in order to give jobs to more men. The committee urged that the United States Shipping Board expedite the breaking up of wooden tonnage on hand, and using the material for constructive purposes. Overhauling of ships likely to be used soon was another idea urged upon the marine industry. The Committee on Public Roads urged more activity in road building, and there were many other of these committee reports that offered emergency relief. These measures are being put into effect now, and in due time their result will be felt. But with all the emergency measures the result will be but temporary. Road work cannot go on forever, neither can the breaking up of wooden ships, and sooner or later men working as stevedores, or as anything else, must have full-time work. This can be brought about only by the adoption of a permanent policy that will stabilize industry in general and consequently stabilize employment.

## Postal Rates to Pan-American Countries Will Be Lowered

THE lowering of postal rates and improvement of the parcel post to foreign countries is a subject of pressing importance to exporters and automotive manufacturers engaged in overseas trade. Consequently, the action of the recent Pan-American Postal Convention at Buenos Aires is fraught with promise for the future course of commercial relations between the countries of Pan-America.

In substance the convention's action will have as its result the lowering of postage rates from the United States to all countries of Pan-America to the domestic rate of two cents. This rate is now in effect to Mexico, Cuba, Dominican Republic, Porto Rico, Nicaragua, Honduras, Panama and the Canal Zone, Colombia, Peru and Bolivia. The Pan-American convention will lower it to all countries, and after it goes into effect the same rate will apply to Argentina, Brazil, Chile, Uruguay, Venezuela and elsewhere as for letter transmission in continental United States.

The simplification and betterment of the parcel post is perhaps of even greater import. At present it is almost impossible to send shipments of advertising or sales literature, catalogs, small parts and accessories to the various countries of Latin-America by parcel post. The regulations differ in each country. Special charges of various kinds, with numerous penalties for non-compliance with vexatious and little-understood rules, pile up on the receiver to such an extent that the parcel post can seldom be used.

The Buenos Aires convention eliminated all these vexatious regulations and adopted a single system that will be used in each country. In the words of O. K. Davis, who headed the American delegation, the result will be to exchange nineteen systems for one. The Pan-American limit for parcel post packages will be 10 kilos (22 lb.) except to a few interior countries in which special conditions limit the packages to half that size. This limitation does not pertain to the larger countries, such as Argentina, Brazil, Chile and Peru. Furthermore, all charges against the receiver of the package, except custom duties that are payable in the country of destination, are wiped out and replaced by a single charge of ten cents American gold assessed against the sender of the package. This single provision is declared to be one of the most important contributions of recent

months to the promotion of closer trade relations between North and South America. It will eliminate the costly delays, penalties, charges, etc., that to-day pile up in some countries against the receiver and which make it impossible for the American shipper to use the system.

One point on which the convention was unable to act concerned the filing of consular invoices with parcel post packages and one slight reservation was made by Argentina against the convention because of its custom laws. Therefore, the matter of consular invoices must remain as at present, because any change in it concerns the custom laws of each country and, therefore, did not come within the province of the Buenos Aires deliberations. It has been proposed that a custom conference be held to take up this point.

The convention was unanimously agreed upon the proposals, with the reservations enumerated, and they will go into effect generally on Jan. 1, 1923. This delay was caused by the fact that the Mexican congress will be unable to act upon ratification before the latter part of next year, as it does not have another meeting before that time. However, the agreement provides that the provisions may be put into effect at any date prior to that time by countries ratifying them. This leads to the hope that its provisions will become effective in some sections shortly.

In commenting upon the convention, Mr. Davis declared that the results would go a long way in furthering Pan-American solidarity, as the rates provided are much lower than those prevailing between American countries and Europe. In fact, the American dollar was made the standard for the convention.

**A** NAPHTHALINE engine for stationary purposes is being manufactured by the Deutz Gasmotorenfabrik of Germany. The naphthaline is kept in the liquid state by means of steam generated by the exhaust gases, both the naphthaline container and the feed passage being surrounded with a steam jacket. Naphthaline at present costs only about half as much as benzol, the conventional liquid hydro-carbon fuel in Germany, on the weight basis. The engine must be warmed up with benzol or illuminating gas, and in the case of a 20-hp. engine it is necessary to run 15 minutes on this auxiliary fuel.

# The Argentine Automotive Market

Here is the most recent and authoritative summary of the automotive situation that has come to the United States. Internal conditions in Argentina are fundamentally sound. First nine months of 1921 were dark ones, but a trade revival has begun. The reasons are discussed in detail.

By M. T. Meadows\*

BUENOS AIRES, ARGENTINA, Oct. 1.

**T**HE internal conditions of Argentina are to-day fundamentally sound. This, despite the fact that the country has undergone during the past ten months a period of business depression more serious than any experienced since 1914. The causes of this depression have been, broadly speaking, the decline in the values of Argentine foodstuffs and raw materials in the world's consuming markets with the aggravating circumstances of a restricted demand for these products, even at low prices.

The picture as painted during the first nine months of 1921 is a dark one. Happily its colors are now brighter. In fact, even the more pessimistic observers are granting that the worst of the storm has blown over and that an improvement may be confidently expected.

A month ago many business men thoroughly familiar with trade conditions in Argentina predicted a trade revival contingent upon three things:

First—General rains throughout the country.

Second—The conclusion of negotiations for a \$50,000,000 loan.

Third—The granting by the National Bank of a two-year moratorium to its clients who had obtained credits on cattle mortgage liens.

During September the menace threatening Argentina with a disastrous crop and cattle failure, in the form of the most serious drought experienced by the country in the past decade, was dispelled by heavy rains which benefited all sections of the country. The \$50,000,000 loan was secured and the last-named condition for a return to more prosperous times seems to be well on its way toward fulfillment.

It is true that the volume of Argentine grain exports during 1921 were vastly inferior to those effected during same period of the previous year. However, grain prices have been well sustained and farmers have received ample remuneration for their produce. Cattle prices during September have shown an increasing tendency upward. The effects of this steadiness in the meat market are already being noticed in the readiness of ranchers and interior merchants to purchase more liberally those commodities required by them. Another factor which is considered as most favorable is the decided firmness in the prices of hides which, of course, is having a marked influence in the betterment of the live stock business.

Fortunately, a growing demand for all grades of Argentine wool is to-day becoming more evident. Buyers are to be found not only for the finer wools, which met with some sale even in the period of the depression, but also for the enormous stocks of coarse wool which some

months ago could not be disposed of at any price. These circumstances, together with the prospects of good crops, should mean that the Argentine can soon resume the purchase of American cars on a scale which, even though not commensurate with the demand during the past four years, will be sufficiently large to supply normal post-war requirements.

On Jan. 1, there were 3,500 automobiles held in the bonded warehouses of Buenos Aires. This number did not include Ford cars which are brought into the country as spares and assembled here. The liquidation of this stock during the present year has been slow but steady. By March 1, 2,003 cars were still in the custom-house. To-day the number in the custom-house is considerably less than 1,000. It is well to add that of this number more than 500 have already been paid for by the importers. Beyond a doubt, the end of the present year will see a final liquidation of these cars and certainly before the end of the spring and summer selling season now ushered in these vehicles will have been marketed and importers will be forced to place new orders.

Even a cursory investigation will demonstrate to what extent American cars predominate in the Argentine market. It is true, of course, that prior to 1914 European automobiles, especially French makes, were the only ones finding ready acceptance. The universal use of automobiles in Argentina is, however, entirely due to the popularity of the low-priced American vehicles. Not only in the Argentine cities, but even in the most distant hamlets and rural districts, Fords, Chevrolets, Dodges, Maxwells, Buicks, etc., are to be found in abundance. Higher priced cars are usually owned in the cities and larger towns, but Packards, Cadillacs, Hudsons, Hupmobiles, Studebakers, etc., are to be found here much in the same relation to the total number of automobiles as in the United States.

At the present time there are no statistics available giving the number of automobiles in actual use in Argentina. An effort is being made by the local Automobile Chamber of Commerce to take an automobile census, but this information will not be ready for publication before the end of the present year.

Automobile and tire importers estimate that from 70,000 to 80,000 cars are now being used in the republic. Of this number, approximately 55,000 are used outside of the larger cities. This plainly demonstrates the fact that ranchers and farmers are the heaviest buyers of automobiles. Buenos Aires is credited with approximately 15,000 cars in use within the city limits. Licensed taxicabs comprise about 6,500 of this number, with nearly 8,500 cars in the hands of private owners. The ready sale of the Ford is shown by the fact that more than 40,000 trucks have been sold in Argentina since 1914.

\*Manager of Chamber of Commerce of the United States of America in the Argentine Republic.

# New Commodity Divisions Will Give Industry Many Advantages

Reorganization of Bureau of Foreign and Domestic Commerce includes the formation of divisions that will function for automotive industry and rubber exporters as well. Collection and distribution of merchandising information as it is related to international trade will be chief task.

IT has been understood for some time that the Bureau of Foreign and Domestic Commerce was undergoing a general reorganization and that it would soon be equipped to handle the problems of American business in a more practical and constructive way than in the past. This reorganization has been completed to a large extent, and already the parts of the Bureau relating to automotive products are in a position to function efficiently. An analysis of the aims and possibilities of the reorganized Bureau indicates that a source of real aid to the manufacturer is being established which will help him in solving many practical business problems, especially those relating to international trade.

A general survey of the changes in the Bureau, together with a somewhat detailed discussion of the functions of the automotive division in particular, will make clear to manufacturers just what may be expected from the Bureau in the way of service, and how the facilities of the Bureau can be most efficiently utilized. The most striking development in the Bureau consists of the creation of fourteen new commodity divisions. The names of these fourteen divisions and of the men in charge are:

Agricultural Implements and Vehicles.....	George B. Bell
Automotive.....	Gordon Lee, Wm. I. Irvine
Electrical Goods and Machinery.....	Ruben A. Lundquist
Fuel.....	Henry C. Morris
Boots, Shoes and Leather.....	Arthur B. Butman
Lumber.....	Axel H. Oxholm
Foodstuffs .....	Edward G. Montgomery
Iron and Steel.....	W. S. Tower
Industrial Machinery.....	Walter H. Rastall
Rubber .....	Paul L. Palmerton
Textiles.....	Edward T. Pickard
Chemicals .....	(Open)
Paper .....	(Open)
Specialties .....	(Open)

These new commodity divisions are additional to the former geographic divisions, and are designed to render a distinctive service which has not previously been performed for American industry by the Bureau. The men appointed to take charge of the various commodity divisions have all been drawn from industry itself. They are men who have had practical experience in the industry which they represent and are thoroughly familiar with the requirements and problems of practical business.

It is the duty of these men to keep in the closest possible touch with the centers of the industries they serve by way of appropriate commercial organizations, trade papers, editors and individual manufacturers and merchants. They are charged with the responsibility of ascertaining the character of the information most urgently

needed by their particular industry. With this as a basis, it is their task to utilize the existing world-wide facilities of the Department of Commerce, consisting at present of over 600 foreign representatives in promptly obtaining the information desired.

Their long experience in a special knowledge of the peculiar problems connected with each industry should result, it is believed, in the rendering of reports which will be understood in their true significance by the American business men concerned. These men will also see to it that reports reaching the department from all sources are properly interpreted from an industrial standpoint and are immediately submitted to the points where they will do the most good.

The automotive division has already begun to function actively. The co-operation of the National Automobile Chamber of Commerce has been extended to it, and through that contact considerable mutual benefit will doubtless accrue. One of the chief interests of the automotive division at this time is to get manufacturers to tell their troubles to the division; to let the division have their opinions as to what service they believe can be rendered, and the best form of rendering that service.

There is a vast amount of information available from consuls, trade commissioners, and commercial attachés, which if properly interpreted and compiled, will be of infinite value to American manufacturers in connection with their international trade. The agent's reports in the past have frequently been useless because the consul was not thoroughly familiar with the information desired and the use to which it was to be put. The automotive division is taking definite steps to acquaint the agents in various parts of the world with a detailed analysis of the sort of information desired by American automotive manufacturers, and will consequently have at its disposal before long really worth-while commercial data.

## Analysis of Foreign Markets

It is expected that one of the members of the division will make an extended trip of several months shortly after the first of the year with the purpose of analyzing thoroughly, from the standpoint of American automotive selling, some specific foreign market. This survey will not be the usual seaport investigation consisting of general statements and hearsay data. It will be conducted with thoroughness and will be designed to reveal practical material of selling value. The man making the survey will go out with a complete knowledge of the marketing problems of the American automotive industry and will seek throughout the country the kind of specific trade information that would be desired from a personal representative of an individual manufacturer.



The first foreign market to be investigated in this manner will depend to a large extent upon the desires of the automotive manufacturers, but present indications are that China in particular, or the Far East in general, will be the first ground covered.

Efforts are being made to present statistical data to the automotive industry in such a way that it will be of practical value. The reclassification of automotive export statistics announced recently marks a definite step in advance. The reclassification as announced by AUTOMOTIVE INDUSTRIES, it will be recalled, affected cars, trucks, tires and aircraft. It showed that the American export statistics would be compiled and issued under the following classifications beginning with Jan. 1, 1922:

*Cars*

1. Under \$800.
2. Over \$800 and under \$2,000.
3. Over \$2,000.

*Trucks*

1. 1 ton and under.
2. 1¼ tons to 2½ tons inclusive.
3. Over 2½ tons.

*Tires*

1. Pneumatic casings for automobiles.
2. Other pneumatic casings.
3. Pneumatic tubes for automobiles.
4. Other pneumatic tubes.
5. Solid tires for automobiles and trucks.
6. Other solid tires.
7. Tire repair materials.

*Aircraft*

1. Airplanes and hydroplanes.
2. Other aircraft.

Comparing these classifications with the present one, it is readily evident that the export information available next year will be of far more selling value than it is now. These classifications, while perhaps not the last word so far as manufacturers' information is concerned, undoubtedly will reveal much information not now available and will enable American firms to analyze more intelligently the trade with various individual countries.

The handling of tractor statistics is another problem being discussed by the automotive and the agricultural section. A definite decision has not yet been reached in regard to the listing of tractor exports. There is some discussion as to whether tractors belong to the agricultural or automotive divisions. According to the present status, agricultural tractors will be listed in the agricultural machinery and implements section under the following heads:

1. Farm Tractors
  - a. Wheel
  - b. Track laying

Under the power generating machinery division will be listed the commercial tractors under this head:

Complete Tractors, Except Agricultural.

The inconsistency of this practice as regards tractors is evident from the standpoint of business needs and sales analysis. There is every likelihood that a better grouping will be determined before next year's program goes into effect.

These specific incidents are cited, however, to indicate the kind of problems with which the automotive division is concerned and to illustrate the practical efforts which are being made to render more effective existing potential services, to extend the service in many ways, and to enable the government bureau to function efficiently in co-operation with the automotive manufacturer.

The rubber division is also of special interest to automotive manufacturers since a large percentage of the material handled by this division relates to automobile and truck tires. This division is organized and functions as does the automotive and other sections, so that a few details of its work serve as typical examples of what it and the automotive division are doing.

### Purposes of Rubber Division

The first purpose of this division will be to give exporters information that will be complete and accurate on the world's markets for their products. Two representatives of the division, one of whom will be traveling at all times, will determine just what information is desired by the industry and the complete facilities of the bureau will be used to obtain the data required. At present all information on the rubber goods market that is available in the Bureau of Foreign and Domestic Commerce is being gathered and filed in the rubber division. All this data will be checked for inaccuracies and incompleteness and the field force of the bureau will be asked to supply missing information or verify that now on hand. It is also planned to have questionnaires constantly going to representatives of the United States in all territories and a return stream of information always coming into the division.

Dissemination of this information will be partly through "Commerce Reports," and partly through answers to correspondence from manufacturers inquiring about some particular phase of the industry. Present indications have pointed out the fact that "Commerce Reports" will not be able to print all the information received, and for this reason answers to special inquiries will form one of the major outlets for the distribution of information. Special bulletins will also be sent out to the industry that contain pertinent information that cannot await publication.

As in the past confidential information will be sent only to firms that are American owned and controlled. Special trade opportunities and importers' lists will be sent only to companies who have filed with the bureau a form showing this to be true. The list of companies thus qualifying will form what is known as the Exporters' Index, and admission to this index can be obtained by applying for and filling out Form 57 which will be supplied by the Rubber Division upon request. Indexed firms will be given the advantage of having specific trade opportunities automatically delivered to them instead of having them published under a special key number.

### Comprehensive Surveys Projected

As in the automotive division, collection and interpretation of statistics on the export trade will be a task of the division. Such statistics are now issued each month, but there are certain other channels, not now generally employed, through which the division will secure valuable information which will serve admirably as guides to better and greater markets. Certain markets, at times, will undergo unusually comprehensive surveys. This will usually be accomplished by putting a man from the division right in the country to be investigated. Rubber and motor journals from all over the world will be read and foreign competitors will be watched and reported upon.

The usefulness of the automotive and rubber divisions will depend largely upon the assistance given to them by the manufacturers and the extent to which manufacturers take advantage of the information which is being made available. The automotive section is among the first of the commodity divisions to begin to function at high efficiency and manufacturers are having opened to them a source of accurate and practical trade information that has not before been available.

# Patent Bureau Efficiency Will Aid Manufacturer

The Lampert measure now before Congress would increase the salaries of employees and officials in this important government office as well as provide for a large increase in the working force. One-fourth of patents applied for affect automobile industry. Bill would aid in other ways.

SOMEWHERE beneath the measures affecting the tariff, peace with Germany, taxes and disarmament there lies in Washington a bill designed to increase the salaries and working force of the patent office. Whether or not it will be acted upon or even discussed at the present session of Congress is somewhat problematical in view of the rush of important legislation that representatives and senators are facing, but if it does come to the fore before adjournment, manufacturers of automobiles and automotive equipment will be particularly interested in its fate. Just what this will mean to the manufacturer in automotive industries can be realized when it is known that fully 25 per cent of all patents now being issued pertain in one way or another to automobiles.

A similar bill, sponsored by Representative Nolan, was defeated at a recent session after every indication had been given that it would go through. When this measure first came up there was scarcely a dissenting voice heard. The road seemed clear for immediate passage, when suddenly a provision was added that caused those favoring the bill to immediately change their views and the measure was defeated. The reason ascribed for this almost over-night reversal of opinion was a section providing that government employees who had patentable ideas should turn those ideas over to the Federal Trade Commission; the government would secure a certain amount of the revenue from the patent and the employee the remainder. This section of the bill was, no doubt, intended to encourage scientific men to enter the government service, but an analysis of the measure by various industrial interests brought out a few interesting facts that, when they became known, practically caused the bill's defeat.

## The Objectionable Feature

It was pointed out that various government bureaus exist which are operated for the benefit of the taxpayer. The Bureau of Mines might be taken as an example, and a mine owner or his representative might write to this organization asking advice on some technical mining question. A government employee would be assigned to the case, solve the problem and send the answer to the mine owner. If the answer contained some original feature the bureau employee could patent the idea through the Federal Trade Commission, which in turn could bring action against the mine owner for an infringement of the patent rights.

It was this feature that caused the untimely death of the otherwise unobjectionable Nolan bill. The new measure, introduced by Representative Lampert, does not include this provision, but in substance its other provisions are similar to those in the original Nolan bill. The scale of annual salaries for various patent

office officials would be fixed under the new bill as follows:

Commissioner of Patents, \$6,000; first assistant commissioner, \$5,500; assistant commissioner, \$5,000; five examiners-in-chief, \$5,000 each; chief clerk, \$4,000; six law examiners, \$4,000 each; examiner of classification, \$4,200; two examiners of interference, \$3,900 each; examiner of trade-marks and designs, \$3,900; first assistant examiner of trade-marks and designs, \$3,000; forty-seven principal examiners, \$3,900 each; one hundred first assistants, \$3,300 each; thirty first assistants, \$3,100 each.

The schedule of salaries also includes many other assistant examiners, clerks and others at salaries ranging from \$2,900 to \$1,080 a year.

## Patent Bureau Operates at Profit

These salaries are practically the same as those provided for in the Nolan bill. It has been repeatedly pointed out in connection with the request for higher salaries that the patent office is one of the few, if not the only government department, that operates at a profit. It has done this since its inauguration, and those friendly toward the measure are confident that the increased salaries will be taken care of by revenue from the office. In fact, the salaries were figured on this basis.

The bill, if passed, will mean considerable to the manufacturer, for with an increased working force the long delays prevalent between the time a patent is filed and when the first action is secured should be eliminated. At the present time the patent office force is composed of a few conscientious men who are doing all within their power to maintain efficiency, but their power is limited by lack of funds and lack of help. It has been figured that of the vast number of cases taken to the office to be examined, the examiner does not have an average of a full day for each case. Naturally this does not tend to increase efficiency.

## The Present Salaries

As to whether or not the patent office officials and employees are deserving of an increase in salary it should be borne in mind that the last increase to this department was granted in 1907. The only increase prior to that time was back in 1840 or '45. At that time patent office officials received the same salaries as congressmen. The present scale of salaries is as follows:

Commissioner of Patents, \$5,000; first assistant commissioner, \$4,500; second assistant commissioner, \$3,500; three examiners-in-chief, \$3,500 each; chief clerk, \$3,000; two law examiners, \$2,750; examiner of interference, \$2,700; examiner of trade-marks and design, \$2,700; forty-three principal examiners, \$2,700 each; sixty-three first assistants, \$2,400 each.

There are, of course, many other assistant examiners and clerks who receive salaries below \$2,000 a year. A part of the increase in the working force is shown by a comparison of the two tables of salaries. There are also additions in the clerical and examining forces provided for under the Lampert measure.

There is one thing that may stand in the way of passage of this measure. That is the fact that a federal commission has been working for a year or more on a general revision of government employees' salaries, and some congressmen may feel that this revision, when it is completed and acted upon, will take care of all departments alike, and dealing with one separate department would be somewhat partial. It is probably true that other departments are as deserving of increases as are the employees in the patent office.

Under the present system, or lack of system, of computing government employees' salaries a highly trained engineer in one bureau may be receiving an adequate salary, while on the next floor, in another department, there might be another engineer, with the same training, the same ability and doing equally important work, who receives half the salary of the first. The commission is working to overcome this discrepancy.

#### Other Important Provisions

But there are other portions of the patent bill that deserve consideration. The fact that it increases the working force of the department is enough in itself to make it a worth-while measure. Various provisions are attached to it, however, some of them merely being of a minor nature, but one or two are of sufficient importance to be commented upon.

One feature of the measure provides that when court action is begun in any patent case in the various courts throughout the country, the clerk of the court shall file notice of such action in the patent bureau within one month from the time such action is begun. This is not done at present, and parties interested in buying patents often go to the patent office to look up data on the case and remain uninformed of the fact that legal action is being taken for some cause or another. The provision states that the patent commissioner must have notice of such litigation filed with the original patent papers.

In the patent law now in operation there is a section providing that holders of patents who bring suit to recover alleged losses from the misuse of the patent must show definitely the amount involved and present other information that in most cases would be extremely difficult to secure.

A clause in the Lampert measure makes a new provision in this respect. The various federal courts are given the power to grant injunctions to prevent the violation of any right secured by patent, and, upon a decree being rendered in any such case for an infringement, "the complainant shall be entitled to recover, in addition to the profits to be accounted for by the defendant, the damages the complainant has sustained thereby." The measure further provides that "if on the proofs it shall appear that the complainant has suffered damage from the infringement or that the defendant has realized profits therefrom to which the complainant is justly entitled, but that such damages or profits are not susceptible of calculation and determination with reasonable certainty," the court may accept expert testimony on the subject and determine the amount the defendant has to pay.

This, of course, is a protective measure for the patentee and one to which he is entitled. Another protection offered the inventor is the barring of attorneys or agents who are incompetent or dishonest from having

dealings with the patent office. The Commissioner of Patents is given the power to prescribe rules and regulations governing the recognition of such agents, and to require them to show that they possess the qualifications necessary to render their clients valuable service.

#### Fees Slightly Increased

The bill would also change the rates for patent fees as follows:

	Present fees	New fees provided
Due with application.....	\$15	\$20
Upon allowance of patent.....	20	20
Design patents—		
Three years six months.....	10	10
Seven years.....	15	15
Fourteen years.....	30	30

The Lampert measure would also add the following fees: On every application for the reissue of a patent, \$30; on filing each disclaimer, \$10; on an appeal for the first time from the primary examiners to the examiners-in-chief, \$10, and on every appeal from the examiners-in-chief to the commissioner, \$20.

It will be seen that one slight increase is effected in the new measure in that \$20 instead of \$15 is to be paid with each application for a patent. This increase, with the additional fees, should amply provide for the increased salaries asked for and keep the patent office a money-making department for the government.

From these facts it can be seen that, although the commission attempting to work out an equitable method of fixing salaries of government employees might find a satisfactory solution to the problem, there are other matters of importance contained in the bill. The salaries and increased working force are, of course, of prime importance, for both these provisions will mean increased efficiency and that is the factor the manufacturer will be most affected by. The other items are worthy of consideration, however, and worthy of support.

### New British Society

A COMPARATIVELY recent body in England with a somewhat delicate but meritorious mission is the Society of Technical Engineers. According to the Journal issued by that body it has a twofold objective—the one connected with the interests of individuals and of the profession, and the other connected with the advancement of the British engineering industries. It will attempt to establish communications with individual employers and with organized employees in pursuit of both groups of its objects. In dealing with the manual workers, while the society will not associate itself with the labor movement nor seek to join the Trades Unions Congress, it will earnestly seek to find some means of co-operation with unions of manual workers in the industry in pursuit of the second group of its objects—those concerned with efforts to secure the advancement of the engineering industries of the empire.

It is the aim of the society, for the present, to make certain that technical engineers shall occupy and preserve a position intermediate between employers and workpeople, both within their firms and in relation to the organizations of employers and of workers. The society wishes to see the establishment of joint councils of employers and technical staff in suitable firms, which should in time come to discuss not only conditions but questions of technical engineering interest. The constitution of joint committees of technical staff and manual workers to consider means whereby the industry might be advanced would also be welcomed.

# The Economic Problem of Marketing

How can consumption be increased to fill manufacturing capacity and decrease price, without lowering wages, so that the product will be cheaper in relation to the purchasing power? This is the economic problem. It must be faced and can be solved only by decreased merchandising costs.

By Harry Tipper

**I**N the previous article upon this subject some indication was given of the position of the United States in its growth of manufacturing capacity. It was stated that the manufacturing capacity had increased beyond the present market requirements and that the problem of filling this manufacturing capacity was to a great extent a problem of economic marketing.

Most lines of industry find themselves facing a serious problem of over-production capacity and the discussions of all manufacturing associations are devoted largely to the attempt to find a solution to this problem. In the metal trades industry, for instance, some manufacturers have decided to enter other branches of that business in order to fill out their capacity for production.

This may provide a solution for some of the individual manufacturers, but it is only temporary, because every line has a larger production capacity than is necessary for present consumption and the problem is not improved by shifting individual organizations from one line to another.

In the endeavor to secure a sufficient proportion of the market to keep the individual factory running at individual capacity, the competition will become keener and more ruthless, so that some of the factories in every line of business will be busy at full rate while others will have a percentage of idle time due to their inability to secure enough of the market.

Unless the manufacturing capacity can be used fully and intelligently, the interest upon the idle capacity investment will be a direct burden upon the industry, adding to the costs. Prices have a tendency to fall and this tendency will be continued with temporary fluctuations for some time. Only by manufacturing at full capacity and with the very best equipment can the price yield the proper profit.

The economic problem, therefore, may be stated in this way: How can we increase the consumption so as to fill the present manufacturing capacity and decrease the price without proportionately decreasing the wages, so that the product will be cheaper in relation to the purchasing power?

The same problem was faced by Great Britain after the Napoleonic Wars, and by this country after the Civil

War. The problem was solved by the introduction of machinery and mechanical aids to manufacturing and transportation, so that the production capacity grew very rapidly. The price of production decreased very steadily and at the same time the individual wages increased almost as steadily. From the Civil War to about 1900, this progress continued.

In the face of declining prices the growth of industry will depend upon the ability of the manufacturer to produce and market his product at lower prices without being obliged to reduce his labor in proportion. People will consume more product if it costs less in proportion to their earnings.

The method adopted in the solution of the problem which we faced at the end of the Civil War cannot be relied upon to solve the problem today. The mechanical equipment of industry can be improved very considerably, but the improvement will be slower because the fabric is so much larger, so much more complete and has developed to a much higher stage of efficiency.

Undoubtedly great improvements will be made in manufacturing costs. The productivity of labor can be increased by large percentages.

The character and capacity of machinery can be improved very greatly in almost any individual factory. The improvement in mechanics will not be made at the same pace, however, because any single improvement will have less effect upon the total costs.

On the other hand, the commercial costs of business have been increasing for a number of years. The efficiency of marketing and of all the commercial elements of the transaction have been decreasing, so that many of the economies secured in production has been cancelled by the additional cost demand as the production was completed.

The tendency of commercial costs is to increase. If the present tendency continues, a considerable part of the economy secured in production in the future will be absorbed by the increasing cost of the commercial transactions.

It is necessary, therefore, that the business of distribution and marketing with all its commercial elements be examined and analyzed, so that its costs are

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**M**ARKETING does not mean simply getting an order. It means getting the order at a cost justified by the character and extent of the order and under conditions which will make it possible to maintain the market with the least expenditure of time and effort.

A careful analysis of marketing is necessary to make it possible to obtain orders in this way. Practically no analysis of any importance has been made of marketing in the automotive field. Money has been spent on purely speculative possibilities. The manufacturer with a thousand cars to sell has not hesitated to try to sell those cars to four million people and to conduct his business as though such marketing expenditures were entirely justified.

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reduced or the increase of costs at present operating is eliminated.

In the automotive field it costs far too much to market a vehicle or an accessory after the manufacturing is done.

The economic problem facing the automotive industry is the same that faces every industry in this country: How to keep the plant full, to lower costs without lowering wages in proportion, so that the purchasing power is increased in relation with the product.

The most important subject for analysis in the solution of this problem is on the commercial side of the business establishment, the costs which go into marketing, distribution and financing of marketing and distribution, the commercial overheads and similar functions.

Practically no analysis of an important character has been made of marketing in the automotive field.

Money has been spent on purely speculative possibilities without any knowledge of the limitations of the market or its reactions. The manufacturer with a thousand cars to sell has not hesitated to try to sell those cars to three or four million people and conduct his business as though the expenditure of money in marketing work on that basis were entirely justified.

The same manufacturer has distributed his cars, without regard to distribution costs, in any part of the country from which he could secure an order. Manufacturers of accessories and materials and parts have attempted to get distribution in every retailer's establishment, spending the same time and effort upon all retailers, although the buying capacity, the stability and the value of the retailers as customers vary very greatly, so that a considerable proportion of them do not buy sufficiently to pay for the efforts actually expended upon them.

The effect of turnover upon the capital invested in completed stock has not been sufficiently analyzed. Dealers' and jobbers' establishments have been stocked with material which has not been properly marketed, so that it would not move quickly enough to pay the interest upon the capital involved. Not only that, but the capital involved in distributing stocks properly arranged can be turned over at compound interest because of the opportunity to reinvest it frequently.

No analysis has been made of the effect upon costs produced by a change in the rapidity of the flow of prod-

ucts in distribution and marketing. Consequently, the cost of getting goods from the factory door through the manufacturer's commercial departments, the distributor and retailer to the final user, is unnecessarily high and has a tendency to increase constantly.

Unless better means of analysis are adopted this cost will have a tendency to further increase, because the intensity of competition will be increased and the efforts required to overcome the competition will add largely to the costs of distribution.

The most important problem faced by the automotive manufacturer to-day, therefore, is the problem of analyzing and reducing his marketing costs by the elimination of the observable and avoidable wastes, the application of known statistics properly judged and analyzed, keener understanding of the necessities of the distributor and retailer, and a far better knowledge of the problems of the user in both his buying and his service requirements.

Some consideration will be given in the following articles to the elements of visible and avoidable wastes and to the other factors entering into the marketing costs in the automotive field.

The problem must be faced. The growth of the business will depend upon the intelligence with which the problem is attacked and the character of the answer.

No sane man could justify the expenditures which have been made on the plea of sales and marketing in the past ten years. The profits may have justified such expenditures, but the necessities of the business did not justify them at any time. The observable wastes, which could be easily calculated by the analyst without much study, have run into thousands of millions of dollars every year in this field, and there are other inefficiencies that add measurably to this total. Even the economies so-called that have been established in the marketing departments since the business depression, have been established without any particular analysis, so that valuable and efficient means of maintaining a market have been eliminated or curtailed in common with the wasteful means, and valuable activities within the organization have been reduced in the same proportion as those of less definite efficiency.

Marketing does not mean simply getting the order. It means getting the order at a cost justified by the character and extent of the order and under conditions which will make it possible to maintain the market with the least expenditure of time and effort.

## An Unusual Export Market

**P**UNTA ARENAS is the most southern city in Latin America. Situated on the Straits of Magellan, in the Chilean territory of the same name, it has a population of from 35,000 to 40,000 persons and is the entry port to a great sheep and cattle growing territory that stretches far to the northward. This territory, the development of which has no more than commenced, already requires many automobiles for its necessary transportation services.

The needs of the territory and of Punta Arenas have been only partially met, according to a letter from Jorge Skarmeta S., one of the dealers of that city, who writes to *El Automóvil Americano*, the Spanish dealer publication of the Class Journal Co., as follows:

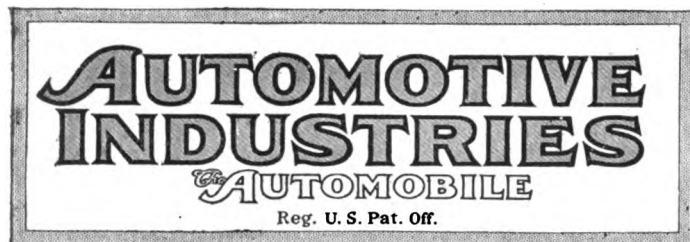
"I believe that Punta Arenas is the last place in which the universal crisis is making itself felt, but not on as large a scale as is indicated by the news from other sec-

tions. Any improvement in the price of wool would quickly dispel any disturbance that might make itself felt.

"The slight crisis through which the city is passing, as you will see, is of a momentary nature and will disappear entirely with any improvement relating to the products of this section. As this is quite an extensive territory, its products will require automotive power to move them. At the present time nearly all the business concerns, even those on a small scale, need rapid transportation.

"For that reason you can see that this section deserves quite a little attention on the part of those who contribute to our automotive development. Not one-half as much has been done along these lines as would be possible in replacing unnecessary vehicles drawn by animals."





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## Reduction of Unsprung Weight

**Q**UITE the most interesting design of car at the recent Berlin show evidently was the Rumpler. The mechanical features of this car may be considered distinct from its extreme body lines, which are unlikely to appeal to American eyes. As regards the chassis, most interest attaches to the rear axle construction, which tends to materially reduce the unsprung weight. The first move in the direction of reducing the unsprung weight of the driving axle was made by De Dion as long as 20 years ago. On the car referred to the differential was suspended from the frame and the rear axle was made tubular and curved to the rear so as to clear the differential housing. Two universal joints were incorporated in each axle shaft, so that the chassis frame could move freely in a vertical direction relative to the axle without interfering with the drive.

This design improved the riding qualities, reduced tire wear and relieved strains on the chassis parts; but these advantages are gained at the expense of

the use of four universal joints, each of which had to have about four times the torque capacity of a joint in the propeller shaft. Notwithstanding this drawback, De Dion used this form of rear axle for many years with entire satisfaction.

The tendency to reduce the unsprung weight is persistent. Numerous American manufacturers have tried out the transmission axle, in which the gearset is mounted at the center of the rear axle, but one after another they have given it up again. The reason is that the additional unsprung weight represented by the transmission in such cars is a detriment in every respect; it is hard on the car and hard on the occupants. Manufacturers using this construction sometimes made determined efforts to lighten their rear axles in other ways, as by the use of aluminum centers and alloy steel tubing and shafting, and in one or two cases the claim was made that the transmission axle weighed no more than plain axles on similar cars of less refined design. Yet the fact remained that if the gearset were carried on the chassis frame the unsprung weight would be reduced by just that amount.

In an effort to further cut down the unsprung weight several engineers in recent years have designed cars without a rear supporting axle, the weight of the chassis being transmitted to axle stubs by a combination of cross springs. Tests have shown that cars of this type are exceptionally soft riding. Similar riding qualities should be obtained by the Rumpler construction, because both the arrangement of the axle and the use of the cantilever type of spring tend to cut down the unsprung weight, which should not be much more than that in a car without supporting axle. Over the De Dion type the Rumpler axle has the advantage that it dispenses with the need for universal joints. An axle of this type could be used on a car having the engine located under a bonnet in front, and in such combination it would probably stand a better chance of success—in countries outside Germany, at least—than in combination with the rear-mounted engine and the ultra type of body.

## New English Buses

**L**ITTLE buying developed at the Olympia truck show in England. It is interesting to note, however, that what buying did take place was largely in the motor bus field. There were numerous inquiries for new motor coaches and omnibuses, and the indications are that firms which have made a reputation in this field of construction will profit considerably from the show.

While the general business depression appears to be seriously hindering any upward movement in British truck sales in general, the bus transportation interests are not seriously hampered by general economic conditions. Bus transportation has already taken a definite place in the British transportation system, and consequently bus companies are appearing as welcome buyers at a time of general depression.

A similar development of the bus movement in this country might furnish similar help to our truck industry.

## A Message for Business

**T**WO historic events will take place in Washington next week. The stage has been carefully set for each, but with vastly different trappings. One will make history for a world in need and the other will be a dramatic reminder of history already written, but each bears a close relation to the other.

Business and industry, intent upon their immediate and individual problems, appear to have given scant thought to the significance of these events. World peace for the future and the great war which has gone by seem in some way remote from the manufacture, sale and transport of commodities, but those who seek the connection need not dig deep to find it.

Business has been bound up inextricably in every event which has happened since an Austrian archduke was slain at Sarajevo eight years ago and the world was set on fire. Business boomed and profits soared to unexampled heights while the drum-fire of cannon was heard from one end of Europe to the other. It was an inevitable concomitant of war. It was equally inevitable that the greater portion of those profits should vanish in the reconstruction of a world left rocking on its foundations when peace was signed and slaughter ceased.

It may seem a far cry from a survey of business to-day to a retrospective glance at the battlefields of France; from the study of a balance sheet to an international conference on the limitation of armaments. Each cause has its effect, however, and little happens in the world in which business does not play a part.

The nation has been asked to stand at salute for two minutes at noon of Armistice Day while an unknown soldier of the Republic is being buried in the hallowed soil of Arlington, where heroes sleep. The war lords who gather there and the elder statesmen of the nations they serve will meet in solemn conclave the next day to determine whether the crushing burden of armament cannot be lightened.

Soldiers and sailors with reversed arms, led by the commander-in-chief of the army and navy, will march behind the caisson bearing the flag-draped casket, to the measured cadence of funeral dirges. Great soldiers will pin upon the coffin tokens of valor taken from their own breasts. The simple soldier who gave his life that democratic ideals might not perish will win in death the Congressional Medal and the Victoria Cross, heritages of heroism. Gold star mothers will mingle their tears over the bier of the boy who might have been their son. No honor will be great enough for the unknown lad who fell in France, for he will be symbolic of all those who made the supreme sacrifice.

This solemn ceremony should do more than evoke a thrill of patriotic pride and a pang of sorrow in the hearts of Americans. They would do well to bow their heads and offer up a silent prayer of thanksgiving to the God they serve that they are citizens of the United States. Americans are fortunate, indeed.

They are not crushed under a load of taxation which is sapping their financial strength. Their nation is not standing on the verge of bankruptcy, battling bravely to keep from going over the brink. Their currency is at a premium the world around. Their mills and factories and municipalities are solving the problem of unemployment. They are not confronted daily by the spectre of another war. Opportunities for success are theirs to-day, as they were yesterday and will be to-morrow.

America suffered scarcely at all in the welter of war, and, in comparison with other nations, it knows nothing of the agonies of peace. It knows nothing of the stupendous problems of reconstruction and readjustment. The path to prosperity lies straight before it with only a few stones to be cleared away.

Have business men no interest in the symbolic burial of the unknown or in the arms conference which will follow it? Does it mean nothing to them that their nation, which need fear no foe, is leading the way in striving to lighten the burden of the world by cutting down the cost of armies and navies?

Do they want no part in turning the world toward a peace which shall endure and a prosperity which shall be great enough for all to share?

There is a message for business in the pageantry and pomp which are only a week away.

# Car Shipments Show Slight Decline

## Equal in Volume to Last October

### Truck Business for Third Quarter Proves Better Than for Second

NEW YORK, Nov. 1—Shipments of automobiles for October were only 11 per cent less than the preceding month and for the first time since the process of liquidation began they were virtually the same as shipments for the same month of 1920. There is every reason to believe that from now on comparison of shipments and production will show a gain over the same month in the previous year.

The October showing is better than had been expected. Manufacturers believed at the beginning of the month that there might be a considerable decline in sales, but they have been pleasantly disappointed. October last year was 26 per cent less than September.

Truck sales are showing a slow but steady growth, and business for the third quarter was better than for the second, which ran approximately 100 per cent ahead of the first. Several of the larger companies have a substantial number of orders on their books.

Export business is slowly looking up. Canada and Mexico are among the best foreign fields at this time for American automobile manufacturers. Conditions in South America and the Far East are more satisfactory, and sales are gaining slowly in almost every quarter of the world except Continental Europe.

Factory operations this month will be carried on with caution. A few factories propose to increase their schedules to meet business on hand or in prospect. This is true particularly of those manufacturing cars in the higher price classes. On the whole, however, production schedules will be made flexible and the output will be governed entirely by actual sales.

While sales as a whole show little tendency to slacken, notwithstanding the approach of winter, manufacturers generally look for a tapering off in business between now and Jan. 1; but they have expected about the same thing every month since June. For that reason it may be pos-

## M. A. M. A. SEPTEMBER BUSINESS SHOWS GAIN

NEW YORK, Nov. 1—The volume of business done by members of the Motor and Accessory Manufacturers Association for September showed a slight gain over August. This marked the seventh consecutive month in which total sales showed slight variation. It is significant, however, that June was the only month to show a decrease as compared with the preceding month. Another striking fact shown in the report is that there was a change of only 00.22 per cent in the volume of past due accounts in September. For the first time since March there was a slight increase in the total volume of notes outstanding. The figures for each month this year follow:

Month	Total Purchases	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January .....	\$6,264,587		\$8,099,727		\$4,359,871	
February .....	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,063,118	39.08 Inc.
March .....	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April .....	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May .....	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June .....	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July .....	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August .....	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September ....	23,141,891	1.09 Inc.	4,358,545	00.22 Inc.	3,677,500	5.24 Inc.

sible that November business will exceed their expectations.

The fundamental strength of the industry and the deep interest of Americans in motor vehicles is evidenced by the fact that sales for the last seven months have varied only slightly from month to month and have been in volume sufficient to keep the industry as a whole, including many of the smaller plants which have done practically nothing, running at more than 50 per cent of capacity.

## Milwaukee Manufacturers Report October Increase

MILWAUKEE, Oct. 31 — Activity among manufacturers of passenger cars, engines, parts and equipment in Milwaukee during October showed on the broad average a slight gain over September. A few shops fell below the previous month's mark, but the majority were able to hold their own or to establish a somewhat better position. This is encouraging in view of the fact that September was not quite up to the August volume.

Makers of motor trucks and motor truck parts and equipment are in a more cheerful attitude than since last spring, due to an upturn in sales. Cold weather is expected to accentuate this advance in some directions and cause a reaction in others, so that opinion seems to be in favor of no marked activity in truck merchandising until spring. Export business in motorcycles is running better than expectations.

The export market is the principal one for this class of automotive merchandise, as many domestic prospects are able to buy a four-wheeled motor vehicles as cheaply as a cycle, and economy of operation is the biggest inducement for the purchase of cycles.

## Harper Will Direct Sales for Studebaker

SOUTH BEND, IND., Oct. 31—Harry B. Harper, former president of the National Automobile Dealers Association and until recently the largest distributor of Willys-Overland cars, has been appointed sales manager of the Studebaker corporation. He will assume his new duties Nov. 7.

Harper's reputation as an automotive merchandiser is country-wide and has been gained by nearly 20 years of selling experience. He retired as advertising manager of Bowser & Co., Fort Wayne, in 1905 to become advertising manager for the Ford Motor Co. In 1907 he was made assistant to Norval Hawkins and in 1909 became Ford's first foreign manager. His work with the Ford company attracted the attention of John N. Willys and in 1911 Harper organized the foreign department of the Willys-Overland company. A year later he was made assistant to the sales manager and in 1915, 1916 and 1917 he was general sales manager for the Willys-Overland company.

## Harper Long Distributor

Harper became Philadelphia distributor of Willys-Overland cars in 1918 and six months later he raised that city to first place as an Overland distributing center. He was sole owner of this business until the Overland company announced a new policy and established a direct factory branch in Philadelphia. Throughout his activities as head of an automobile sales organization, Harper has taken a deep interest in the affairs of his dealers. He has studied their problems from every angle and tried to give practical assistance. Few men in the country have wider dealer acquaintance than Harper.

# C. O. Miniger to Join Durant Motors

## Severs Connection with Willys by Jan. 1

### Electric Auto-Lite President Will Become Director of Durant Subsidiaries

NEW YORK, Nov. 2—Clement O. Miniger, vice-president of the Willys Corp., as well as president and general manager of the Electric Auto-Lite Corp., will sever his connection with the Willys organization some time between now and Jan. 1 to become associated with W. C. Durant in the management of Durant Motors, Inc. No formal announcement of Miniger's plans has been made, but he will be a director of several Durant subsidiaries, including the Durant Motors Co. of Canada, Ltd. It has not been determined whether his headquarters will be in New York or Toledo.

Miniger ranks next to Walter P. Chrysler and J. R. Harbeck in the Willys Corp. He is credited with much of the success of the Electric Auto-Lite Corp., which has had a comparatively satisfactory business all through the period of depression, and is now in a highly satisfactory position.

The Electric Auto-Lite Corp. was organized by Miniger in 1911 and he became secretary and treasurer of the company. When John N. Willys associated himself with the corporation three years later Miniger was elected president and general manager. He has continued to occupy that position ever since. He also is president of the Fostoria Machine & Tool Co. of Fostoria, Ohio, vice-president of the Burt Foundry Co. of Toledo and director of the National Bank of Commerce and the Morris Plan Bank, both of Toledo.

Born on a farm at North East, Pa., on Nov. 11, 1874, Miniger was taken to Ohio by his parents at an early age and was educated at the Fostoria high school. He later took a course in pharmacy in Chicago after which he went to Toledo and entered the employ of a wholesale drug house as traveling salesman. He held this position for 10 years. His first business venture was the operation of a coal mine at Cambridge, Ohio, with offices in Toledo. He remained in that field for three years and then manufactured paper boxes for a like period.

There are reports, as yet unconfirmed, that another prominent figure in the automotive industry who soon will join

Durant, will be Hugh Chalmers, who gained wide fame with the National Cash Register Co. before he entered the automotive field. His last active work in connection with automobiles was with the Chalmers Motor Car Co., which now has been merged with the Maxwell Motors Corp. He was president of the Chalmers company until the reorganization in 1918 when control was acquired by J. S. Bache & Co., bankers.

## To Reorganize Signal Under Michigan Laws

DETROIT, Nov. 1—The Signal Motor Truck Co., a Maine corporation for which a receiver was appointed in Portland on Aug. 17 by Federal Judge Hale, will be reorganized this week as a Michigan corporation. It is learned that the property of the company was taken over Oct. 26 by a former officer as an individual pending the reorganization. The new company will retain the same name and there will be no change in its products.

The petition for a receiver was filed by Milton B. Hoagland, vice-president and general manager of the company, in accordance with a vote of the stockholders. The Maine company has outstanding \$548,000 in common and preferred stock in addition to a funded debt of \$190,000 in bonds and \$220,000 in notes. J. G. Heaslet was president of the old company and H. H. Emmons was secretary.

## Cunliffe, Branch Head, Leaves to Join Collins

CHICAGO, Nov. 1—C. R. Cunliffe, for more than ten years associated with the Cadillac organization, has resigned from the general managership of the Chicago branch of the Cadillac Motor Car Co. to become associated in an executive capacity with R. H. Collins, former Cadillac president and now president and general manager of the Peerless Motor Car Co. of Cleveland.

Cunliffe came to this city Aug. 1, 1919, for the purpose of opening the local branch, the understanding being that after its establishment he would take up other work. During his administration the floor space used by the branch has been more than tripled, necessitating the erection of a new service building. Previous to coming to Chicago, Cunliffe served as manager for the Cadillac distributor in Philadelphia.

His successor here is L. B. Sutherland, who has been associated with him in various capacities. Sutherland, who is a resident of Chicago, has been sales manager of the Chicago branch for the last two years.

## New Gray Product to Be in \$500 Class

### Output Will Start Early in Year—12 Points for Assembling Cars

DETROIT, Oct. 31—F. L. Klingensmith, president of the Gray Motor Corp. and former vice-president and treasurer of the Ford Motor Co., has announced that the new Gray car will be priced at approximately \$500 in the open models and will be in production following the first of the year. Associated with Klingensmith in Gray Motors is Frank F. Beall, former Packard vice-president.

The Gray car will be shipped in a knockdown condition to 12 assembly points in the country, the engine and parts to be made in the Gray plant here which is to be enlarged. The Gray car has been in development for more than a year, its introduction being deferred until the market was considered satisfactory.

The car follows the usual lines, having a four cylinder engine and will be made so as to be readily assembled. It will have a 100 in. wheelbase and be made of alloy steel. The company is capitalized at \$4,000,000, which is said to be the nucleus of a planned \$50,000,000 corporation.

In a statement of his plans, Klingensmith declares his knowledge of low-priced motor cars gives assurance that he will be able to build a motor car which will compete successfully with the world. He adds that this was what he had in mind when he retired from the Ford organization. His plan of operation calls for the purchase of all parts except the engine.

It is stated that \$1,500,000 already has been put into the company and that an additional \$2,500,000 in stock will be underwritten. The first \$500,000 will be 10 per cent preferred to sell at \$10 a share.

The directors of the company are Klingensmith, Frank F. Beale, Paul R. Gray, David A. Brown, J. H. Poole, George H. Kirchner, H. B. Hoyt, O. J. Mulford, Benjamin S. Hanchett and Luman W. Goodenough.

## MILLER RETIRES AS JOBBER

NEW YORK, Oct. 31—Charles E. Miller, who has conducted for years one of the largest automobile supply houses in the United States, has decided to retire from the general automobile jobbing business. He will establish himself as a manufacturers' agent after selling his present business as a going concern.

## Trucks Led Federal Plan to Meet Strike

### Arrangements Evolved by Government Will Probably Stand for Future Emergencies

WASHINGTON, Oct. 31—Plans of the Federal Emergency Organization for the movement of necessities in case of a railway strike, as made public by Secretary of Commerce Hoover, show that the motor truck was the keystone of the Government's transportation plan. Everything was in readiness for the strike, which was called off. The Motor Transport Division was created with Windsor T. White, of the White Truck Co., as chairman, and Gordon Lee, chief of the automotive section, Department of Commerce, as his assistant.

#### Headquarters in Washington

The plan of operation drafted for the emergency will undoubtedly hold good in the event of a similar condition arising in the future. The organization was to have had headquarters in this city with its primary object the handling of interstate and inter-regional problems, and all other activities were to be left to the local initiative of Governors' organizations.

The program called for the determination of the primary, secondary and tertiary stocks of food, fuel and feed throughout the country. Primary stocks were those available within State radius; secondary, those within interstate water and motor radius; and tertiary, those within interstate rail and water radius.

It was also planned to determine the areas dependent upon interstate movement for supplemental supplies. Furthermore, it was believed advisable to ascertain the character of movement, whether by water, rail or truck, required or available.

#### Local Surveys Also

The Federal authorities, after a series of conferences, arrived at the conclusion that trucks should head the list of transportation units. In addition to the Federal survey they planned to have each locality make its own survey of commodities and the transportation problem. One of the significant features of the plan shows that the utmost reliance was placed upon the efficiency of truck operation. The official report of the plan as distributed to the State organizations, contains statements that two alternatives would be apparent in the service: first, that the railways cease operation and that reliance be placed solely upon trucks and water; and second, that limited operation of railways would be maintained.

The Department of Commerce plans to supply graphic maps to State committees showing primary reserves of each commodity available without movement. They intend also to make known the secondary reserves which could be obtained by motor and water movement. The plan called for the establishment

of priorities on commodities. It was the idea of the Department to make reports to individual organizations as to truck transportation available and truck mobilization for long and local hauls.

Assuming that railroad operations ceased entirely, it was pointed out that all towns and cities outside the "dense area" could supply themselves by motor or water for at least sixty days without any consequential interstate movement. The "dense area" comprised New England, New York, New Jersey, Delaware, Maryland, Pennsylvania, Ohio, Indiana and Illinois. It was suggested that steps be taken by the local authorities in anticipation of any difficulties to supply gasoline.

The Department of Commerce declares that two primary changes in the situation from pre-war conditions are to be noted: first, by war experience the country understands the whole process of civilian and industrial organization to meet emergencies; and second, the motor truck has given every town an extended radius of food supplies by some 50 miles and thereby protects such vital matters as milk and perishables against the first shock.

The automobile industry has been much concerned over the mobilization points which the Government would select in the event of a strike. The Department of Commerce divided the country into regions under regional representatives. The first region covering the New England States centered at Boston; the States of New York, New Jersey, Delaware, centered at New York City.

(Continued on page 897)

## Darrow and Dinsmore Join Goodyear Tire

AKRON, Nov. 1—Burgess Darrow has been appointed development manager and R. P. Dinsmore chief compounder for the Goodyear Tire & Rubber Co. following the resignations of W. S. Wolf and W. P. Keith.

Wolf and Keith have joined the staff of Frank A. Seiberling, formerly Goodyear president and now owner of the Lehigh Rubber Co. at New Castle, Pa., and organizer of a plan to amalgamate a number of smaller rubber factories into one large corporation.

The resignations are in line with others which have been previously announced and others expected as Seiberling completes his new organization.

The resignation of K. B. Kilborn as experimental engineer to be succeeded by V. V. Messer has also been announced by Goodyear.

Darrow and Dinsmore are graduates of the Massachusetts Institute of Technology in chemical engineering. Darrow came to Goodyear ten years ago in development work in the California Goodyear Co.

Dinsmore has been with Goodyear eight years and was in charge of compounding work several years ago when he assumed the same duties at the Canadian Goodyear plant.

## Malleable Castings Discussed by S.A.E.

### Better Understanding Regarding Their Use Urged at Cleveland Sectional Meeting

CLEVELAND, Nov. 1—More than 70 members of the Cleveland section of the S. A. E. listened to an address by H. A. Schwartz, manager of the research department of the National Malleable Castings Co. on malleable castings in the automotive industry. Most of the talk was made in explanation of lantern slides.

There is too much misunderstanding regarding the use of malleable castings in the motor car, Schwartz showed in reciting cases of certain cars which have 31 malleable castings but which the sales organizations often declare have none at all.

To-day the malleable casting industry is at 35 per cent capacity. There are 176 manufacturers of malleable castings, all of them being located east of the Mississippi River. Two electric furnaces are used in the manufacture of such castings, but no difference in the merchandising of these products is being made. One difficulty in the manufacture of malleable castings little appreciated in the motor industry, it was stated, is that nine days are needed in the proper annealing. Too frequently purchasing agents are delinquent in placing orders and become impatient at the delay in receiving shipments, which is due largely to the time needed for correct annealing.

The council of the S. A. E. met here in order to be present at the Cleveland sectional meeting. President David Beecroft addressed the latter on the necessity of sections using part of their program in better selling the standards that have been adopted by the society. One manufacturer of bolts and nuts is saving \$500 on these products daily due to S. A. E. standardization. As yet there is not so wide an appreciation of the dollar and cent valuation of standardization as there should be, he said, and urged that the S. A. E. members sell the work to their own executives.

## Auto Body Co. Awarded Contract by Durant

DETROIT, Oct. 29—Auto Body Co. of Lansing has been awarded the contract for all open bodies for Durant Motors of Michigan, whose plant at Lansing is ready to launch production in November.

The body company after making the necessary equipment arrangements will start at once upon the Durant work, deliveries going forward at once and continuing through 1922. The styles of the bodies have been laid down by Durant engineers and will be along conventional lines. A large number of men will be added to the force now employed to meet the new contract demands.



## Sees Motorization of Interurban Cars

### Truck Maker Receives Inquiries As to Types and Costs of Engines

CLEVELAND, Nov. 1—The truck business in Cleveland is picking up. While the passenger car business has held up well in the Cleveland territory during the first three weeks of October, there has been a slight decline as compared with the corresponding period last month. This decline in October in passenger car business is said not to be so great on the average as it has been in other years.

Peerless Motor Car Co., for instance, reports that October business is on a par with September. The Stearns Co. reports that its passenger car business increased in October. There may be other exceptions in this city, but it may be fairly stated that there has been a slight falling off in volume.

#### Public Utilities Interested

Both the passenger and motor truck business was much better during the first three weeks of October this year than it was in the same month in 1920, according to reports.

At the general offices of the White Co., the prediction was made that in the immediate future there is to be a great development of business with certain public utilities that are now operating their cars at a loss with electricity.

The motorization of the interurban systems of the country at no great future date was predicted and, in substantiation of the prediction, White officials said that many inquiries are being received from interurban companies about types of engines that could be used and the cost.

The interurban roads in Ohio have been down-at-the-heels for years. Most of the companies have paid no dividends and they have been steadily losing business to motor buses in late years. Stocks in the companies are far below par and a great many shares have no market.

#### Operation Costs Less

It costs about \$3 a mile to operate an interurban car with electricity, while it can be done for less than a dollar with a gasoline engine, according to statements made at the White company. The State Public Utilities Commission has found the interurbans to be a millstone under existing conditions that they cannot shake. Motor vehicles are hauling much of the freight that formerly was delivered to the electric cars. A large element of the traveling public that used to ride in interurban cars are now using either their own automobiles or the public motor buses.

The Ohio Public Utilities Commission has had its attention called to the advisability of changing from electricity to the gas engine. Several interurban lines have shown enough interest to write the

White company about the subject. The utilities commission would have to authorize a bond issue, as the interurban lines now have hardly sufficient money to operate their plants.

The motor truck is the center of attention temporarily, at least, on account of the publicity that was given the threatened railroad strike. In every community the motor truck resources were offered to the mayor. The truck as an agent for short hauls was brought forward in a manner by the proposed strike of railroad employees that created a good will of inestimable value.

### Hares Motors Completes Plan to Handle Thomart

NEW YORK, Oct. 31—Hares Motors, Inc., has practically completed negotiations with the Thomart Motor Co. of Kent, Ohio, under which it will take over sales of the Thomart truck.

President Thompson of the Thomart company, in announcing that a contract had been agreed upon, stated that the plant at Kent would be placed on a highly efficient basis to meet the increased business which is expected. The company manufactures a light speed truck.

The fact that Hares Motors is taking on this new line will have no bearing whatever on the continuance of its selling arrangement with the Kelly-Springfield Truck Co.

### French Automobile Salon Draws 463,285 Visitors

PARIS, Oct. 22 (*By Mail*)—Nearly half a million persons paid for admission to the French Automobile Salon during the twelve days the Grand Palais was open to the public. The exact official figure for paid admissions is 463,285, giving gate receipts totaling 1,555,849 francs, or about \$112,000 at present exchange. The biggest crowds were received on the last day of the show, when 57,499 persons paid to pass through the turnstiles.

At the last show held in 1919, 438,552 persons entered the Grand Palais.

#### REORGANIZING STANWOOD

NEW YORK, Oct. 31—Plans for the reorganization of the Stanwood Rubber Co. provide for the issuance of \$300,000 in first mortgage bonds; \$500,000 in first preferred 8 per cent stock; \$151,000 in second preferred; \$175,000 in debentures and \$50,000 shares of no par value common. The creditors will receive 50 per cent of their claims in debentures and 50 per cent in new common based on a value of \$2 a share.

#### NEW ARMLEDER TRUCK

CINCINNATI, Oct. 31—The O. Armleder Co. is bringing out a new Model 30 with a capacity of 1½ tons. This will fit in the line between the present Model 20 and the Model HW. The engine is a Buda, 3¼ x 5½ in., wheelbase 147 in., and final drive by Timken worm type axle.

## Maibohm Receiver to Continue Plant

### Petition in Bankruptcy Filed to Save Company—Creditors Have Refinancing Plan

TOLEDO, Nov. 1—Efforts to save the Maibohm Motors Co., Sandusky, through a reorganization were the basis for a petition in bankruptcy filed in Federal Court here last Friday. The assets of the company are listed at \$759,124.38 and debts at \$681,640.11.

Judge John M. Killits appointed W. J. Corr, secretary of the company, as receiver with power to continue the business. The property of the company was ordered sold.

A creditors' committee filed a similar petition with a plan for re-financing attached. Edward Kirby of the Commerce Guardian Trust & Savings Bank, Toledo, is chairman of the committee. The plan is to pay outstanding indebtedness with the proceeds of an issue of preferred stock.

#### Plant Fire Responsible

Difficulties of the company are said to be due to efforts to recover from a disastrous fire which swept away the plant at Racine, Wis., before the company moved to Sandusky.

A statement issued by the Maibohm company says that "unless unforeseen obstacles arise the receivership will terminate Nov. 14 and the reorganized company will take charge." It is stated that there will be no interruption of manufacturing operations.

The committee which has worked out the reorganization plans is headed by R. E. Hayslett, treasurer of the Hydraulic Steel Co. of Cleveland, N. T. Brotherton, president of the Brotherton-Knoble Co. of Detroit, and E. G. Kirby, vice-president of the Commerce Guardian Trust & Savings Bank of Toledo. All three are directors of the company.

#### Succeeded Former Company

The Maibohm Motors Co. was incorporated in Maine in 1917 as the successor to a company of the same name incorporated in Delaware a year earlier to take over the business and assets of the Maibohm Wagon Co. and Maibohm Rubber Co.

The authorized capital stock is \$2,500,000 of which \$1,780,000 is outstanding. There is no funded debt. Gross sales for the year 1920 were \$1,897,658. The surplus for the year after payment of taxes, etc., out of the profits, \$51,503, was \$2,213.

H. C. Maibohm has been president of the company since its organization and recently has acted as general manager.

The plant of the company at Racine was burned Dec. 31, 1918, and it was decided to accept an offer from the city of Sandusky of 15 acres of land with a cash bonus of approximately \$100,000. The new plant in that city has 75,000 sq. ft. of floor space.

## Durant Car Sales Total \$31,000,000

Contracts Signed up to Oct. 22  
Call for 30,842 Deliveries  
by July 31, 1922

NEW YORK, Nov. 1—Durant Motors, Inc., has made public a remarkable affidavit signed by M. B. Leahy, general sales manager of the Durant Motor Co. of New York which controls the manufacture and sale of Durant cars for the New England and Atlantic Coast territory.

In his affidavit Leahy says that although the first Durant car was not placed on exhibition until Aug. 4 last, he had received at the close of business Oct. 22 a total of 24,817 shipping orders, based on signed contracts with deposits, for the four cylinder car, and 6025 contracts for the six cylinder car, or a total of 30,842. The contracts specified deliveries dating from Nov. 1 up to July 31, 1922.

Total Expense, \$15,416

Leahy declares that this business, approximating \$31,000,000, was obtained without the assistance of traveling men and that the total expense, including both sales and service departments, was \$15,416 or an equivalent sales cost of one-twentieth of one per cent.

The assertion is made by Leahy that in his judgment the territory covered by the Durant Motor Co. of New York will produce a volume of business requiring the production of 140,000 automobiles in the next nine months.

Durant Motors, Inc., has issued a statement confirming the report that a contract has been closed with the Continental Motors Corp. for all motors for the Durant four cylinder car which will be made at Long Island City, Lansing, Oakland and Toronto. The statement says:

### Continental Makes Ready

"That contract just closed provides for a minimum of 100,000 motors and involves, it is understood, between \$12,000,000 and \$15,000,000. The motors are to be built according to the specifications of Durant engineers.

"This is believed to be the largest single transaction in automobile parts negotiated.

"An interesting side-light in connection with this contract, which indicates the degree of confidence existing among big business men, is brought out in an interview given by President Judson of Continental Motors in which he states that upon Durant's assurance last April, when an order for a sample motor was placed, that a mutually satisfactory contract would eventually be signed, and upon Durant's verbal assurance only. Continental Motors invested in tools and special equipment necessary to expedite production upwards of \$700,000."

### LIMITS TIRE RECEIVERS

CLEVELAND, Oct. 31—Federal Judge Westenhaver has issued an order permitting operation of the Republic Tire & Rubber Co. of Youngstown and Canton under the receivership until further orders of the court. He declined to order continuance of the receivership for a

## MILEAGE GUARANTEE REPORT COMPLETED

NEW YORK, Nov. 1—The special committee of the tire manufacturers' division of the Rubber Association of America, which has been investigating all phases of the tire mileage guarantee, has presented its report to the division for adoption or rejection by the individual manufacturers.

While the report will not be made public until it is known definitely whether the general sentiment favors its acceptance, it is understood to recommend strongly the abolition of mileage guarantees. This is done on the theory that all reputable tires are good for more than the number of miles guaranteed and for that reason nothing is to be gained by continuing the practice. It is understood there is little doubt that the recommendations of the committee will be accepted.

year. The receivers are directed not to make contracts for fabric and other materials more than six months ahead.

## Goodrich Tire Completes Preferred Dividend Year

AKRON, Nov. 1—The B. F. Goodrich Co. has successfully completed the year of preferred dividend payments. The directors' meeting at Akron, Oct. 26, provided for the preferred dividend of \$1.75 a share payable on Jan. 2 to stockholders of record Dec. 22.

Although the statement to the directors by the officers of the company was not given out it was characterized by members of the board as exceedingly satisfactory.

The company has recently increased production to approximately 9000 tires a day after having sold two tires for each one manufactured during the past year.

The entire organization has been combed and placed in readiness for the expected increase in business early in the new year. Approximately 500 men were put to work immediately after inventory taking and this force will probably be gradually increased as the new year approaches and advances.

The company recently announced that the floating indebtedness of more than \$30,000,000 has been reduced by \$23,000,000 during the past year and that sufficient cash is on hand to liquidate the balance.

### COMMERCE SETS PRICES

DETROIT, Nov. 1—The Commerce Motor Car Co. announces prices on the new Commerce truck as follows: 1½-ton (pneumatic equipped) \$1,450; 1½-ton, \$1,695; 2-ton, \$1,995; 2½-ton, \$2,150. Pneumatic equipped on the three latter are \$1,800, \$2,150 and \$2,495.

## Government May Buy Highway Motor Stock

Subscriptions, Under Senate Bill,  
Would Constitute Loan to  
Corporations

WASHINGTON, Nov. 1—Senator Sheppard has introduced a bill to encourage highway motor transportation in this country by authorizing the Government to subscribe for stock in organizations created for the purpose and for the establishment of a national highway motor transportation bureau.

The bill provides that the sum of \$100,000 be appropriated to enable the proposed motor transportation board to secure such expert assistance as it may deem advisable in carrying out the purposes of the proposed act.

Another appropriation of \$7,200,000 would be authorized for the purchase of stock in corporations and would be issued by the Secretary of the Treasury to the corporation specified by the trade.

### Provisions of Measure

The measure, which is known as S. 2631, further provides that it shall be shown to the satisfaction of the board (a) "that a corporation is in process of organization within a state, territory, or the District of Columbia, by reputable and reliable persons for the purpose of operating a highway motor transportation route at least fifty miles in length; (b) that the plans, resources, capital stock, rates, personnel, material, and probable business of such corporations are, or will be, of such nature or amount as to offer reasonable hope of success; (c) that the laws of the state, territory, or District in which the route is to be operated provide proper protection for the permanent operation of the corporation and proper construction and maintenance of the highway or highways to be utilized by the corporation. Under such conditions it is provided that the board for and in the name of the Government of the United States shall subscribe the last fourth of the capital stock of the corporation remaining unsubscribed."

### Stockholders Must Apply

The proviso is inserted that application for such subscription must first be made in writing by the stockholders of the corporation over verified signatures. The rate of interest is fixed at 10 per cent. The amount paid by the Government will constitute a loan to the corporation, repayable with interest at the rate of 5 per cent per annum in ten annual installments, the first installment to be due five years after the date of subscription.

The issuance of stock is limited to six corporations within one State, territory or District of Columbia. Under the Sheppard bill, corporations would be obliged to make annual reports covering transactions and progress during the preceding year. There is a provision in the bill which prohibits the purchase of other stock unless subsequently authorized or directed by Congress. This bill has been referred to the committee on interstate commerce.

## Trucks Have Forced Lower Rail Rates

### Competition Impelled Executives to Ask for Revised Tariffs on Commodities

WASHINGTON, Nov. 1.—Competition by automobile trucks has forced railroads to lower freight rates in cases where every other argument has failed. A study of the recent decisions of the Interstate Commerce Commission by a representative of AUTOMOTIVE INDUSTRIES showed that the cost of hauling by truck has decreased, while the rail carriers are finding it difficult to bring about economies essential to rate reductions.

The fact that several short line railroads have suspended operations owing to truck competition is a disturbing factor in the present agitation for cuts in freight rates. There has been some talk of regulation of motor trucks by the Federal Government but there are few who anticipate such action. It is believed that Federal regulation would find little favor in Congress at this time. Some traffic experts insist that laws regulating rail carriers would not be applicable to trucks.

#### Numerous Instances Shown

As to the effects of truck competition, the records show that there have been numerous instances where rates on commodities have been reduced on the request of rail carriers. Lincoln Green, vice-president of the Southern Railroad, very frankly admits that competition of trucks forces the lines to reduce their freight rates. He says:

"Our purpose in making these reductions in short-haul rates on cotton was primarily to meet truck and wagon competition not merely within the short radius of the consuming center, but for longer distances to which truck service has been extended, not merely taking cotton away from us at actual railway shipping points, but engaging in the transportation of other commodities in both directions.

"The matter has been under consideration for more than twelve months and our action is now taken in the belief that it is in the interest of the conservation of our revenues. Whether the proposed rates will actually enable us to meet the competition and continue to control a share of the traffic is a matter of experiment."

#### Truck Operation Decreasing

Just how it is possible for trucks to quote lower rates for the transportation of commodities has been illustrated by R. A. Brand, vice-president of the Atlantic Coast Line. He declares that the cost of hauling by truck is naturally on the decrease since wages, gasoline, trucks and parts are declining in price. In discussing conditions in a territory surveyed by the Charleston & Western North Carolina Railway of the Southern System, Brand said:

"It fairly may be assumed that the trucks are going to handle a certain amount of cotton in the Carolinas regardless of rail-

### OSHKOSH DELIVERS "GROCERY STORES"

OSHKOSH, WIS., Oct. 31.—Four large "traveling grocery stores" have been built by the Oshkosh Motor Truck Co. and delivered under their own power to the U-Save-It Stores Corp. of Dayton, O., during the past week.

The cars were built on the standard four-wheel-drive chassis of the Oshkosh company and equipped with special bodies built by the J. L. Clark Mfg. Co. of Oshkosh. The Dayton company is conducting a "motor groceretaria" business, bringing a complete grocery store in miniature to the doors of housewives.

road freight rates, just as they are now doing as to freight traffic of all kinds as well as passenger traffic in sections along our lines traversed by improved highways. Trucks make warehouse delivery, which is of value, particularly as to small lots of cotton since drayage is avoided. A reduction in their rates may turn to the railroads some cotton now hauled by trucks, but the revenue derived from this additional cotton will not, as demonstrated by actual tests, already made for our line, affect the loss of revenue on cotton to interior mills alone.

"I do not believe that the interests of Southern cotton mills are adversely affected by the existing adjustment, nor that the producers of cotton will be benefited one iota by the reduction. A reduction in cotton rates will be an incentive to state commissions to bring about reductions in rates on other commodities, and will also be an invitation to shippers of other commodities to press for a general reduction in their rates."

(Continued on page 895)

### Erie Creditors Ask Collections on Stock

TOLEDO, Nov. 1.—A committee of the creditors of the Erie Tire & Rubber Co., Sandusky, has filed an application in Federal Court here asking for an order of the court compelling the receiver to collect unpaid portions of stock subscriptions.

The application states that there is due on preferred stock \$278,404, and on common stock, which was issued as bonus to purchasers of preferred, \$1,029,986.

There are claims of more than \$500,000 against the property and unless the unpaid portions of the stock subscriptions are paid the plant will have to be sold at a loss.

#### HINKLEY MOTORS SOLD

DETROIT, Nov. 2.—Property of the Hinkley Motors Corp. was sold at public auction to-day by the Security Trust Co. as trustee. The property includes equipment approximately valued at \$192,038; tool equipment valued at \$41,100 and stores valued at \$198,685. They will be offered in several parcels and also as a unit.

## British Truck Sales Await Trade Boom

### Impression Gained at Show is That Business Revival Must Come First

LONDON, Oct. 17 (By Mail).—Whether the British truck show will assist appreciably in lifting the truck industry out of the depression into which it has fallen in the past year remains a problem. The exposition itself has brought little in the way of actual sales and it is feared that until the general trade of the country revives there is not much hope that sales of commercial vehicles will increase to any extent.

There have been a good many inquiries for new motor coaches and omnibuses and firms which have a reputation for this type of vehicle, with a seating capacity of from 14 to 40, probably will pay their expenses and have something over. There also will be a few sales direct to the public of the smaller type of truck.

#### Many New Models

The proportion of new models at the show is surprisingly large and they are chiefly in the heaviest classes. In fact, trucks for bigger loads than ever before were suggested in England are among them. The Cadelon has a new model for 15,600 lb. net load while Maudslay has a new 13,500 lb. type with platform space 19 ft. 6 in. in length.

A half dozen makers are showing "overtypes" trucks having the driver alongside or over the engine. Four of these are new. Guy has a new 2800 lb. net load chassis which has attracted much attention both in its design and price, which is slightly less than \$2,000 and the lowest price high class British job of this kind.

Prospects for the passenger car show are difficult to forecast. The mild weather may induce a buying tendency but unhappily there is so little money available for the running and maintenance of cars that heavy sales are not probable. It appears that big cars will be in small demand for a long time to come. The public believes there will be a further drop in prices before the year ends.

### South African Imports Decline During Year

NEW YORK, Oct. 31.—Automotive trade conditions in British South Africa are summed up as follows in a cablegram from the National Bank of South Africa, Ltd., Capetown, to its branch here:

"Motor cars: Market tendency is better, country districts displaying more interest and a fair number of sales has been effected."

The dispatch also states that custom figures for the first seven months of the year, ending with July, show a falling off in automobile imports of 4758.

## Factories Deny Canadian Rumors

### Paige and Liberty Not Consider- ing Assembly Plants—Hupp Marking Time

TORONTO, Oct. 31—Automobile business in Canada continues spotty. Companies which have made radical price reductions report excellent business. This applies to Canadian makes as well as imported lines. The general feeling is that next year will be good and 1923 excellent. The outlook of the average dealer is decidedly optimistic.

The air is full of rumors about American companies establishing Canadian factories. The passenger car companies included in this list are Liberty, Hupp and Paige. The International Harvester Co. has taken over a plant in Chatham and now produces International trucks there.

W. C. Durant has spent considerable of his time for the last two or three weeks in this city. Arrangements have been completed to go ahead with the Toronto plant and stock is being offered to the public. Durant Motors of Canada, Ltd., has not as yet decided whether to link up with A. L. Carron of Carron Brothers, Montreal, and take over their extensive munitions plant for export business.

It is understood that Durant personally favors this plan because it would keep the Toronto plant busy supplying parts to the assembling plant for export during slack seasons. Inasmuch as the plan affects Durant operations in the United States, the final decision is understood to rest with the board of directors.

#### Hupp to Build

DETROIT, Nov. 1—The Hupp Motor Car Corp. will erect a Canadian subsidiary plant in Windsor early in 1922 if the business outlook is regarded as favorable at that time. The company has acquired a site for a factory but will defer actual building operations until the time is considered ripe. Paige and Liberty are not considering Canadian assembling plants, they assert.

#### Vesta Looks Over Ground

MONTREAL, Nov. 1—Officials of the Vesta Battery Corp. of Chicago have been looking over plants and sites in Sherbrooke for the establishing of their Canadian branch factory. The reason given for the establishing of a Canadian plant is the increased Canadian and foreign demand for the batteries. Much of the company's export business from the United States will be carried on by their Canadian branch. The plant will start with 60 to 70 men with a pay roll of about \$1,500 per week. It is expected operations will start within a few months.

#### RECEIVERS FOR DISTRIBUTOR

BOSTON, Oct. 31—Judge Morton, in the United States District Court, has

appointed Edward A. Badol and Charles C. Barton as receivers under bonds of \$10,000 each for Hares Motors Co. of New England, Inc. The concern was petitioned into bankruptcy recently by three creditors with claims of \$8,000. A third receiver will be appointed later.

It is expected some plan will be worked out whereby the Locomobile company will regain possession of the big building on Commonwealth Avenue which it used as a branch until it was occupied by Hares Motors.

### Willys Pays 10 Per Cent of Maturing Bank Loans

NEW YORK, Nov. 1—The Willys-Overland Corp. yesterday paid off in cash 10 per cent of its maturing bank loans of \$18,000,000. The balance has been renewed for eight months. Bankers for the corporation say that the concern is in a comfortable cash position.

It is understood that entirely satisfactory progress is being made in the program for refinancing the Willys Corp. Details now are being worked out under which it is expected a banking syndicate headed by Kuhn, Loeb & Co. will underwrite a note issue of approximately \$20,000,000. Business of the subsidiary companies within the corporation is steadily increasing and has been in satisfactory volume for some time. There are unofficial reports that operations will be started in the near future in the huge new Chrysler plant at Elizabeth, N. J.

### Hartford Parts Sale Advised by Committee

NEW YORK, Oct. 31—The creditors' committee of the Hartford Automotive Parts Co., headed by A. E. Brion, has addressed a statement to creditors recommending the sale of the assets under the direction of the court. It is recommended that the committee be prepared to bid in the property for the purpose of operating it in the interest of the creditors until such time as it can be sold and converted into cash for distribution among them.

Claims deposited with the creditors' committee aggregate approximately \$500,000. The statement points out that this plan would not jeopardize the interests of the stockholders or prevent reorganization by them, for such a reorganization could be effected by purchase of the assets at any sale the court may order.

### Agents for Carbureter Given \$55,000 Damages

CHARLOTTE, N. C., Nov. 1—Damage in the sum of \$55,000 was awarded to the Southern Automatic Steam Carbureter Co. of Charlotte against the Automatic Steam Carbureter Co. of Chicago in Federal Court here. The Southern company asked for \$150,000. The Chicago concern will appeal from the decision.

## Studebaker Shows Gain for Quarter

### Profits Exceed Year Ago by \$976,407—Regular Dividends Declared

SOUTH BEND, IND., Nov. 1—The Studebaker Corp. to-day declared the regular quarterly dividends of 1% per cent each on its preferred and common stocks, both payable Dec. 1, stock record Nov. 10.

During the quarter ended Sept. 30 last the corporation showed net profits of \$3,263,201, as compared with \$2,286,794, an increase of \$976,407 over the same period of 1920. For the nine months ended Sept. 30 last net profits amounted to \$9,644,326, against \$9,765,851 in the same nine months of 1920, or a decrease of \$121,525.

The earnings statement for the quarter and nine months ended Sept. 30 compares as follows with the same period last year:

	1921	1920
Number cars sold.....	21,086	15,765
Sales and receipts.....	\$29,058,893	\$27,823,611
Net earnings.....	4,263,201	3,179,572
Reserve for federal tax.	1,000,000	892,777
Net profits.....	3,263,201	2,286,794
From Jan. 1:		
Cars sold.....	55,552	41,092
Sales and receipts.....	\$80,593,998	\$73,374,153
Net earnings.....	11,644,326	12,208,629
Reserve for federal tax.	2,000,000	2,442,777
Net profits.....	9,644,326	9,765,851

The profit and loss surplus as of Sept. 30 last stood at \$15,396,874, as compared with \$9,822,048 on Jan. 1, 1921, an increase of \$5,574,826; cash in banks and on hand, \$9,332,846, compared with \$4,226,234; inventories on the same date were \$20,594,985, against \$28,076,793 on Jan. 1 last, a decrease of \$7,481,808; total quick assets were \$41,491,167, against \$41,367,497, with current liabilities of but \$11,161,791, compared with \$16,337,164 on Jan. 1, 1921.

### Pierce-Arrow Officials Dine George M. Graham

BUFFALO, Oct. 29—Officers, representatives of the board of directors and executive heads of the sales and manufacturing departments of the Pierce-Arrow Motor Car Co. gathered at the Ellicott Club last evening to bid goodbye to George M. Graham, who has resigned from the company to become the vice-president of the Chandler Motor Car Co.

Robert O. Patten, truck sales manager, introduced the speakers, who included Col. George W. Mixter, president; Col. Charles Clifton, chairman of the board of directors; John F. Guider, chief of production; Myron E. Forbes, treasurer, and L. E. Corcoran, passenger car sales manager. Others at the table included Robert F. Coleman, Joseph C. Dudley, C. D. Cowles, T. J. O'Rourke, Fred C. Wells, E. F. Himmele, Charles Sheppy and Walter P. Cooke.

## G. M. Folder Gives Stockholders Data

They Are Informed That Every  
Sixth Motor Vehicle in Use Is  
Corporation Product

NEW YORK, Oct. 31—An interesting folder setting forth all the essential facts in reference to the various motor vehicles made by the General Motors Corp. are contained in a circular which is being mailed to stockholders with their dividend checks. The information includes the number of cylinders, wheel-base, weight and factory prices of all the models in the various lines together with the location of factories and distributors. A summary of prices of touring cars shows Chevrolet at \$525 and \$975; Buick at \$975 and \$1,525; Oakland at \$1,145; Oldsmobile at \$1,145, \$1,625 and \$1,735; Cadillac at \$3,790. It is significant that Scripps-Booth is not mentioned in the circular.

A letter addressed to the stockholders by President duPont states that one out of every six motor vehicles in use in the United States is a General Motors product. He points out that "members of the immediate family share in the profits from every sale."

"Employees and stockholders are potential missionaries for General Motors. The institution—and users of General Motors cars are word of mouth advertisers of the products General Motors sponsors," says duPont. "If each of the employees and stockholders would interest himself to the extent of helping to convert but one new buyer a year, sales would be 33 per cent greater and profits accordingly larger."

President duPont points out that there are 133,500 persons in the General Motors family. These include 68,000 stockholders, 53,000 employees and 12,500 dealers and distributors. Since 1909 the corporation has produced more than 2,000,000 passenger and commercial cars, of which approximately 72 per cent are now in use.

## Many American Cars Entered in Olympia

LONDON, Oct. 21 (*By Mail*)—Whatever the result of the approaching Olympia car show, interest is being manifested through a large entry list. The number of bona-fide car chassis, bodies, parts, tires and accessories, and exhibits in the marine section, will probably be 550.

American cars listed are the following makes: Willys-Knight and Overland; Dort, Hupmobile, Essex, Hudson, Paige, Nash, Packard, Dodge, Buick, Chevrolet, Oakland, Cadillac, Scripps-Booth, King, Owen-Magnetic, Moon, Alsace, Dixie-Flyer, Stanley, and possibly two makes assembled from imported American parts.

### DALLAS TRADE IMPROVES

DALLAS, Nov. 1—The actual retail sales of automobiles on the part of retail dealers in Dallas for the month of

October exceeded those of the preceding month from 10 to 15 per cent, according to statements of the various retailers in Dallas.

The retail dealers attribute this increase to three things:

First—Reduction in retail prices.

Second—Increased prices for cotton and grain which gave the farmers more money.

Third—The automobile show for sixteen days during the State Fair.

The dealers also claim that more advertising, better personal solicitation, more team work and generally increased activity contributed materially to the improved conditions in this section.

## Monthly Report Issued on Motorcycle Exports

WASHINGTON, Nov. 1—Compilation of motorcycle export figures for each month by countries has been undertaken by the Bureau of Foreign and Domestic Commerce. This is the first time such figures have been made public.

The new division has announced that figures will be made public each month. The figures for September include both the number of machines shipped to each country and their value. The figures follow:

Countries	Number	Dollars
Belgium .....	18	4,931
Denmark .....	1	200
Estonia .....	8	2,900
France .....	53	12,925
Greece .....	1	300
Italy .....	36	10,098
Netherlands .....	252	62,771
Poland and Danzig .....	1	271
Spain .....	54	15,310
Sweden .....	3	815
England .....	7	1,810
Ireland .....	1	150
Canada .....	68	4,796
Panama .....	4	1,063
Mexico .....	12	3,891
Jamaica .....	1	50
Trinidad and Tobago .....	3	1,250
Cuba .....	4	1,116
Dutch West Indies .....	1	344
Peru .....	1	225
China .....	1	325
Chosen .....	1	175
British India .....	1	376
Dutch East Indies .....	14	4,338
Japan .....	14	3,621
Palestine and Syria .....	1	212
Australia .....	60	15,320
New Zealand .....	1	225
Other British Oceania .....	1	431
British South Africa .....	4	1,141
Total .....	627	151,380

## First Haynes Tractor Put on Seiberling Farm

KOKOMO, IND., Oct. 31—The first tractor manufactured by the Haynes Tractor Co. will be placed on the farm of A. G. Seiberling, vice-president and general manager of the Haynes Automobile Co., for further tests. According to John Powell, manager of the tractor company, and designer of the new product, no other machines will be manufactured until the first tractor has been fully tested.

## N.A.C.C. Considers Contract Changes

Recommendations Made at N. A.  
D. A. Conference Presented  
to Directors

NEW YORK, Nov. 2—Recommendations for contract modifications which have been approved by a special committee of the National Automobile Chamber of Commerce after a series of conferences with representatives of the National Automobile Dealers Association, were submitted to directors of the N. A. C. C. at their monthly meeting here to-day. If the suggestions are approved by the directors they will be submitted to the individual manufacturers for such action as they see fit to take.

### To Discuss Used Cars

The conferences between the special committees representing the two organizations have been marked by a spirit of cordiality and an honest desire to cooperate in solving problems which affect both branches of the industry. The proposed contract changes are in no sense radical but they are designed to remove some of the causes of friction which have arisen in the past.

After the directors have taken action on the contract changes, they will spend the major portion of their time wrestling with the used car problem. The N. A. C. C. has undertaken a survey of the entire situation with the idea of improving conditions which have become serious not only for dealers but for manufacturers as well. After the field has been carefully studied and analyzed the directors will make recommendations to improve conditions and also recommendations designed to aid in averting a repetition of a similar situation in the future.

### Hold Dealers at Fault

It is recognized that part of the present trouble is due to over production in the past but it is held that dealers also are somewhat at fault because they have accepted cars in trade-ins when it was not actually necessary to do so. Information is being gathered from all parts of the country as to the actual number of used cars remaining unsold and also full details of the most successful methods adopted in disposing of them. The N. A. C. C. knows that reports of a half million used cars on the market are greatly exaggerated. Although no definite figures are available at this time, it would not be surprising if the number did not exceed 350,000.

Many possible solutions of the problem are being submitted to the N. A. C. C. but most of them, if adopted, would be in restraint of trade. This is one of the most difficult elements in the situation because it will be impossible to take any stand which would cover the entire industry. Much valuable information in regard to successful selling plans is being received, however.



## Trade Associations Favored by Hoover

**States They Present an Indispensable Point of Contact With Government**

WASHINGTON, Oct. 29 — Although the Administration has declined to make a formal definition of its attitude regarding trade associations, pending the decision in the Memphis Hardwood case, an informal interpretation of its position is believed to have been expressed by Secretary of Commerce Hoover when he addressed the Synthetic Organic Chemical Manufacturers' Association here.

Secretary Hoover and Attorney General Daugherty have held a number of conferences on this subject and are understood to have reached an agreement on the general principles involved and apparently were on the point of making a public announcement. At the last moment, however, Mr. Daugherty is said to have come to the conclusion that it would have been injudicious to take such action, in view of the litigation now before the Supreme Court. Mr. Hoover reiterated his past position in support of the legitimate activities of the trade association, which he held to be not only "an enormous power in commerce, but a tremendous power for good in industry and it represents a new step in the whole social and economic development of our business lives."

### Co-operation Necessary

The various trade associations, Mr. Hoover said, present a point of contact for a department in the Government such as did not exist ten years ago, and by setting up a friendly relationship between the Department of Commerce and these associations, the Government is able to get in touch with the needs of all of the different branches of industry.

Mr. Hoover said he knew of no way by which it is possible to undertake the solution of collective questions relating to waste, adding as a preventive means, "except by the cooperative organization of the men in the industry; that we cannot go on and hope to make the progress that will maintain this standard of living in the face of the competition that we have in front of us, unless we can make some progress in the collective sense. So far as I know, the only way that we can hope for it is through the organization of associations that will take up the problems that are common to all, that gain inch by inch the efficiency and stability that make for national efficiency."

## Pierce-Arrow Deficit Increases Last Quarter

NEW YORK, Nov. 2—A report of the Pierce-Arrow Motor Car Co. for the quarter ended Sept. 30 shows a deficit of \$2,109,999 after charges, depreciation and Federal taxes. This compares with a deficit of \$1,400,550 in the previous quarter and surplus of \$355,310 in the

## SUPPORT GATHERING FOR SALES TAX PLAN

WASHINGTON, Nov. 2 — Senators who are advocates of some form of a sales tax declare they have almost enough votes to insure putting through one of three plans offered by Senator Smoot of Utah as a substitute for the miscellaneous excise taxes contained in the pending bill.

It is asserted that at least half the Republican membership is prepared to support the sales tax plan which has been advocated by the automotive industry. Party lines seem to have been obliterated in consideration of taxation measures. So many of the excise taxes already have been voted out that abolition of the remainder would result in the loss of a comparatively small amount of revenue.

corresponding quarter of 1920. The deficit for the nine months ended Sept. 30 amounted to \$4,000,051 compared with a surplus of \$1,778,354 for the corresponding period last year.

Directors of the company have set up a special reserve fund of \$3,750,000, which is considered ample to provide for shrinkage in inventories and other contingencies. It is stated that future statements of operating results will benefit from the adjustment which has been made.

## Republic Noteholders Asked for More Time

NEW YORK, Nov. 2 — The Republic Motor Truck Co. is mailing to noteholders to-day a request for an extension until 1926 on \$500,000 of its \$2,500,000 7 per cent serial notes which matured Nov. 1. The request is made because of business conditions, which have not permitted liquidation of sufficient inventories.

It was announced that a plan was in preparation, with the approval of the bankers, which provides for the payment of interest on the extended notes. The rate is to be increased to 8 per cent, it is said, and an adequate sinking fund will be provided. The same security will be given as under the present mortgage.

Confidence is expressed by the bankers that, with the extension plan adopted, the Republic company will be able to meet all its claims in full. It is understood that bank creditors have intimated their willingness to renew their loans.

In the balance sheet of Sept. 30, the company reports cash amounting to about \$500,000, the amount of the note instalment due. The bankers have refused to let this be withdrawn, since it would leave the company without working capital. Current assets total \$5,636,000 and current liabilities are about \$1,941,000, making a net working capital of \$3,695,000.

## Brighter Outlook Seen in Colombia

**One Company Handling American Lines Makes First Sales in Year**

BARRANQUILLA, COLOMBIA, Oct. 17 (By Mail)—Considerable improvement is under way here in regard to automobiles. One company, representing two American lines, sold a number of cars during August and September, the first they had sold since October of 1920. This improvement is due to generally better business conditions, to improved exchange and to the fact that Colombian products are moving in better volume. Further progress is expected.

Registration figures as of this date show that 332 automobiles and about 60 motor trucks are operating in the city of Barranquilla. Reports from Cartagena, another of the Colombian seaports not far from here, place the motor vehicles in that city as approximating 90 passenger cars, 20 trucks and 10 buses. The importations through Cartagena last year were 182 automobiles, five trucks and eight tractors. Several tractors are in use in the Cauca Valley near here and a number of the tracklaying type are employed in various parts of the country by the oil companies.

Among the recent automotive events of importance here was the organization of the Sociedad Automoviliaria de Colombia, composed of dealers and car owners, its object being the furtherance of automotive development and the promotion of rural highway and city pavement construction. The first meeting was held early in September and plans were made to cooperate actively with the Asociacion Automoviliaria de Bogota, which was formed some time ago in the Colombian capital with the same purposes as the Barranquilla organization.

## Dry Goods Association To Hear Fenn on Trucks

NEW YORK, Nov. 3—F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, will address members of the National Retail Dry Goods Association at a dinner at the Aldine Club in this city Nov. 9 on the use of motor trucks for short hauls. The attention of the dry goods dealers was centered on the use of trucks because of the railroad strike threat and Fenn will tell them something of their advantages.

The big difficulty in the past has been lack of insurance against theft. Merchants have lost large quantities of valuable merchandise in this way and they will insist upon adequate protection before resorting on a large scale to the use of the trucks.

Fenn addressed the woodland section of the American Pulp & Paper Association at Chicago last night on the increasing use of trucks in that industry.

## November Output to Meet October's

### Factories in Detroit Where Changes Have Been Made Expect Increase

DETROIT, Nov. 2—Production in the Detroit district in November will continue along the steady levels maintained in October, with a slight falling off looked for in some factories. In others where there have been decreased prices, new models and intensive selling efforts, gains are anticipated.

Medium priced cars have been most affected by price fluctuations, factories reporting a hesitancy on the part of dealers to do any stocking up. Despite this, sales are running strongly.

Ford Motor Co., with a production which will total approximately 85,000 in October, will manufacture about the same number in November, sales being reported as steady in all parts of the country with every indication that they will continue so. Revival in export business is having an important part in maintaining Ford's high production marks.

Packard has come through with a strong October business and expects to improve on this in November owing to lower prices on the single six line. A production of 10,000 of this model was planned to be reached by December of this year. With a month left this total is assured and will be exceeded. Enclosed models in the twin six line are reported sold six weeks in advance. November production in this line will approximate October's. Truck business in November will show an increase of 100 per cent over October, which had shown gains over previous months.

Cadillac is continuing on its high production schedule of its new models.

Lincoln reports an October business on a par with September, and has set a high schedule for November.

Roamer is continuing in strong demand and executives look for steady business for the rest of the year.

Hupp, with a price cut restoring 1917 levels, looks for heavy business in November after a somewhat dull October.

Buick and Studebaker continue to lead in their field, October business showing a slight decline, however, from the earlier heavy production marks. November will show a still further curtailment.

Reo reports business as steady and satisfactory.

Oldsmobile will continue along at about the October pace.

Hudson-Essex, with new models in the former and lower prices in the latter, report sales running high in comparison with earlier months.

Earl Motors has fixed a schedule for 500 of the new Earl in November, in addition to which it will manufacture Briscoe to meet sales in this former model.

Maxwell has not set a manufacturing schedule for its new line, but orders are

## October Car and Truck Shipments 96 Per Cent of Last Year; 11 Per Cent Below September, 1921

NEW YORK, Nov. 2—Reports of October shipments of passenger cars and trucks as compiled by the National Automobile Chamber of Commerce show that they aggregated 96 per cent of the total for the same month last year. It was the first month since the liquidation really got under way that shipments reached practically the same level as in the same period a year previous.

There is every reason to believe the comparison will be more favorable from now on. Gratification also is felt that October shipments showed a decline of only 11 per cent as compared with last month. Shipments for October of last year were 26 per cent less than for September. The shipment figures by months for this year and last follow:

	Carpools		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
January .....	25,057	6,485	29,283	3,185	....	93
February .....	25,505	9,986	43,719	7,507	....	99
March .....	29,326	16,287	57,273	9,939	....	75
April .....	17,147	20,187	64,634	14,197	....	1,619
May .....	21,977	18,608	74,286	15,193	....	2,381
June .....	22,516	20,269	60,746	18,834	8,350	3,947
July .....	23,082	19,470	52,342	15,320	8,702	3,725
August .....	23,286	20,350	34,060	14,290	7,095	3,565
September .....	20,804	20,150	24,431	13,550	5,469	3,580
October .....	17,209	17,323	14,127	11,257	2,519	2,300

reported running high and heavy business is looked for.

Dodge continued in October its schedule of 550 cars daily and is starting November on approximately the same schedule.

Dort will continue its October schedules.

Saxon reports business better than for several months and looks for steady November sales.

Columbia reports good October business and finds the November outlook satisfactory.

## Trucks Have Forced Lower Railroad Rates

(Continued from page 891)

The Atlantic Coast Line recently filed a petition pointing out that owing to competition, reduction in rates on cotton and cotton linters in the Carolina territory will have to be made in Georgia, Florida and Alabama, with the probability of the reductions extended clear into Texas. These statements indicate that the extension of highway systems throughout the South is the one great factor in motor-truck transportation. The railroads knowing that competition of motor trucks lessened on long hauls proposed to reduce the short haul and increase the long haul rates but the South Carolina Commission would not permit this action.

It is interesting to note that the railroads, especially the Atlantic Coast Line, believe that the truck competition can only be successfully maintained in cases in which the haul is not more than 50 miles, and then only in territories in which there are good roads.

There are many other commodities affected by motor truck transportation. Refineries have saved large sums by having their products hauled by motor trucks, which is made clear by railroads asking to reduce rates.

## W. R. Willett Heads Durant of Indiana

NEW YORK, Nov. 3—W. R. Willett, a veteran of the automotive industry, has been elected president and general manager of the Durant Motor Car Co. of Indiana, which will manufacture the six-cylinder Durant car in the former Sheridan factory at Muncie. A good share of Willett's business career has been spent with the General Motors Corporation. His latest work with that company was the organization of the Saginaw Products Co. division.

His apprenticeship in the industry was served in the Buick plant from 1904 to 1909. From 1909 to 1910 he was acting manager of the Rainier plant and later manager of the Welch Motor Car Co. at Pontiac for General Motors. He was works manager for the Gemmer Mfg. Co. of Detroit from 1913 to 1916, and later was general manager of the Chevrolet plant at Bay City, Mich. His first task will be to equip the Sheridan plant for the manufacture of the Durant six.

### 1,700,000 IN 1922

NEW YORK, Nov. 3—Careful estimates indicate that production of passenger cars and trucks for the calendar year 1921 will approximate 1,700,000 vehicles. This compares with 1,928,000 cars and 348,000 trucks, or a total of 2,276,000 for 1920. Inasmuch as it was predicted 1921 would be a "million car year" the output of motor vehicles has run far beyond expectations.

### ADAMS WITH RICKENBACKER

DETROIT, Nov. 3—Charles Adams has resigned as production manager of the Maxwell Motor Corp. to become production manager for the Rickenbacker Motor Car Co. Adams has long been closely associated with B. F. Everitt, president of the Rickenbacker company.

## Firestone Makes Price Reductions

Nothing Definite Decided by  
Goodyear or Goodrich to  
Meet Cuts

AKRON, Nov. 2—The Firestone Tire & Rubber Co. announced to-day that it had made a 20 per cent reduction in prices on cord tires, 10 per cent on fabric tires and 10 per cent on truck tires. This gives all tire purchasers the advantage of a 20 per cent discount offered to dealers some time ago effective until Oct. 31. The announcement evidences a sudden change of front by the Firestone company, which stated Monday that it did not contemplate continuing the 20 per cent discount which had been given to dealers.

It is considered probable that the other large tire manufacturers will be compelled to take similar action in order to meet competition, although there is said to be a possibility they may decide to let Firestone go it alone.

President E. G. Wilmer of the Goodyear Tire & Rubber Co., who declared Monday that he knew of no plan on the part of the larger tire companies to announce a general tire reduction, stated to-day that nothing definite had been done to meet the Firestone cut. A similar statement was made in behalf of the B. F. Goodrich company.

NEW YORK, Nov. 2—Tire companies with headquarters in this city are understood to be going over their schedules with the expectation of meeting the Firestone price cut but formal announcement will not be made until later in the week.

## Changed Maxwell Prices Accompany New Models

DETROIT, Oct. 31—Closely following its announcement of new models the Maxwell Motor Corp. announces it has revised its prices. The list follows:

	Old Price	New Price
Roadster .....	\$845	\$885
Touring car.....	845	885
Coupe .....	1,445	1,385
Sedan .....	1,545	1,485

President Wilson states that 24,000 cars on hand when the reorganization of the company was completed have been sold as well as nearly all the 10,000 produced since that time. Former models on hand now average less than one-half car per dealer.

### CHALMERS PRICES REDUCED

DETROIT, Nov. 1—The Chalmers Motor Car Co. has announced price reductions on its various models ranging from \$150 to \$400. The price revisions are as follows:

	Old Price	New Price
Roadster .....	\$1,495	\$1,245
5 passenger touring.....	1,545	1,295
7 passenger touring.....	1,795	1,395
Coupe .....	2,295	1,995

	Old Price	New Price
Sedan .....	\$2,445	\$2,295
Sport .....	1,695	1,445

### DAVIS PRICES CUT

RICHMOND, IND., Oct. 31—The George W. Davis Motor Car Co. has reduced prices on the sedan and coupé from \$2,795 to \$2,595. The price of the touring car was reduced early this month from \$1,895 to \$1,695. The latest reductions combined with the June revisions make total reductions from the December, 1920, prices of from \$455 to \$590.

## Tractor Manufacturers Make Price Revisions

CHICAGO, Oct. 31—The following reductions in the prices of tractors have been announced by the various manufacturers, effective immediately.

Name	Old Price	New Price
ARO .....	\$550	\$495
Aultman (22 to 45 rating) .....	3,850	3,420
Aultman (30 to 60 rating) .....	5,000	4,500
Caterpillar (25 rating) .....	4,250	3,975
Caterpillar (40 rating) .....	6,500	6,050
Centaur .....	405	385
Dart .....	2,100	1,800
Imperial .....	5,000	4,500
Kalumb .....	1,650	1,475
Peoria .....	1,785	1,600
Plowman .....	1,995	1,695
Port Huron .....	1,700	1,600
Allwork Model 2 G .....	1,875	1,775
Allwork Model 2 C .....	1,675	1,525

### NEW WILCOX PRICES

MINNEAPOLIS, Oct. 31—The Wilcox Trux, Inc., has made reduction in price on all its models as follows:

	Old Price	New Price
1 ton.....	\$2,100	\$1,900
1½ ton.....	2,775	2,550
2½ ton.....	3,300	3,000
3½ ton.....	4,250	3,950
5 ton.....	5,200	4,350

### TOWER REDUCES

ST. LOUIS, Oct. 31—The Tower Motor Truck Co. has reduced prices on its three models as follows:

	Old Price	New Price
1½ ton.....	\$3,000	\$2,900
2½ ton.....	3,475	3,200
3½ ton.....	4,400	4,100

### REPUBLIC LOWERED

ALMA, MICH., Oct. 31—Prices of Republic trucks has been reduced, effective immediately, as follows:

	Old Price	New Price
1 ton.....	\$1,695	\$1,395
1½ to 2 ton.....	2,295	1,795
2½ to 3 ton.....	2,795	2,195
3½ to 4 ton.....	3,845	3,095

### DOUGLASS TRUCKS REDUCED

OMAHA, Oct. 31—The Douglass Motors Corp. has reduced its 1½-ton truck from \$2,050 to \$1,850 and its 3-ton truck from \$3,250 to \$2,950.

### WALTER TRUCK CUT

NEW YORK, Oct. 31—The Walter Motor Truck Co. has reduced the price of its 5-ton model from \$5,600 to \$4,850.

## Committee Handles Mexico City Show

Twelve Dealers in Charge of  
Display Scheduled for  
Next Spring

NEW YORK, Nov. 1—Plans are now being made for the 1922 automobile show that will be held in Mexico City under the supervision of the automotive division of the American Chamber of Commerce of the Mexican capital. The show is to be held before the Mexican rainy season starts and after the New York and Chicago exhibitions, which, it is expected, will make it some time in March.

The show will be the second held in Mexico City, the first having taken place during April and May this year. The 1922 show, however, will be entirely different from the previous one, as it will be directed by a committee of automotive dealers of the capital and not by one man. The automotive division of the Chamber of Commerce, which was organized some months ago, plans to name a committee of 12 representatives who, through an executive committee, will be in charge of the show. The committee is to consist of six men representing the passenger car field and as many more representing trucks, tractors and accessories.

The preliminary plans, announced by S. L. Carrico, the Mexico City representative of the U. S. Rubber Co., provides for holding the show in the bull fight arena, a structure that affords ample exhibition facilities. Under the tiers of seats, Carrico explained, there are a number of large-sized rooms, connecting with each other and forming a large oval. These rooms will house the exhibits, the ring itself being reserved, if necessary, for the showing of heavy machinery, etc.

Automotive business throughout Mexico continues brisk, Carrico states, and, except for a possible seasonal decline, is expected to keep at a high pace.

### NO CHANGE IN DODGE OWNERS

DETROIT, Nov. 1—Directors of the Dodge Brothers Motor Car Co. announce that no change in ownership or management is contemplated and that the company has entered into long term contracts with F. J. Haynes, the president, and John Ballantyne, the treasurer, who will continue in charge.

### LOWER RAINIER PRICES

FLUSHING, Oct. 31—The Rainier Motor Corp. announces the following price revision on its trucks.

	Old Price	New Price
¾ ton.....	\$2,150	\$1,990
1 ton.....	2,350	2,150
1½ ton.....	2,600	2,490
2 ton.....	2,950	2,890
2½ ton.....	2,600	2,550
3½ ton.....	4,500	4,000
5 ton.....	5,250	5,100

## Finds Improvement in Latin-America

### Studebaker Representative Says Brazilian Market Offers Strongest Appeal

NEW YORK, Nov. 1.—Confidence in the future of the automotive trade between this country and Latin-America is expressed by M. C. Reichert, manager of the New York export branch of the Studebaker Corp. Reichert has just returned from an extensive trip to Argentina, Uruguay and Brazil, and he has noted already an extensive improvement in the general trade conditions affecting those three countries.

The Brazilian market made an especial appeal to the Studebaker representative, and he expects that the coming months and years will witness an impressive expansion in our sales to that country. This will take in not only the larger cities into which the American car has gone in great numbers, but also will concern the smaller cities both along the coast and inland. Reports of large stocks of automobiles and automotive equipment in the Brazilian ports were denied by Reichert who believes that the generally quoted statements concerning unclaimed cars in the various Latin-American centers are both misleading and exaggerated.

So far as Argentina is concerned, before his departure from Buenos Aires in late August, some fears were being expressed that the year's crops would be seriously damaged by lack of rain. However, since then reports have reached him of generous rains and the crop situation looks quite optimistic.

"All countries of Latin-America are proceeding rapidly and satisfactorily in assimilating the belief that the motor car is an essential vehicle of transportation needed in the upbuilding of their vast territories," he said. "There can be no doubt about the standing of the American-made motor car there."

"Competition from the European makers is more of a threat than an actuality, thus far having been almost entirely in the field of high-priced limousines and similar cars. Our activities in these countries are continuing without a let-up and we naturally have high hopes that this belief will be justified in continuing and increasing business."

## Trucks Led Federal Plan to Meet Strike

(Continued from page 888)

In the Middle West, Chicago was the mobilization center selected. It was not determined whether Washington or Pittsburgh would be the center for Maryland, Pennsylvania, Ohio, Virginia, West Virginia and Kentucky. Atlanta was selected as mobilization headquarters for the States of Tennessee, North Carolina, Mississippi, Alabama, Georgia, South Carolina, Florida and Louisiana. Kansas

City was chosen as the center for Nevada, Colorado, Kansas, Oklahoma, Missouri and Arkansas, while Houston was to be the point of mobilization for Texas and New Mexico.

For Arizona, California, Nebraska and Utah, San Francisco was selected as the central point. Seattle was chosen as the mobilization point for Idaho, Oregon and Washington, while Aberdeen or Pierre was decided upon for Montana, Wyoming, North and South Dakota.

The administrative section of the plan called for the assistance of governors and their State organizations in securing interstate movement of the supplemental necessities that they might require, and to set up relations with food and fuel industries to assist in interstate or inter-regional movements of supplies, and also to secure co-ordination of railway and water movement in the delivery of these necessities to points in need.

## Reeves Investigates Used Cars in Chicago

CHICAGO, Nov. 1.—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, has been in this city for several days to attend the annual meeting of the National Association of Business Executives. Between sessions of this body, Reeves spent as much time as possible with Chicago dealers, inquiring into the used car situation. In explaining this activity, Reeves said:

"The Chamber is going into the used car phase of the automobile business very seriously. Our contact with the dealer's committee has brought us much excellent information and the members of the Chamber realize the seriousness of this situation more than ever before."

"My conversations with Chicago dealers have been very helpful to me. There is one peculiar phase to this question—it is as interesting and important to talk to a dealer who is troubled with his used cars as it is to talk to a dealer who is moving the used cars rapidly and making money from them. We need information on all points of this question."

"I have obtained some very helpful information from Chicago dealers, some of whom are quite advanced in this phase of the work."

## Louisiana Will Adopt Graduated License Tax

NEW ORLEANS, Nov. 1.—A graduated license tax on tonnage and a flat rate of 68 cents per horsepower on trucks and automobile buses has been agreed upon by a committee of the Louisiana Legislature in session at Baton Rouge. The license, which will be in addition to the 68 cents per horsepower, has been graduated as follows:

Trucks	Per Thousand
750 to 4,000 pound.....	\$10.00
4,001 to 5,000 pound.....	12.50
5,001 to 6,000 pound.....	15.00
6,001 to 8,000 pound.....	20.00
8,001 to 10,000 pound.....	25.00

The license proposed for auto buses would apply as follows: 1 to 7 passengers, \$2.50 per passenger; 8 to 20 passengers, \$3 per passenger.

## METAL MARKETS

LITTLE change is looked for in the market for those steels that enter chiefly into automotive construction until purchasing agents place their first orders for the 1922 season. That the last attempt to lift sheet prices to the extent of \$5 a ton proved an utter failure, should make for a conservative attitude in the matter of prices on the part of producers when 1922 demand sets in.

The market for strip steel is perhaps a shade steadier than it was, a condition, however, in no wise traceable to enlarged demand but solely to the fact that very little additional business for delivery before Dec. 31 is expected to be booked and that so far there is no chance to get any 1922 business on producers' books. Alloy steel makers have for so long been on short rations, as concerns orders from the automotive industries, that they will enthusiastically co-operate with prospective buyers and bring any possible sacrifice in order to broaden the outlet for their products.

Ferroalloys, moreover, have been liquidated with reference to price even more thoroughly than most other steel making raw materials. Nickel prices have been pruned likewise. All in all, if sellers show even the least sense of perspective, automotive buyers should be able to place 1922 orders, when the time for such contracts comes, without incurring the risk of driving prices upward to their own detriment, a danger that is always more or less present in seasonal buying by an entire industry.

What climbing aspirations pig iron values had, appear to have come in for a check due to the hesitancy of buyers to commit themselves until at least part of the 28 per cent freight rate cut on iron ores has been translated into price reductions on pig. In the steel industry, of course, the inability of the carriers to put into early effect further wage cuts which, in turn, precludes inclusive reductions in freight rates generally is being used as a convenient argument to explain the impossibility of further price reductions.

Pig iron.—Automotive foundries figure very little in the market, the majority having sufficient supplies on hand for present requirements.

Steel.—The sheet market remains at 3c. for black and 4c. for galvanized with blue annealed quoted at from 2.25c. upward. Full finished body sheets, 22 gage, are quotable at 4.35c. and upward. One of the low-priced passenger car builders continues to buy No. 9 gage tank steel quality sheets at the 1.75c. plate base price. Hot-rolled strip steel is relatively steady at 2.25c., with cold-rolled in light demand at from 3.75c. upward. Hot-rolled nickel steel (S. A. E. 2315-45) is nominally quotable at 4.50c.

Aluminum.—The new sheet prices of the domestic producer are still being cut by some of the importers of Swiss and German aluminum sheets. Quotations on the latter have ranged down to as low as 28c. for coils and 30c. for flats. Quite a few consumers, however, have been disappointed in the quality of some of these importations. British and French sheets are held on a parity with the domestic product. Somewhat higher prices are being asked for imported ingots by those who have them to offer.

Copper.—The market is once more pliable. There is talk of a resumption of production by the low-cost producers early next year.

## INDUSTRIAL NOTES

Robert H. Hassler, Inc., has broken ground for the seventh unit of its plant at Indianapolis. The new building will be two stories in height and will add 15,000 sq. ft. of floor space to the manufacturing facilities of the company. It will be completed in from thirty to sixty days. An eighth building, larger than that now under construction, is planned for erection next spring. The company is producing over 1000 sets of shock absorbers daily for all models of Ford and Dodge Brothers' cars.

Lincoln Motor Car Co. shipped 302 cars in September, the original estimate being 200. The shipments for October will aggregate 300. Third quarter shipments were approximately 600 cars compared with 850 the second quarter and 340 the first. The company is obtaining greater production with 2000 men than with twice that number a year ago. The greatest output now is in higher priced enclosed models, the November outlook indicating production of a minimum of 200 cars.

Federal Rubber Co. of Cudahy, Wis., division of the Fisk Rubber Co., has increased the rate of operations to approximately 65 per cent of capacity, and expects to be able to make further increases in the coming sixty days as the result of the steady demand for goods from all sections, enforced largely by prevailing low dealer's stocks. The number of men employed at present is nearly 1200, compared with a normal force of 1800 and a full capacity force of 2000.

Moon Motor Car Co. reports that its plant is working full time and that production is up to capacity. October production schedule was 100 per cent greater than the schedule for the corresponding month of last year, and this increased schedule will hold good for the next three months, it is stated, due to the amount of orders on hand. It is estimated that 85 per cent of the cars shipped were of the enclosed type.

P. & J. Motor Co., Inc., of Cudahy, Wis., which was incorporated recently with \$100,000 capital, is marketing an initial issue of \$50,000 to build and equip a machine shop for the manufacture of an air-cooled, three-cylinder engine, developing 29.7 hp. at a piston speed of 2000 ft. p.m. Dr. B. F. Palmer is president; George C. Dutcher, vice-president, and A. Dretzka, secretary and treasurer.

Hendee Mfg. Co. states that it has received orders for over 4000 motorcycles since new prices were announced Sept. 1. At the annual meeting of the company, Henry H. Skinner was re-elected president, and Frank J. Weschler, treasurer. It is announced that the working force has been increased since Sept. 15 from 450 to 900 men and that the goal of 1000 would soon be reached.

Cutler-Hammer Mfg. Co. of Milwaukee has completed a new sales arrangement with Brandenburg Bros. & Eccleston of Chicago, New York and Detroit, for the sale in the United States of the products of the Gear shift department of the Milwaukee company.

Glenwood Motor Car Corp., which will locate its plant at Findlay, Ohio, within a few weeks, has elected C. F. M. Niles, H. Fort Flowers and William A. Hollington, all of Findlay, directors.

American Chain Co. has removed its general sales and export offices to Bridgeport but will continue its district sales office in the Grand Central Terminal, New York.

Oakley Machine Tool Co. has moved its factory and general offices to Middletown.

Ohio, occupying part of the building of the Willard-Middletown Machine Co.

Root & Van Dervoort Corp. reports that the week ended Oct. 22 was the best in the company's history. New car orders actually entered totaled 48.

Niles-Bement-Pond Co. has obtained exclusive selling rights for the Cincinnati High-Speed Machine Co.

## FINANCIAL NOTES

Wright Aeronautical Corp. reports net sales of \$554,981 for the quarter ended Sept. 30. Net profits after reserve for taxes and including income from investments and patents amounted to \$214,935, equal to 98c. a share of the 224,390 shares of capital stock. For nine months to Sept. 30 net earnings after taxes amounted to \$1.91 a share on the stock. The total current debt is \$184,000. Working capital is in excess of \$2,000,000, this not taking into account a trust fund of approximately \$2,800,000 set aside for contingent liabilities of the old Wright-Martin.

Root & Van Dervoort Corp. balance sheet for Sept. 30 shows cash in hand \$81,913 against \$631,932 as of Dec. 31, 1920. Notes and accounts receivable on Sept. 30 were \$501,893 compared with \$896,361, Dec. 31. The inventories on the latter date totaled \$3,811,917 against \$1,571,630 on the date under comparison. Notes and accounts payable on Sept. 30 were \$2,889,698 and on Dec. 31, \$3,730,288. The surplus last December was \$1,466,792; in September they were \$880,384.

General Tire & Rubber Co. announces that the last of its bank indebtedness has been paid off. A year ago in May the debts aggregated \$2,000,000 which was \$500,000 in excess of capital and surplus combined. By November the indebtedness had been reduced to \$1,400,000. Sales for the present year, it is estimated, will be greater than for last year. The company has paid all dividends.

Fisk Rubber Co. combined income account for six months ended June 30, 1921, shows net income after depreciation and other charges, but before taxes, of \$1,856,268. The net sales were \$18,122,145; gross profit, after depreciation, \$6,156,255 and administrative, selling and general expenses, \$4,299,987.

B. F. Goodrich Co. has declared the regular quarterly dividend of \$1.75 a share on the preferred stock, payable Jan. 2 to stock of record Dec. 22.

Franklin Automobile Co. regular quarterly dividend of 1% per cent on preferred stock was paid on Nov. 1 to stockholders of record Oct. 20.

## DUPONT ISSUES STATEMENT

NEW YORK, Nov. 3.—The following statement in reference to rumors regarding the policies of the General Motors Corp. has been issued by President duPont:

"It is but natural that there should have been constant gossip during the past few weeks while automobile price revisions were under way. The policies of General Motors with respect to certain of its manufacturing divisions were not immune, the future of Oldsmobile being the subject of persistent rumor.

"This division is in a healthy condition with its business stabilized and sales increasing in the face of the coming winter. The present line of passenger and commercial cars, with gradual improvements, will be continued for 1922 and 1923 selling seasons. Thereafter new models as may be required by the trade may be introduced."

House Passes Road  
Conference ReportSenate Action Will Be Expedited  
Following Passage of  
Taxation Bill

WASHINGTON, Nov. 2.—By vote of 236 to 194 the House passed the conference report on the good roads bill. Every effort is being made to expedite passage in the Senate after the taxation bill is approved. However, it is expected that the anti-beer legislation will hold up enactment of the highway measure.

The principal opposition to the conference report was by Chairman Madden of the appropriations committee on the ground that it was sectional favoritism and extravagance.

The bill as passed by the House provides that the law shall be administered by the Department of Agriculture through the Bureau of Public Roads and not a commission. It also provides that the initiative in locating roads to receive Federal aid shall remain with the States. The several State highway departments, with the approval of the Department of Agriculture, shall lay out a system of roads, interstate and inter-county in character, and not interstate alone.

The funds from the several States put up to match Federal aid, from whatever source derived, shall be subject to the direct control of the highway departments of the several States.

The several States shall maintain and keep in good repair at all times all highways constructed with Federal aid. A penalty is provided for failure to put in proper repairs after 90 days' notice from the Department of Agriculture.

Open Meeting Arranged  
to Discuss Oil Status

NEW YORK, Nov. 2.—The rapidly failing supply of oil from Mexican sources, which for some years has been depended upon to fill the widening gap between American domestic production and consumption, has made it necessary to consider seriously the possibilities of securing supplies from other foreign sources.

Because of this situation, Ralph Arnold, chairman of the petroleum and gas committee of the American Institute of Mining Engineers, has arranged for an open meeting in this city, Dec. 13 and 14, 1921, at which foreign oil possibilities and related subjects will be considered.

Among those persons scheduled to speak at the meeting are Secretary of Commerce Herbert Hoover, T. G. O'Donnell, Henry L. Doherty, David White and Joseph E. Pogue. It is a significant fact that the meeting is to occur when the oil resources of the world are being discussed in connection with the Armament Limitation Conference at Washington.

Oil resources are regarded as having great international significance.



## MEN OF THE INDUSTRY

O. S. Tweedy and J. F. Lanier have become associated with the McKone Tire & Rubber Co. of Millersburg, Ohio, the former as general sales manager and the latter as southern distributor. Tweedy for many years was connected with the Diamond Rubber Co. and with the United States Tire Co. as general branch sales manager. Latterly he has been western sales manager of the C. Kenyon Co. Lanier was formerly associated with the Diamond Rubber Co., the Norwalk Tire & Rubber Co., and lately with the Howe Rubber Corp. as district manager.

F. M. Benson, formerly connected with the sales departments of the Chevrolet Motor Co. and the Sheridan Motor Car Co., has left the General Motors Corp. to organize the Benson Motor Car Co. of New York which will distribute Bell trucks in the eastern territory including New York and the New England states. The company will specialize in one-ton trucks and will build up a dealer organization throughout this territory.

L. W. Coppock, production manager of the Kalamazoo Motors Corp., has organized the Kalamazoo Tire & Rubber Co., Kalamazoo, Mich., which has taken over a portion of the building in that city formerly occupied by the Kalamazoo Steel Goods Co. The company will manufacture the Kalamazoo cord tire, one size only, 30x3½, and a production of 1000 tires a month is the scheduled output for the next few months.

Leland F. Goodspeed, for the past five years or more chief of the engineering staff of the Roamer, has resigned from the Barley Motor Car Co. to join forces with the Commonwealth Motors Co. of Chicago and Joliet, Ill. Goodspeed has been elected vice-president in charge of engineering of the Commonwealth company, which at the present time is working on a new passenger car model.

J. T. Knight, until recently district manager of the Kelly-Springfield company's branch in Atlanta, has been appointed southern district manager of the Howe Rubber Co. of New Brunswick, N. J., and Cleveland, Ohio, with southern offices and branch in Atlanta. A large warehouse will be opened here to take care of the company's business in the southern field.

Ralph W. Hollenbeck has been appointed special sales representative in the motor truck division of the International Harvester Co. For a number of years he has been auditor of the Springfield, Ohio, works. He will be succeeded at Springfield by Charles Miller. For the present Hollenbeck will cover the Ohio territory.

H. A. Kimber, formerly of the Quigley Furnace Specialties Co., is now in charge of the sales of the Quigley Pulverized Fuel Department of the Hardinge Co., New York City. This change was made owing to the acquirement by the Hardinge company of the pulverized fuel department of the Quigley company.

C. H. Hobbs has been appointed assistant general manager of sales of the Detroit Seamless Steel Tubes Co. of Detroit. For over fourteen years Hobbs was associated with the Lackawanna Steel Co. and for the last five years served as district representative in charge of the Detroit office.

Louis A. Pratt and Roy Moore have organized the Pratt-Moore Advertising Agency in Detroit with offices in the Ford Building. Both men are well known in the industry having been connected with the advertising

department of several important companies for a number of years.

William B. Hall, for the past four years in charge of General Motors Truck Co. advertising and other automotive accounts for the Green, Fulton, Cunningham Co., advertising agency, Detroit, has resigned to join the Dunlap-Ward Advertising Co. of Cleveland.

Robert I. Miner has been appointed sales engineer in the pressed steel division of the Motor Wheel Corp., Lansing. His activities will be devoted principally to handling the sales to car manufacturers of the Gier pressed steel plant of the corporation.

Fred W. A. Vesper, head of the Vesper-Bulck Co. of St. Louis, and treasurer of the National Automobile Dealers Association, will be elected this month president of the St. Louis Chamber of Commerce.

Joseph Husson, general sales and advertising manager of the Northway Motors Sales Co., Boston, has resigned from that position as of Nov. 1. His future connections have not yet been announced.

William N. Davis has rejoined Cadillac Motor Car Co. as body engineer, after having resigned from a similar position with Lincoln Motor Co.

Rolls-Royce of America  
Votes to Pass Dividend

SPRINGFIELD, MASS., Nov. 2—The directors of Rolls-Royce of America, Inc., have voted to pass the quarterly dividend of \$1.75 a share due preferred stockholders Nov. 1. As explained to the stockholders in a letter from L. J. Belnap, president, provision was made at the time of organization for such dividends during the period of construction, and an amount was set aside sufficient to pay five dividends.

Payments were made at regular intervals up to Aug. 1 last, from which date dividends on the stock became cumulative. In accordance with the schedule of operations, the statement goes on to say, the plant reached production May 1, and while earnings from that time have created a surplus, the directors do not deem it good judgment in view of the present depressed business conditions and in view of deferred charges during construction, to begin paying dividends at this time, but regular payments will begin as soon as the directors feel conditions justify it.

## CURTISS HEADS TIFFANY

NEWARK, N. J., Nov. 2—C. W. Curtiss, formerly general manager of the Splitdorf Electrical Co. and later president and general manager of the Van Sicklen Speedometer Co., until its sale to the Stewart-Warner Speedometer Corp., has taken a substantial interest in the Tiffany Mfg. Co. of this city, of which he has been elected president.

Associated with him are Paul J. Landemare, secretary and treasurer, formerly treasurer of the Splitdorf company and later controller of the Van Sicklen company, and Carl T. Mason, chief engineer, formerly chief engineer of the Splitdorf company. The Tiffany company manufactures a line of high grade automotive electrical specialties.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

The fact that during the past week the United States Treasury was able to float a \$200,000,000 issue of certificates of indebtedness at 4¼ per cent and 4½ per cent, the lowest rates since the latter part of 1919, the issue being over-subscribed by \$400,000,000, is an indication of the general betterment of the credit situation. The week's local money market, however, showed signs of firmness. The range for call money was 5 per cent to 6 per cent, with 5½ per cent ruling, in comparison with 4 per cent to 5½ per cent the previous week.

The undertone for time money was also slightly firmer, and the rate for 60 and 90 day paper advanced to 5½ per cent, as compared with a range of 5¼ to 5½ per cent in the previous week. The quotation for the longer maturities up to six months advanced from a uniform rate of 5½ per cent to 5½-5¾ per cent. Prime commercial paper was in fairly good demand, with quotations maintained at 5½ per cent to 5¾ per cent.

Another outstanding event in the past week's market was the retirement by Great Britain of the amount still outstanding of the \$150,000,000 of 5½ per cent United Kingdom of Great Britain and Ireland Secured Loan of 1916.

The Federal Reserve System's statement for Oct. 28 furnished proof that the position of the banks is materially stronger. The total reserve ratio increased from 70.3 per cent to 70.8 per cent. Total gold reserves stood at \$2,786,239,000, an increase of \$13,518,000, and the highest of the year. Federal Reserve notes in circulation at \$2,408,779,000 showed a contraction of \$32,083,000. Total bills on hand decreased \$13,000,000, while total earning assets at \$1,562,021,000 marked a decrease of \$15,868,000, and a record low for the year, about 54 per cent below the peak figure reported for Oct. 15, 1920. Total deposits at \$1,738,556,000 increased \$21,112,000, of which \$15,504,000 was attributable to Government deposits.

A significant, although not unexpected, event in the industrial world last week was the calling off of the strike set for Oct. 30. Although the United States Steel Corporation's net earnings as reported for the quarter ended Sept. 30 were better than had been expected, they were insufficient to provide funds for the full dividends on the preferred stock. The net earnings of the Bethlehem Steel Corp. for the same period, on the other hand, were more than sufficient to meet dividend requirements of preferred and common stock.

## TRUCK CROSSES CONTINENT

NEW YORK, Nov. 1—A 5-6 ton pneumatic tired truck with six wheels, four of which are drivers, made a 3507-mile run from Los Angeles to New York in 6 days, 15 hours and 23 minutes

# Calendar

## SHOWS

- Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.
- Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.
- Jan. 28-Feb. 4—Chicago, Automobile Salon, Hotel Drake.
- Jan. 7-13—New York, National Automobile Show, Madison Central Palace, Auspices of N.A.C.C.
- Jan. 28-Feb. 4—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.
- Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.
- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

- Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.
- Nov. 4-12—Car Show, Nov. 28-Dec. 3—Motorcycle Show.
- Nov. 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.
- Nov. 12-27—Buenos Aires, Annual Motor Show, La Pabellon de las Sosas, Automovil Club Argentino.
- Nov. 28-Dec. 3—Shanghai, China, Automobile Show.
- March, 1922—Santiago, Chili, Annual Automobile Show.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary As-sociao Automobilista Brasileira.

## CONVENTIONS

- Nov. 14-19—Chicago, Annual Meeting and Business Exhibit of Automotive Equipment Association.
- Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.
- Nov. 21-23—Atlanta, Third Annual Convention of American Farm Bureau Federation.
- Dec. 6-8—Chicago, Second Annual Meeting of American Petroleum Institute.
- Dec. 10—New York, American Institute of Mining and Metallurgical Engineers.

Dec. 20—Philadelphia, American Society of Mechanical Engineers.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 17-20, 1922—Chicago, American Road Builders Association.

Jan. 30-31—Chicago, Fifth Annual Convention, N. A. D. A., La Salle Hotel.

June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

- Detroit, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.
- New York, Jan. 11-14, 1922—Annual Meeting.
- Chicago, Feb. 1
- Minneapolis, Feb. 8—Tractor Meeting.

## Australasian Trade Shows Improvement

### Automobile Imports During First Half of Year Made Notable Increase

LOS ANGELES, Nov. 3—Latest reports received here from the automotive trades in the Australasian markets indicate that business conditions are appreciably improving.

Despite the distressing conditions prevailing in Australia and New Zealand during this year, the American automobile trade has not suffered to any large extent. As a matter of fact, the latest official statistics reaching here show that in some instances automobile imports have increased over the first half of 1920.

In the 1920-21 fiscal year, Australia imported motor chassis valued at \$4,093,108, as compared with total imports of motor chassis in the 1919-20 fiscal year amounting to \$2,443,189, or an increase of \$1,649,919. These statistics emphasize the remarkable development of the body building trades in Australia, which have been greatly encouraged by the high Australian tariff on imported bodies. As against the figures showing the imports of motor chassis the following statistics showing the imports of motor bodies stand in significant contrast: 1920-21 fiscal year, \$194,719; 1919-20 fiscal year, \$137,165, showing an increase of \$57,554.

The total trade of the Commonwealth of Australia in the 1920-21 fiscal year amounted to \$295,258,620, as compared with \$248,797,801.

In New Zealand there has been a slight falling off in the imports of motor vehicles this year as compared with 1920. The total value of automobiles imported by New Zealand in the seven months ending July 31, 1921, aggregated \$1,022,391, as compared with \$1,499,801 in the same

period of 1920 and \$434,224 in the same period of 1919.

Under pressure of the government and the banks the import trade of New Zealand has been greatly restricted during the last few months. In fact, the total import trade for July was almost back to the pre-war level.

## Automotive Merger Waits All Stockholders' Assent

NEW YORK, Nov. 1—Incorporators of the Associated Motor Industries which, it was announced last week, would take over the Jackson Motors Corp., do not contemplate making public the details of the merger, which will take in 19 automotive companies with assets of approximately \$65,000,000, until early in January.

It is explained that while the officers of the various corporations which will be included have signed contracts, it will be necessary to obtain the consent of a majority of the stockholders in each corporation. Satisfactory progress is being made in this work but inasmuch as there are several hundred stockholders in some of the companies it will require a considerable period to complete the negotiations.

## Cadillac Adopts Plan to Aid Used Car Sales

DETROIT, Nov. 1—The Cadillac Motor Car Co. is undertaking to assist dealers in handling used car sales through the establishment of a used car exchange of ideas which will be handled through the advertising department. Ideas of Cadillac dealers who are meeting the used car problem successfully in creating demand will be gathered into a brochure which will be distributed to all Cadillac dealers.

Copy and layouts for advertisements will be prepared in the advertising department and will be mailed to dealers.

## Price Factor Leads in Peruvian Trade

### Improvement in Exchange Accomplishes Reductions and Stimulates Business

LIMA, PERU, Oct. 17—The predominant note in the automotive market in Peru lately has been the lowering of prices. This is revealed in the advertisements appearing in the daily press. When prices began to fall in the United States a year ago, merchants here were prevented from reducing prices for two reasons: First, there was an unfavorable turn in the exchange, the fall in the value of the Peruvian currency more than counterbalancing the fall in price abroad; second, the Peruvian Government raised the tariff rate on automotive products. For these two reasons, when prices were falling in the States, Peruvian merchants instead of reducing prices were compelled to advance them, much to the bewilderment of their customers.

More notable than either the sale of automobiles or tractors in Peru is the increasing use of trucks. The light one-ton truck or ¾-ton is selling better than the bigger trucks, though these are also becoming more numerous. The Peruvian Post Office Department has recently put in service several Albion (Scotch) trucks to haul mail.

## BUYS WILCOX MOTORS' ASSETS

MINNEAPOLIS, Oct. 31—The Wilcox Trux, Inc., has acquired the interest of F. E. Satterlee as receiver of the H. E. Wilcox Motor Co. by purchase of the assets of the receivership. All future business in connection with the manufacturing, sale and service of Wilcox trucks will be handled by the new corporation at its offices 1030 Marshal Street, N. E., Minneapolis.

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

Vol. XLV  
Number 19

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, NOVEMBER 10, 1921

Thirty-five cents a copy  
Three dollars a year

## ATWATER KENT

*Ignition, Starting and Lighting*

Atwater Kent development has kept pace with and frequently anticipated the rapidly changing needs of the automotive industry.

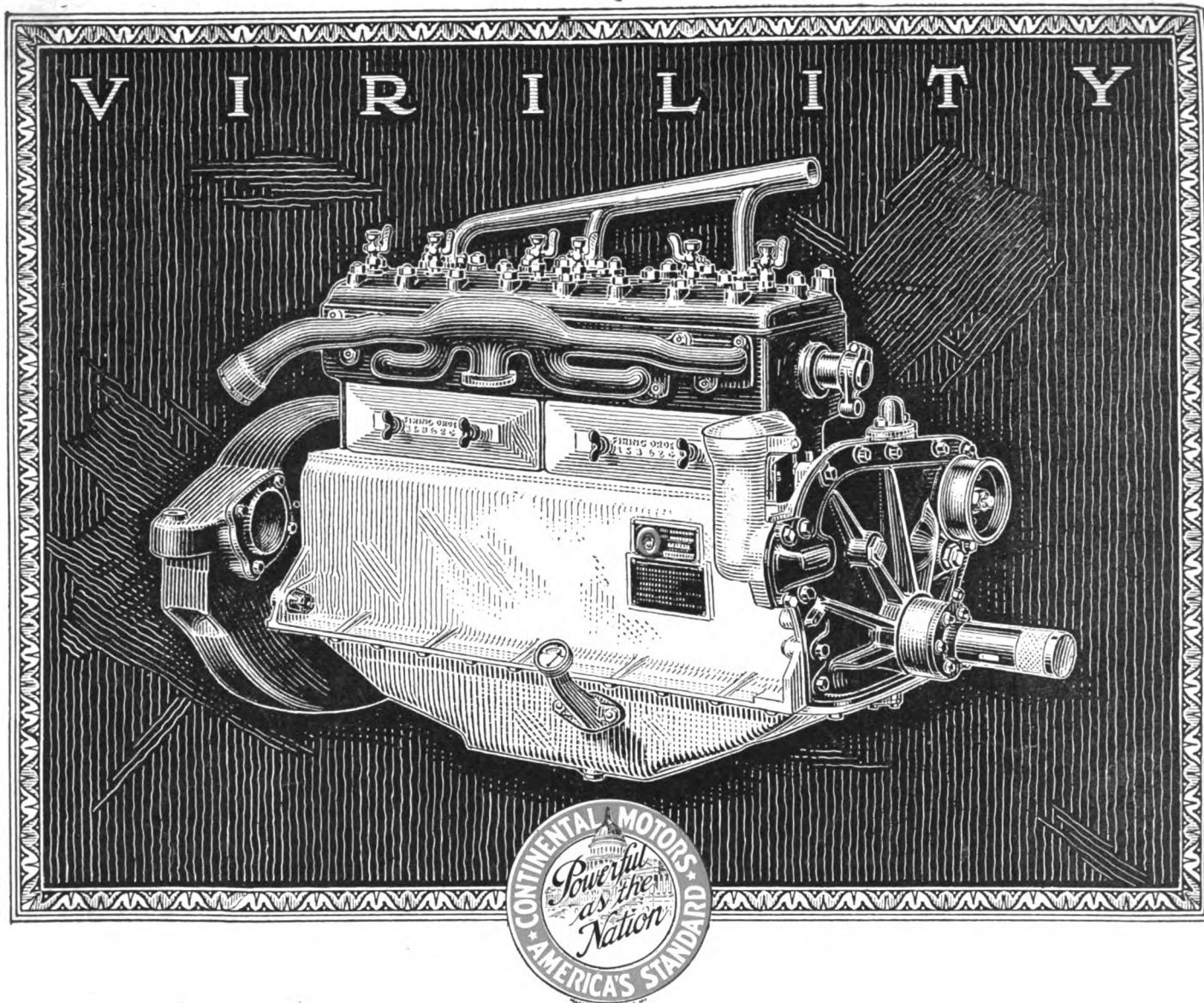
From the beginning of this business almost twenty years ago, a policy of "quality first" has been maintained.

*The result:* appreciation in the shape of hundreds of thousands of factory equipped touring cars, trucks, motor boats, tractors and stationary engines, every one giving that enduring satisfaction that goes with merchandise of quality.

ATWATER KENT MFG. COMPANY

*Philadelphia*





Red-blooded VIRILITY vitalizes the entire Continental organization. It energizes every Continental undertaking. Unconquerable, it drives ahead, bridging the gaps between ideals and realities, converting the motor dreams of today into the Red Seal qualities of tomorrow. ¶ The automotive industry knows and feels this VIRILITY—relies upon it to co-operate forcefully in advancing transportation

standards. ¶ And, since this quality—VIRILITY—is so active within the Continental organization, necessarily it is hereditary in the Continental product. Daily it may be sensed in the performance of the Red Seal motor—the motor that cloaks intense aggressiveness in a dignity of silence—the motor that bears on its crankcase a world renowned insignia of excellence—the Continental Red Seal.

## CONTINENTAL MOTORS CORPORATION

Offices: Detroit, U. S. A.

Factories: Detroit and Muskegon

Largest Exclusive Motor Manufacturers in the World

# Continental Motors

STANDARD POWER FOR TRUCKS, AUTOMOBILES AND TRACTORS

# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, NOVEMBER 10, 1921

No. 19

## New Small Cars Feature British Automobile Show

Attendance is good and optimism prevails at British car show. Many price drops precede opening. Number of chassis model increase. Small cars feature exhibition. 40 more exhibitors than last year.

By M. W. Bourdon

LONDON, Nov. 5 (*Special Cable*).

**T**HE fifteenth annual London show was opened yesterday at Olympia and the White City, the two buildings which have been used for the exhibition in recent years. It is yet too early to take a measure of the prospects for 1922, but hopefulness and almost optimism prevails on many stands, despite the fact that there has been so far no appreciable recovery in other industries. The majority of the exhibitors are cheered by dealers' reports and by their greater readiness than last year to discuss contracts, especially for cars of under 150 cu. in. displacement.

There has been an increased interest in all-weather bodies. This type has to some extent usurped the position as favorite held by coupes and sedans at this show last year. The British exhibits in general have high-grade body finish and carry excellent accessories. There is a large display of polished chassis and parts.

British dealers are exhibiting an increased interest in service features of the new models. They are critical of chassis layouts from the standpoint of accessibility, and are examining the new jobs carefully from the service angle.

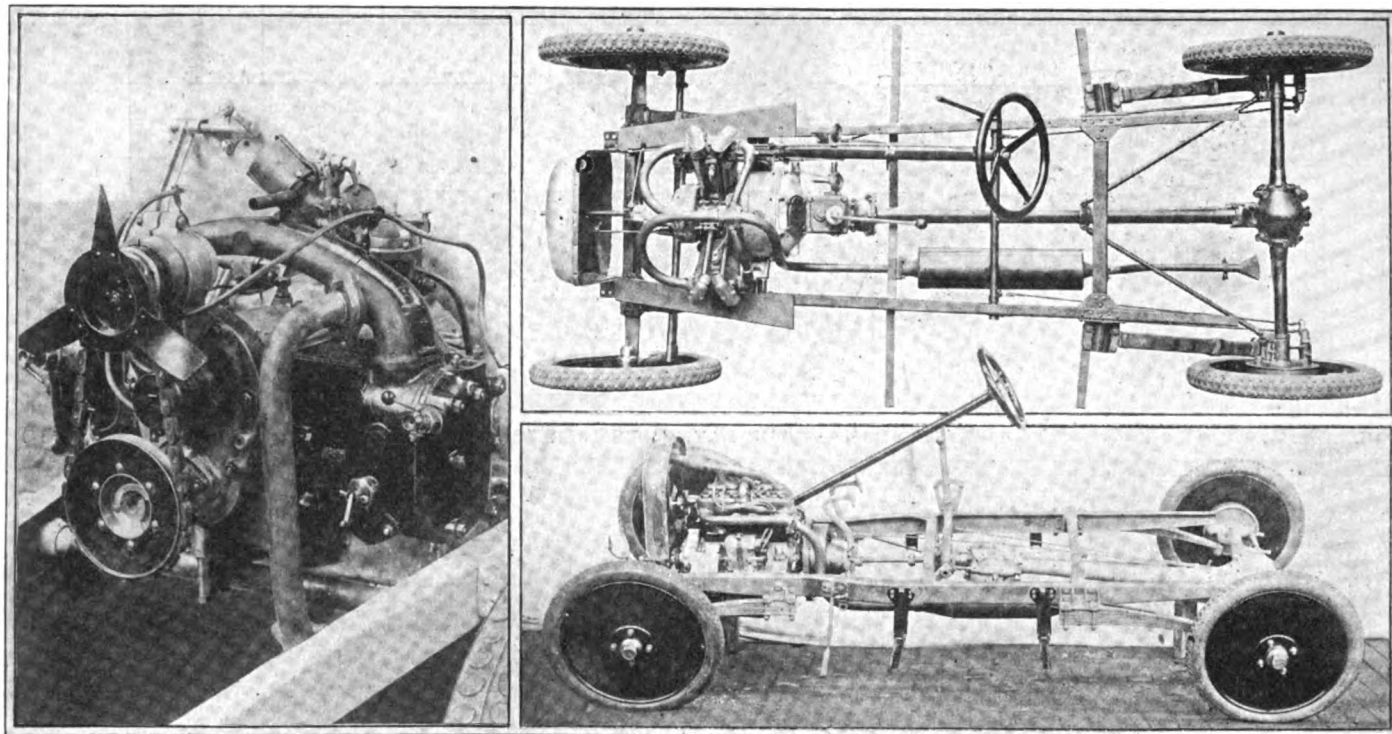
On the first two days the attendance was good; being approximately the same as last year, but not equal to the 1919 crowds. For this the division be-

tween Olympia and the White City is partly responsible. Visitors again, to a certain extent, neglect the section at the White City, placing exhibitors there at a great disadvantage. The White City section has more variety and interest, however, in several ways. One admission fee is good for both sections, and free transportation is furnished. Marine engines and motor boats are also shown in one of the White City buildings.

There are 563 stands at the show, including accessories exhibits, and 43 stands of a marine character. This represents an increase of 40 stands over last year. Six hundred and eighty cars of 145 different makes are shown on 190 stands. Fifty of these stands belong to body builders. Of British makes there are 78; French, 34; American, 18; Italian, 9; Belgian, 3; Swiss, 2; Dutch, 1. American cars at the White City are the Essex, Moon, Dixie, Hudson, Stanley, Paige, Dodge, Alsace, King and Packard. At Olympia are the Hupmobile, Dort, Buick, Chevrolet, Oakland, Nash, Overland and Cadillac. By the regulations, concerns in financial difficulties are kept out of the show and, consequently, the Angus Sanderson, Austin, Bean and Sizaire-Berwick are not represented.

The prices of most British cars have been considerably reduced, and several announcements of price cuts were made just prior to the show, because the





Left—Horizontal water-cooled twin cylinder engine ( $3\frac{1}{2} \times 3\frac{3}{4}$  in.) of new 7 hp. Wolseley. Has battery ignition. Upper right—New B.S.A. chassis with air-cooled overhead valve two-cylinder engine ( $3\frac{1}{2} \times 3\frac{3}{4}$ ). Lower right—New 10 hp. Singer ( $3\frac{1}{2} \times 3\frac{3}{4}$  in.) four-cylinder with three-speed gearset as unit with front end of torque tube instead of with rear axle as hitherto

new rules prohibit price changes during the show period. The biggest drop since last year has been in the price of the 12-hp. Morris, two-passenger; two cuts were made aggregating 30 per cent, the present price being £300. The 8-hp. Rover was reduced 27 per cent. This reduction was made in three steps, and the present price is £220. Other cars have been reduced in price since the last show by the following percentages: Daimler and Vauxhall, 25; Sunbeam and Standard, 20; Rolls-Royce, 16; Wolseley, 15; Lanchester, 12; Humber, 10. Enfield, Austin, Napier and Cubitt have made no reductions. The Cubitt "16" is still the lowest priced full-size British car, selling at £440.

Many makers have increased the number of their chassis models. The Daimler Motor Company has a new "20," which gives this firm three distinct models. Armstrong-Siddeley has added two new models, and Wolseley one, the latter company now producing four models. Sunbeam, Vauxhall and Star have each added one model and now have three each. Vulcan and Talbot have added two models each and now have four. Singer, Austin, Standard and Belsize have one model more each, giving them two each. All additions are entirely distinct models, with few parts that are not of special design or size. No British maker of luxury cars has discontinued that type.

Some exhibitors affirm that the number of genuine private inquiries at the show was distinctly encouraging. Lanchester, Rolls-Royce, Napier and Leyland are still specializing in expensive models. The Rolls-Royce "4," regarding which there have been some rumors, has not made its appearance, nor will officials of the company make a definite statement concerning it. But three new "fours" supplement the Guy "8."

The outstanding feature of the show is the number of new small cars. Cars of this type are exhibited by 20 different makers, of which 11 are French and 9 British. This class includes water-cooled, four-cylinder cars of less than 70 cu. in. piston displacement. In many

cases two- or four-passenger bodies are optional. Two-cylinder models of similar size, but mostly with air-cooled engines, are exhibited by 17 British and one French manufacturer. These are all two-passenger models. The number of chassis models with a piston displacement of between 70 and 100 cu. in. and designed for four-passenger bodies has also increased, this model often being furnished with a fixed or detachable type of sedan body.

The new chassis of 15 hp. and over include two of the Guy additions, the Vulcan "20" with new split-sleeve valve, the Daimler "20," the Armstrong-Siddeley "18," and the Singer and AC sixes, both of which have cylinder dimensions of  $2\frac{1}{2} \times 4$  in. The Entz electric transmission appears on two of the British cars exhibited—the Crown "6-30" with a Knight engine and the Magnetic "4-16" with Argyll sleeve-valve engine. Information is given out that the Magnetic will also be manufactured in a straight eight model, but this is not exhibited.

Production on the Phoenix "18," which was exhibited at Olympia last year, is beginning only now, the delay having been due to trade conditions and not to any faults in the design. Straker-Squire is reintroducing in a slightly modified form its pre-war 15-hp. chassis to supplement the post-war overhead-camshaft, six-cylinder model.

Disregarding the two-cylinder models, the following percentages apply to individual models of all nationalities: Four-cylinder chassis, 76 per cent; six-cylinder, 17 per cent; eight-cylinder, 5 per cent; twelve-cylinder, 2 per cent. Detachable heads are found on 58 per cent of the models exhibited, side valves on 64 per cent, overhead valves with pushrods on 17 per cent, overhead camshafts on 12 per cent, sleeve valves on 7 per cent. Pressure lubrication is found on 61 per cent of all models, magneto ignition is used on 77 per cent, vacuum feed on 58 per cent. Unit power plants are incorporated in 43 per cent of the chassis models, cone clutches are

found on 46 per cent and dry single-plate clutches on 31 per cent, while the remainder have multi-plate clutches which are about equally divided between the dry and wet types. Fifty-one per cent of the models have four speed gearsets, 48 per cent have the Hotchkiss drive, on 67 per cent the final drive is by spiral bevel gears and on 13 per cent it is by worm. Both brakes are located on the rear wheels in 51 per cent of all models, while in 39 per cent one set is on the rear wheels and the other on the transmission, and front brakes are fitted in 10 per cent. Wire-wheel equipment is supplied on 29 per cent of the models, disc wheel on 28 per cent, hollow-spoked metal wheels on 26 per cent and wood wheels on 17 per cent.

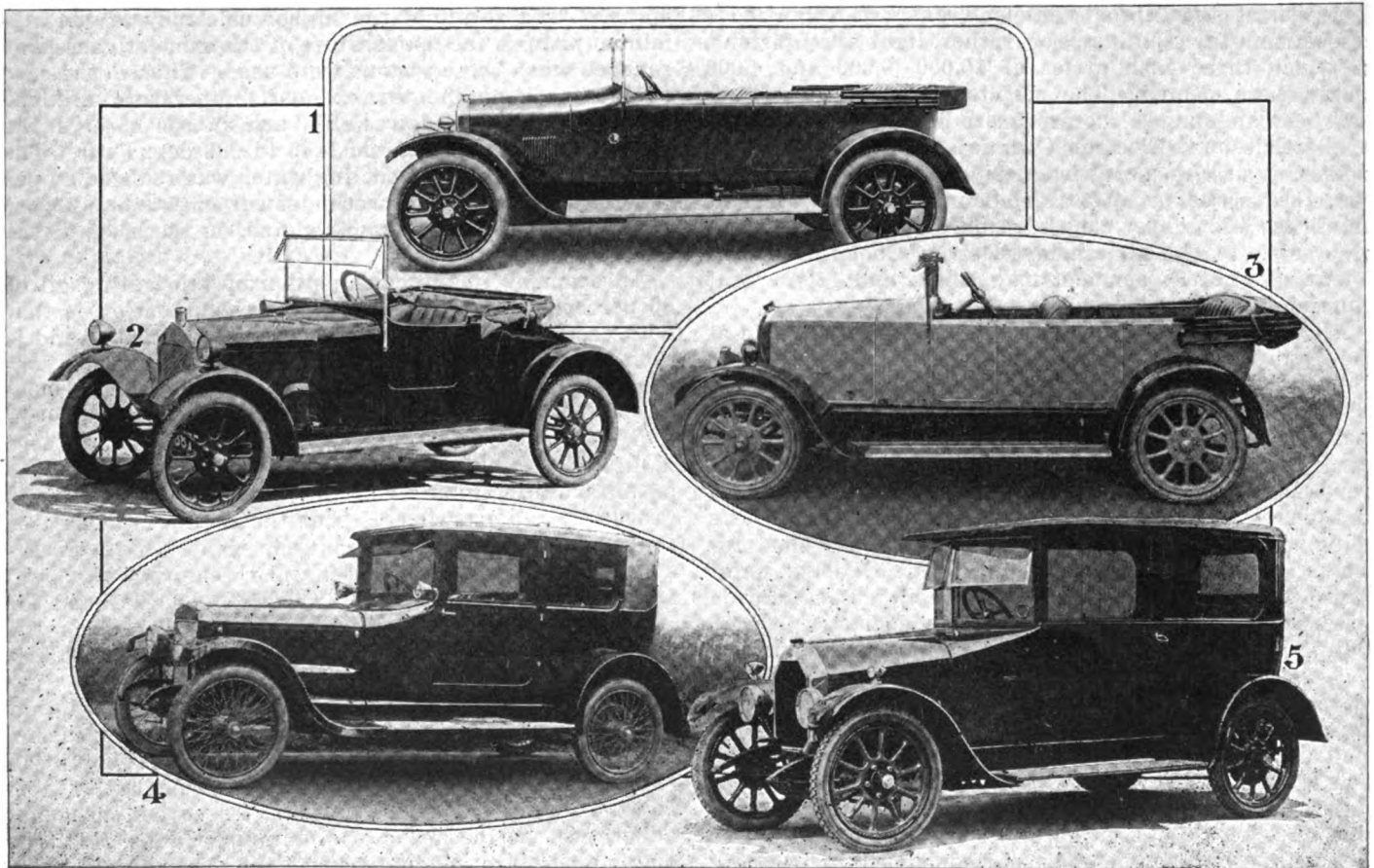
British design does not show any definite trend in respect to change in cylinder number, except that there is an increase in the proportion of two-cylinder models. The four-cylinder models still represent 77 per cent of the whole. The number of sixes has increased, but this increase is so slight that the percentage represented by them is smaller than last year. There has been a decrease in the proportion of side-valve engines from 72 to 66 per cent, whereas the overhead-valve type of engine has advanced in representation from 21 to 24 per cent. Of these overhead-valve engines 56 per cent have pushrods at the side of the cylinders. There has been a decrease in the use of straight-toothed spur gears for the camshaft drive from 23 to 18 per cent, while helical spur gear drives decreased from 31 to 22 per cent.

As regards cooling practice, circulation by pump and by thermo-siphon action are still used on substantially equal numbers of models. Radiator shells of white metal, not plated, show a large increase, being now found on 31 per cent of all models, as compared with

5 per cent last year. Separate shells for the radiator are exceptional. Aluminum pistons are found on 33 per cent of the models, an increase of 7 per cent since last year. The representation of pressure lubrication has increased to 57 per cent. Magneto ignition is still fitted on 94 per cent of all of the models, while of the new models 20 per cent have battery ignition.

Of the 24 new chassis models, ten have unit power plant construction; on seven the transmission gear is mounted amidships, on five the gearset is built in a unit with a torque tube and on two it is combined with the rear axle. Cone clutches have decreased from 61 to 52 per cent, while single-plate clutches have increased from 27 to 34 per cent. The representation of four-speed gear-boxes has gone up from 50 to 58 per cent. Hotchkiss drive is now used on 46 per cent of the models, the same as last year, while fabric universal joints show a further increase, from 28 to 40 per cent. The representation of spiral bevel gear drive has also gone up, from 46 to 53 per cent. The practice of making both brakes of the internal type and locating them on the rear wheels is now represented in 67 per cent of the models, as compared with 61 per cent last year. There are only four models shown which have external brakes.

Quarter-elliptic springs are more popular than last year, being shown on 20 per cent of the models as compared with 16. Floating cantilever springs have made no further progress, being still found on 22 per cent of the models. Hollow-spoked steel wheels have dropped behind, being shown only on 48 per cent of the models as compared with 56 per cent. On the other hand, the representation of the disk wheel has increased to 29 per cent, while the wood wheel representation remains the same, at 5 per cent. All of the wheels are detachable.



1—New 14 hp. overhead valve Sunbeam ( $2\frac{1}{2} \times 4 \frac{3}{4}$  in.) with standard four-passenger body. 2—New 7 hp. Wolseley two-cylinder runabout; high-class job selling at approximately \$1,500. 3—Four-passenger 11 hp. Beardmore. Engine has overhead camshaft with bore and stroke  $2\frac{1}{2} \times 4\frac{1}{2}$  in. 4—New 20 hp. four-cylinder Daimler with sedan coupe body having folding rear quarter. 5—New 11 hp. Humber ( $2\frac{1}{2} \times 4\frac{3}{4}$  in.) four-passenger sedan

No British car maker is as yet supplying straight-side tires as standard equipment, although several may do so when their present stocks of wheels are reduced.

No British car now in production is equipped with front wheel brakes, nor is there any apparent demand for such brakes. Cables are more extensively used for brake operation than heretofore. Several new aluminum axles are shown, and there are three new aluminum engines. The new Vauxhall four-cylinder engine, which is of the L-head type, has iron cylinders and an aluminum head, the cylinder dimensions being 3 by 5½ in. It forms a unit power plant with a three-speed gear-box. Ignition is by magneto, and the rear axle is of aluminum construction. Fitted with a four-passenger body, this model is priced at £750.

The two continued Sunbeam models, the "4-16" and "6-24," both have the new overhead-valve engines with pushrods on the sides, the cylinder dimensions being the same and the chassis design unaltered. The new four of the Sunbeam company has overhead valves and aluminum cylinders with steel liners, the cylinder dimensions being 72 by 120 mm. (2.84 x 4.73 in.). Among the features of this model are unit power plant construction, a three-speed gearset and battery ignition. The four-passenger model sells at £725.

On the four-cylinder, 11-hp., overhead-valve model of the Standard the engine and chassis dimensions have been increased. This company has also introduced a new four-cylinder model with a 67 cu. in. overhead-valve

engine. This model is furnished with a mechanical seat starter and with either a two- or four-passenger body. The price is £340. A new six has been added to the Armstrong-Siddeley line, supplementing the 30-hp. model. It is of substantially the same design as the latter, with small modifications in details, the cylinder dimensions being 2¾ by 4½ in. The price is £800.

The new Singer is the smallest British six-cylinder car, the cylinder dimensions being 65 by 100 mm. (2.56 x 3.94 in.). It sells for £675. The new Wolseley four-passenger model has a two-cylinder, water-cooled, horizontal opposed engine of 58 cu. in. piston displacement. It is a high-grade job, with mechanical seat starter, and is priced at £315. Daimler interests are represented in the B. S. A. concern which has brought out a two-passenger car with air-cooled, 90 deg. V-type engine of 65 cu. in. piston displacement. This model is equipped with an electric starter and is priced at £340, but it compares poorly with the Rover "8" at £220, despite its somewhat better equipment.

Armstrong-Siddeley have developed a new model—not shown at Olympia nor as yet in production—which is fitted with an air-cooled, two-cylinder, 90 deg. V engine, an inverted clover-leaf body and a central steering column. This model is to sell at £225. Many other makers set out to produce a car that should compete with the Rover, but none of the models that have matured seriously threatens what is almost a monopoly in a big, new market.

## German Trials of Aluminum Pistons

**E**ARLY the present year the German Department for Aerial and Motor Vehicle Transport organized a competition for aluminum, or, rather, light alloy pistons, in which three cash prizes of 10,000, 6,000 and 4,000 marks were offered. The results of this contest have just been announced, the first prize having been awarded to the Griesheim-Electron Chemical Works for an alloy consisting of 87 per cent magnesium and 13 per cent copper; the second prize to Karl Schmitz, for an alloy of aluminum and copper cast in metal molds, and the third prize also to the Griesheim-Electron Chemical Works for an alloy of 88 per cent magnesium and 12 per cent aluminum.

All tests in connection with the contest were made at the Motor Vehicle Laboratory of the Berlin Technical College. Nine different firms had entered 32 sets of pistons made out of 16 different alloys. These were tested in a 10-30 hp. passenger car engine and a 45 hp. truck engine. In addition to dynamometer tests, tests were made of the heat conductivities of the alloys and of their capacity for heat absorption, these latter tests being made in an electric oven specially designed for the purpose, which could be heated to 570 deg. Fahr. These tests were made both on the new pistons and on pistons that had gone through the dynamometer tests.

In the endurance tests in the dynamometer laboratory it was endeavored to determine the best compression ratio, by gradually increasing this ratio and refitting the pistons. These tests lead to the conclusion that for the truck as well as the passenger car engine a compression ratio of 5.7:1 was the best, both as regards power output and fuel economy. With this ratio the truck engine developed an average of 21 per cent more power than with gray iron pistons and consumed 20 per cent less fuel per horsepower-hour. In the case of the passenger car engine the gain in output was only 5 per cent and the saving in fuel 13 per cent, as this engine

was of the L-head type and had a very flat compression space. As a result of the higher efficiency of the aluminum pistons, the temperature of the exhaust gases was reduced when these pistons were used. Thus in the case of the truck engine the exhaust temperature dropped from 1340 to 1030 deg. Fahr., and in the case of the passenger car engine, from 1140 to 936 deg. Fahr. The heat carried off by the cooling water was reduced 20 per cent in the case of the passenger car engine and 35 per cent in the case of the truck engine, on the basis of the horsepower-hour.

An economy in the consumption of lubricating oil of 50 per cent was also secured. The explanation is that with cast iron pistons the oil burns on the piston and is then unavailable for lubricating purposes. If rather contrary results have been obtained in practice, this is probably due to the fact that the aluminum pistons are generally not fitted as accurately as in these tests. There is also the possibility that extreme changes in load have an unfavorable influence on the oil consumption. It was proved by the experiments that the required clearances are not nearly as great as has generally been assumed heretofore. The clearance required is 0.0025 D to 0.003 D on the skirt and 0.005 D on the head for aluminum pistons, as compared with 0.002 D on the skirt and 0.0025 D on the head of cast iron pistons, D being the cylinder bore.

Tests regarding the thermal properties showed that the thermal conductivity is materially reduced by carbon deposits on the cylinder head, which explains why in an engine with carbonized cylinders a good deal of trouble is experienced from pre-ignition. As carbon does not adhere well to the heads of aluminum pistons, this type of piston is also advantageous from this point of view.

It was shown that the friction load does not increase if aluminum pistons are substituted for cast iron pistons.

# Engineering Features of British Trucks at the Olympia Show

The "over-type," affording bigger loading platform on the same wheel-base, is increasing in popularity. Heavier load units are in evidence. Largest four-wheeled chassis now carries 15,500 lb., plus 6,000 lb. on a trailer. Considerable attention given to passenger-carrying vehicles.

FROM a spectacular point of view the British Commercial Motor Show held at Olympia, October 14-22, must be considered an advance on any previous exhibition of this kind; potential buyers—of whom there were comparatively few ready to place orders at once—had a wider range for selection in both chassis and bodywork, and the show was impressive in making clear the ever-widening scope of motor transport.

The most prominent feature was the large amount of attention given by exhibitors to passenger-carrying vehicles; some most elaborate examples of saloon and all-season motor coaches were staged, and it is safe to say that 80 per cent of the orders booked were for passenger-carriers, though Guy claimed to have booked up two-thirds of next year's output of his new 2750-lb. model and to be quite satisfied with prospects of larger types.

There was not quite the same air of pessimism in regard to business prospects as at last year's show, but, on the other hand, the real optimists were few, and those that existed were for the most part concerned with light and fast delivery wagons for loads up to 3500 lb. or so. The general depression of industry hung over all, and it was fully realized that the truck business cannot improve materially until trade all around revives. As a result, truck makers refused even to make a rough estimate of their production for 1922, for in nearly all cases they will work "from hand to mouth," erecting a dozen or two chassis at a time and waiting

until those are on the way to absorption before getting to work on another batch.

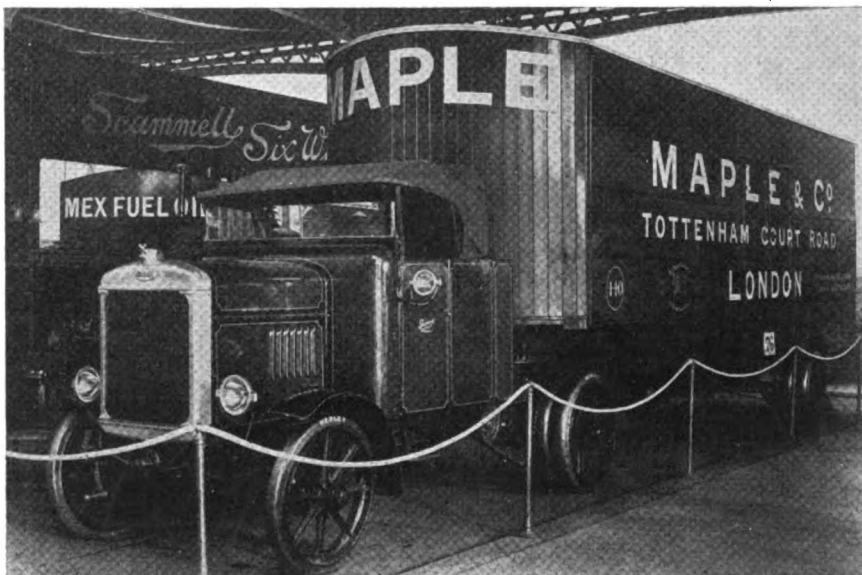
Prices have fallen materially in a number of cases, and Dennis, one of the leading firms, made a cut amounting to over 20 per cent just before the opening of the show. But this reduction was exceptional, and 7½ to 10 per cent represents the usual.

Not a great number of new models of British trucks have been introduced since last year, and these recent introductions possess so many individual features that they afford of themselves very small indication of the general trend of British design. With the exception of one or two private car firms, which have put forward slightly modified chassis for industrial purposes, no British maker has introduced a new delivery van chassis intended for loads of less than 2000 lb. Cubitt is one of the passenger car people who have entered the truck sphere with a modified car chassis for loads up to 1600 lb.; this is the cheapest British van of its type, and yet the chassis price is approximately \$2,000 (normal exchange).

Next in order of load-carrying capacity among the new models is a distinctly interesting production of Guy Motors; it has a maximum net load capacity of 2750 lb. and is excellent value in England at the price at which it is offered, viz., just under \$2,000 (£395). Unlike the Cubitt, it is primarily designed for solid tires with a chassis weight of only 2800 lb.; but pneumatics are offered, and recommended, at \$100 extra. This refusal

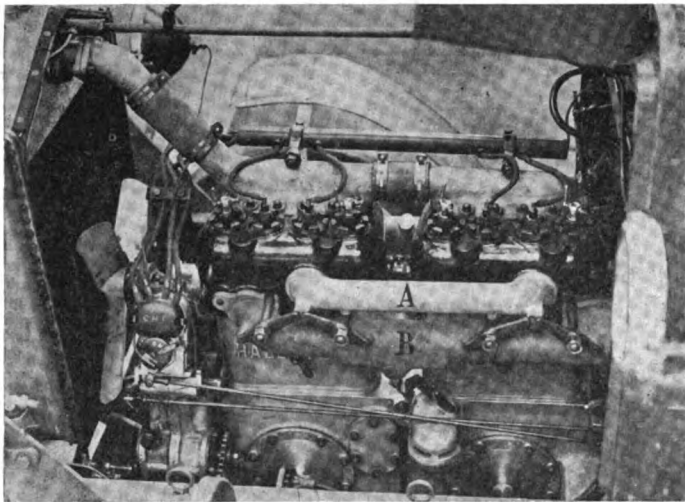


Front end of Karrier 5½-ton truck with driver's seat partly over engine

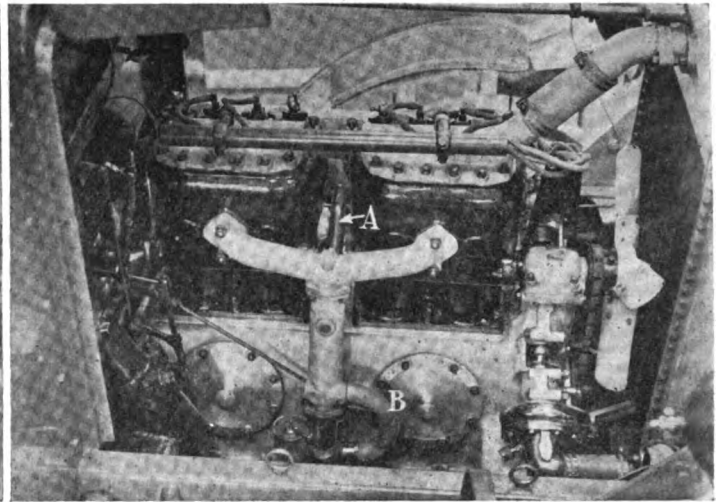


Scammell six-wheeler with furniture van body measuring 27 ft. 6 in. x 7 ft. 6 in.





Left side of Hallford engine



Right side of Hallford engine

of British truck makers—for it amounts to that—to design a chassis primarily for pneumatic tires is still general. Even in the case of public service passenger vehicles, in connection with which the use of pneumatic tires is rapidly increasing, no British firm has yet come out with anything beyond a slightly modified truck chassis quite suitable for running on solids.

This reluctance to design for pneumatic tires may be put down to two causes. In the first place, there is no denying that 1921 has been an extremely bad year for British truck makers, a fact which is not only due to the general depression of trade, but also to the large number of surplus army trucks of various sizes which have been offered at prices far below those applying to new chassis. As a result of this depression in the truck industry the majority of makers have found themselves short of funds and almost entirely unable to secure additional capital; so that, even though some may have felt inclined to embark on a new model or a new range of models suited only and primarily for pneumatic tires, they have found themselves in a position preventing any such enterprise.

The second reason is conservatism. Even where capital has been available for developing new types of chassis of lighter construction and otherwise specially designed for pneumatic tires it has been felt that until the demand for such vehicles assumes far bigger proportions than at present it is better to "play for safety" and offer chassis made for solid tires to those buyers who intend to fit the alternative.

Goodyear has done a great deal of propaganda work in respect of giant pneumatics and has been successful to a limited extent in making sales to owners of motor coaches seating from 16 to 28 passengers. But even those members of the truck industry who have had experience of pneumatics are by no means satisfied that the giant pattern is so good as moderately sized twin pneumatics on the rear wheels, and one sees quite as many, if not more, pneumatic-tired passenger vehicles of the capacity just mentioned with twin tires as with giants.

As for trucks of over 4000 lb. load capacity with pneumatic tires of either kind, it is rarely, indeed, that one is seen on roads where an almost continuous stream of long-distance truck traffic occurs. In the big centers of population, such as London, Manchester, Glasgow, etc., pneumatic-tired trucks—used mainly for local delivery of loads up to 4000 lb.—are by no means rare, and at a rough estimate comprise 25 to 30 per cent of the total number.

In two respects British truck design in the larger sizes is moving toward affording greater load capacities. In the first place, four additional firms have in some of their models moved the driver's position forward so that he is either alongside or over the engine. In three cases the same wheelbase and overall length of the hitherto largest model are retained, but a bigger platform area for the load is secured by the variation, and, usually with an engine of larger dimensions, the chassis is made capable of coping with heavier loads. At present the Caledon 7-tonner (15,500-lb. load capacity) is the biggest British truck in respect of net load, and this is put forward by its makers as suitable for hauling, in addition, a trailer with 6,600 lb. aboard. The Caledon, incidentally, is one of the three British truck chassis using sleeve valve engines. In this particular case the Burt and McCullum (Argyll) single-sleeve engine is used, with a bore and stroke of 4 5/16 x 5 1/2 in.—distinctly on the small side for loads such as those mentioned.

There is but little doubt that the Caledon policy and that of other firms catering to the demand for bigger load units is justified, for not only is the number of trucks with trailers attached to be seen on the roads rapidly increasing, but the Scammell 6-wheeler (combined tractor and trailer) is securing appreciable favor, and has in this way justified itself within 12 months of its introduction. Up till now it is the only combination of the kind on the British market.

#### Engine Design

As might be expected at the present stage of truck development, and particularly in view of the state of the industry of late, no very marked deviation in engine design is apparent. With regard to cylinder construction, for example, the L-head type still predominates, and no additions have been made during the year to the overhead valve construction, except in a new Maudslay model. T-head cylinders are not yet defunct, and one of the best known of British makers (Dennis) only 12 months ago introduced a new model with this valve arrangement.

Four cylinders are used in practically all cases, there still being only one maker using a six-cylinder motor, and even this maker, who at last year's show came forward with a one-model-only (six-cylinder) program, has resurrected two of his earlier four-cylinder types, obviously on account of finding his market restricted by the policy adopted 12 months ago.

Integral heads for the cylinders are not quite so



numerous as last year, for the detachable variety now comprise 24 per cent of the total instead of the 20 per cent 12 months ago. To a similar extent the block casting for four cylinders has increased, and there are now for the first time two examples of a cylinder block cast as a unit with the top half of the crankcase, on the 1600-lb. Cubitt and the 11,000-lb. Straker Squire.

#### Camshaft Drive

Of the overhead valve engines used for trucks 60 per cent have the camshaft overhead; one example has bevel gearing at the top and bottom of the vertical drive shaft, while the remainder have helical pinions at these points. Camshafts within the crankcase for both side valves and push-rod operated overhead valves are mostly driven by helical gearing, though the silent chain drive is not far behind, the percentages being, respectively, 42 and 33; 21 per cent have straight pinions, and the remainder have a form of worm drive.

#### Water Cooling

The vast majority of truck engines of all sizes have pump water circulation, though among the 14 per cent with thermo-syphon are some of those with large load capacity. Even a new 13,000-lb. truck (Commer) depends upon natural flow. But by no means have all the circulating pumps a positive drive, for 30 per cent are operated by a link V-shaped belt, which, in a few instances, also serves to drive the radiator fan on the same shaft as the pump rotor.

This question of water circulation is exercising the minds of some of those firms which are thinking of designing new models in the near future. The thermo-syphon, 13,000-lb. truck referred to, and a few others of slightly smaller capacity, have proved that this simple and inexpensive system is quite practicable for industrial vehicles, and, that being so, a few designers are asking themselves why they should go to the expense of applying a pump to future models. Not a few makers have already, it would seem, put this question to themselves, and have adopted a compromise, apparently in fear of over-heating troubles if they went the whole way and used the plain thermo-syphon system. The compromise in question consists of designing the water jackets, connecting pipes and radiator for natural circulation and then supplementing this with a belt-driven

water "accelerator," which, while admittedly less efficient than the usual pump, does not impede a natural flow if the belt becomes detached or so stretched as to be hopelessly inefficient. But, like all compromises, it does not go all the way in either direction. It saves very little in cost as compared with a positively driven pump, and has not the advantage of thermo-syphon of eliminating an item which cannot fail to require periodical attention and be subject to wear.

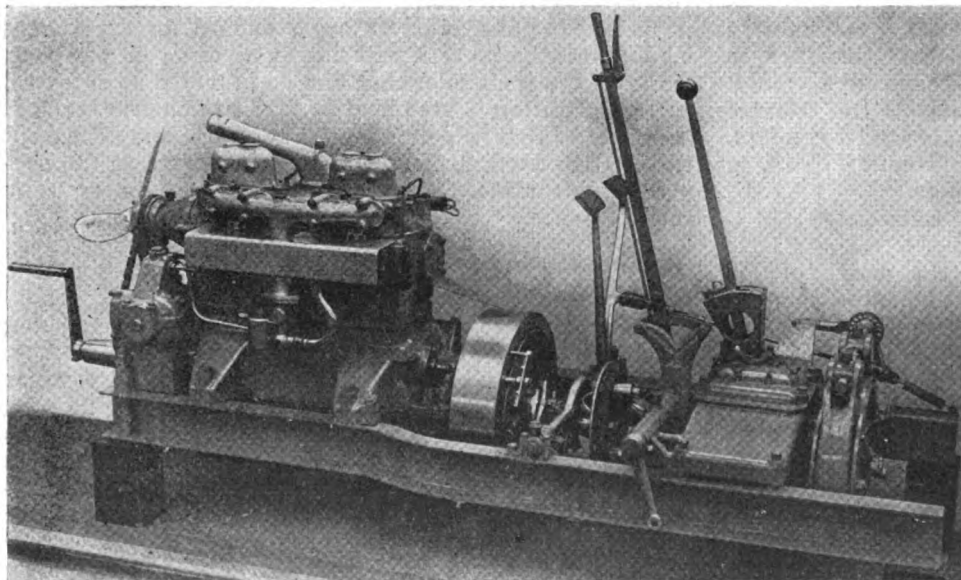
Vertical finned-tube radiators with aluminum tanks are almost general, there being only 8 per cent with plain tubes and 6 per cent of the cellular type. Only one maker has horizontal tubes and only two have other than aluminum casings, one using cast iron and the other sheet brass.

#### Engine Mountings

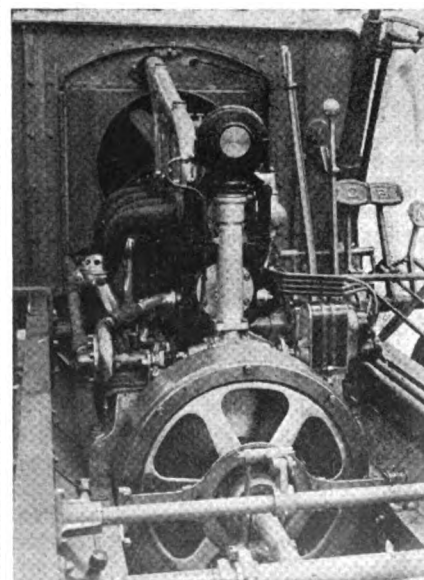
Unit powerplant construction hardly exists in British truck practice, there being only three examples of this put forward by two makers. The most favored methods of mounting the engine are (1) by the three-point system with the engine arms directly attached to the main frame, and (2) by the use of a sub-frame to which the crankcase is secured at four points. Forty per cent of engines have the first-mentioned arrangement and 39 per cent the second. The sub-frames themselves are almost equally divided between three- and four-point suspension systems.

Several chassis with sub-frames have the latter connected to the main frame at three points, though the makers do not go so far as Guy in providing a spherical bearing at the front and two spherically ended swinging suspension links at the rear. In regard to this Guy practice in the maker's largest model, it is of interest to note that it is not continued in a modified and slightly smaller type, which has a four-point suspended sub-frame, nor in an entirely new model, which has something approaching a three-point inflexible suspension in the main frame. Another feature of note in connection with this same make is that for the first time a truck maker with internal-combustion-engined vehicles has introduced an electric model—one of three new Guy trucks at Olympia being a 2½-ton (5600-lb.) electric.

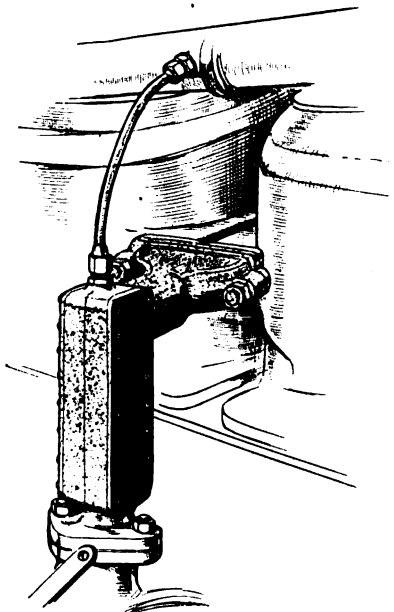
Cast iron still remains the usual material for truck engine pistons, only 7 per cent being of aluminum. The straight-sided-type piston is also in a vast majority,



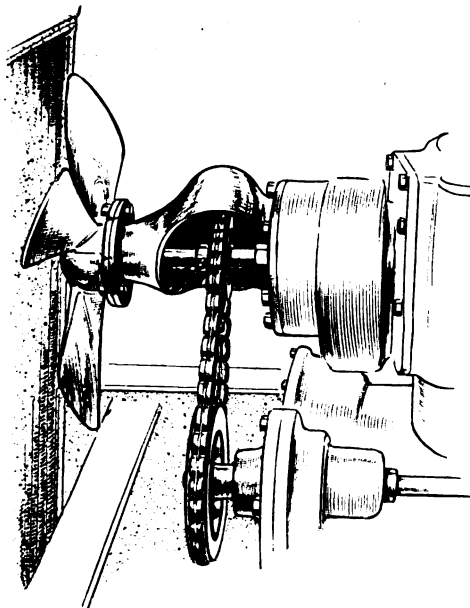
Powerplant of Thornycroft 4,500-lb. truck. The engine has overhead inlet valves. Central gear shift lever is a new feature



Rear end of 4½ x 6-in. overhead camshaft Maudslay engine



Water jacketed Karrier induction pipe with transverse passages at inner ends of cylinder pairs



Thornycroft belt-driven water pump at front of cylinder block, extension of pump shaft driving the fan

though 10 per cent of trucks have the hour-glass design in cast iron. Three compression rings are usual, though in nine examples there are four rings to each piston, and in one example two only. A scraper ring in the skirt occurs in 49 per cent of pistons, though among the remainder the majority have the lower compression ring groove beveled off with small holes drilled through to the interior.

Methods of securing the piston pin have not varied appreciably, for with the exception of 13 per cent fixed in the small end of the rod and 15 per cent floating in small end and piston, all have the pin secured by set-screws, bolts or split-pins in the piston bosses.

#### Engine Lubrication

As is the case in car practice, hollow shaft lubrication is making headway, 43 per cent of crankshafts being drilled to convey the lubricant to main and big-end bearings; but in only three engines is a full-pressure system adopted, and piston pin lubrication in other cases is maintained by splash. The simple trough system with oil pockets over the main and camshaft bearings is losing ground, and its place is being taken by a trough and pressure system in which splash from the troughs is depended upon only for the big-ends and cylinders, direct leads being taken from the pressure circuit to the main journal and camshaft bearings.

#### Carbureters and Vaporization

The Zenith carbureter is by far the most popular among British trucks, some 64 per cent having this device, but only one unusual system is in evidence with a view to securing better vaporization. This is found on Hallford trucks. With these engines, which have pair-cast, L-head cylinders—the valves on the left and the Zenith carbureter on the right—a big hot-air muff is cast integral with the exhaust manifold; leading from the muff a copper air pipe passes between the cylinder blocks to a jacket around the vertical portion of the induction manifold on the right side, and from this jacket a U-shaped pipe leads into the main air inlet of the carbureter, which has a rotating sleeve with ports for admitting and regulating a cold air supply. Thus the air at a high temperature passes at first through the induc-

tion manifold jacket and, leaving it at a reduced temperature, enters the carbureter.

This engine, too, is peculiar in having a "balance" pipe to correct or modify the gas pulsations. From the branched induction pipe on the right the gas passes through a passage in each cylinder block to the central inlet ports on the left, and connecting the left side of the passages in the two blocks is a flanged and bolted-on aluminum pipe of the same internal diameter. This arrangement is claimed to prevent deposition of the fuel, to enhance economy, increase the power developed and provide much smoother running.

A hot-air muff or a water-jacketed induction manifold is the usual arrangement to assist vaporization, integral or adjacent inlet and exhaust branches being exceptional. Gasoline is the standard truck fuel, only one manufacturer making a point of offering a kerosene vaporizer.

Throttle governors are standard on 31 per cent of engines, optional on 20 per cent, and cannot be fitted to the remainder.

#### Fuel Feed

Gravity feed for the carbureter with the tank under the driving seat is the usual combination in fuel feed and tank location; the vacuum system has made no headway, occurring on only four chassis, the same as last year. Of the remainder only three are other than of the gravity system. Some 24 per cent of chassis have the fuel tank mounted on the rear of the dashboard, as compared with 68 per cent under the seat. Maudslay in a new model has adopted an unusual tank position, suspending it from the right-hand member of the frame with a vacuum system of feed.

#### Electric Equipment

The magneto is universal on chassis designed for truck work only, the Cubitt van already mentioned alone having a battery system of ignition. In 14 per cent of cases the ignition timing by the magneto contact breaker is fixed. Impulse starters are standard on 8 per cent of engines, the makers will not fit them on 69 per cent, while on the remainder they can be provided as an extra. Electric lighting is standard in only two chassis, though it is being fairly widely adopted by users, and all except two British truck firms will fit it as an extra to the normal chassis price. Engine starters are conspicuous by their absence.

#### Crankshaft and Camshaft Bearings

As might be expected, the vast majority of crankshafts have three main bearings, this number being used in the only six-cylinder engine as well as in most of the fours. Straker Squire, however, uses two roller bearings only in a block-cast, four-cylinder engine with the upper half of the crankcase forming a unit with the cylinder block. Maudslay uses five plain bearings in two models, though the largest and most recently introduced type has three. Albion also has two engines with five crankshaft bearings.

Ninety per cent of crankshaft journals are plain white metal-lined shells. Straker is the only user of roller bearings for this purpose, and Commer trucks—four models in all—have the only engines with ball bearings,

a feature which has been embodied in this make since Commers were introduced in 1906.

Three bearings for the camshaft is also the usual number, these being of phosphor bronze in 80 per cent of cases, but Tilling-Stevens and Commer in five and four models, respectively, use ball and plain bearings for the camshaft. In the former there are three ball bearings within the actual crankcase and an additional one in front of the distribution gear; Commer uses two ball bearings, one at each end and a plain bearing in the center. Another variation from the normal is in one of the A. E. C. models, where the camshaft runs in a central roller bearing and two plain bearings, one at each end.

### Transmission Bearings

Ball bearings are almost universal for gearsets, though 10 per cent have the roller type for both main shaft and layshaft and 8 per cent make use of plain bearings. The pilot bearing is also more frequently of the ball type, 45 per cent of gearsets being thus provided; 35 per cent of pilot bearings are, however, plain bushes, 7 per cent are roller, while the remaining 13 per cent are floating phosphor bronze bushes.

### Wheel and Axle Bearings

The floating bush still remains the most popular type for wheel bearings, some 55 per cent of the front wheels and 45 per cent of the rear axles having this type. Plain, non-rotating bushes are used in 18 per cent of front wheels and in 24 per cent of rear axles, while roller bearings are preferred as an anti-friction type to the ball variety at both points.

At the differential ball bearings are, however, in the great majority, 84 per cent of rear axles being thus equipped, as compared with 14 per cent roller and only 2 per cent plain.

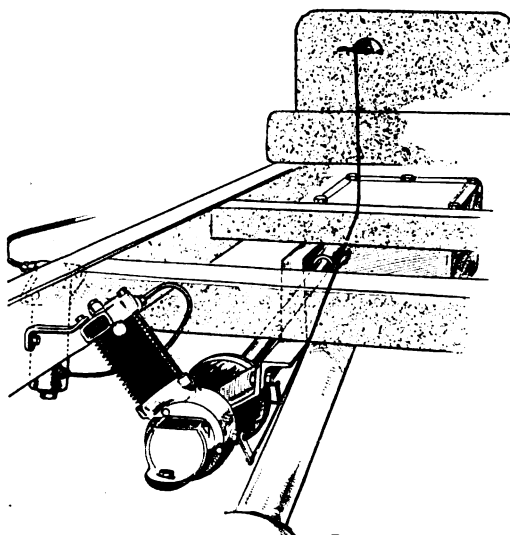
The foregoing remarks concerning truck bearings can, therefore, be summarized as follows: Plain bearings for the crankshaft, ball bearings for the gearset, floating bushes for the wheels and ball bearings for the differential represent the predominant practice.

### Clutch Design

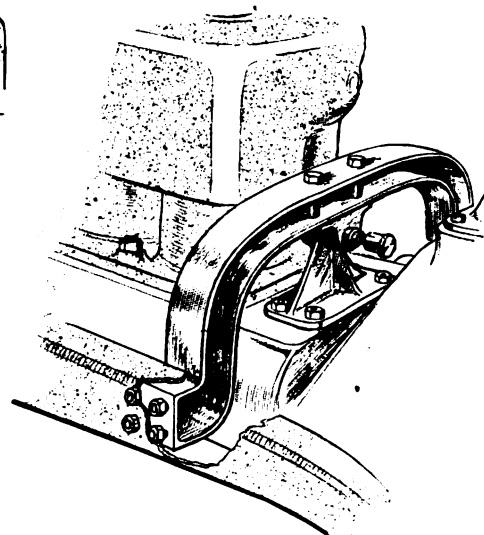
The cone clutch continues to predominate on British trucks, for although it has given way slightly to the dry single plate, there are still 76 per cent of vehicles having it in one form or another, as compared with 79 per cent at this time last year. The inverted cone appears on only 14 per cent of the total of 76 per cent just mentioned. The remaining clutches are all of the dry single-plate pattern, with one exception, which is a dry multi-plate. Leather facings for cone clutches are still found on 25 per cent of trucks, but the use of fabric is very general, though Churchill, on a 7000-lb. truck, retains a metal-to-metal cone pattern running in oil.

### Universal Joints

In the connection between clutch and separate gearsets the fabric disk is gaining ground, but, nevertheless, metallic joints are used at this point in 62 per cent of



Tire pump on Daimler chassis driven from rear end of layshaft in gearbox



Cast cross member supporting front end of Karrier truck engine

British trucks. This majority comprises quite a large variety of types, though the most popular is the pot or sliding block pattern, accompanied by some other type which does not allow for a sliding motion. Steel disks in place of fabric are used in 10 per cent of clutch shaft joints and leather rings in 9 per cent, Thornycroft being one well-known maker who favors the leather ring joint in place of the fabric disk. An accompaniment of the latter frequently observed and arranged at the front end of the shaft to give the necessary sliding motion, is an internally toothed ring engaging with teeth formed on a boss at the front end of the shaft. These teeth are cut like those of a straight pinion, but are an easy fit in the toothed ring and thus allow a limited amount of universal movement.

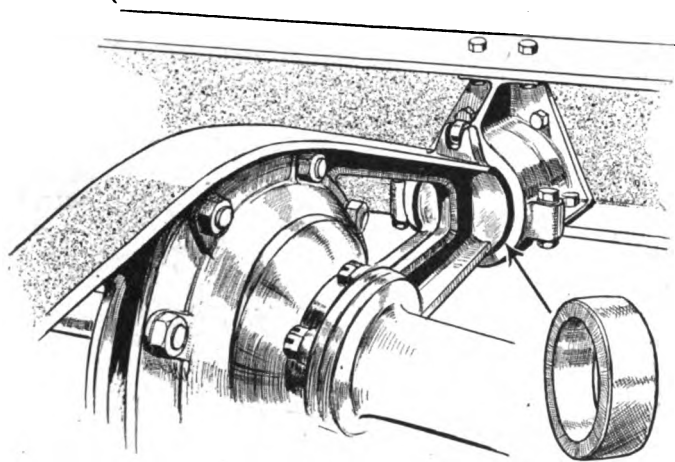
For propeller shafts the star or Hooke's joint is most generally used at the front end, and a sliding block or pot joint at the rear when the shaft is open, though 21 per cent of open propeller shafts have a star joint also at the rear end. Two makers—Daimler and Dennis—use ball bearings for this type of universal joint, though in the latter make it is confined to one model only, a recently introduced 4500 lb. type.

Fabric disk joints for the propeller shaft have not made any headway of late, representing only 10 per cent of the total, a percentage which is exceeded by the leather ring type which is seen in 12 per cent, including Thornycroft's. The internal toothed ring joint mentioned in connection with clutch shafts is used by Commer on one model with a semi-enclosed propeller shaft, this form of coupling being located at the front end of the shaft which forms the front and open half of the propeller shaft behind the gearset.

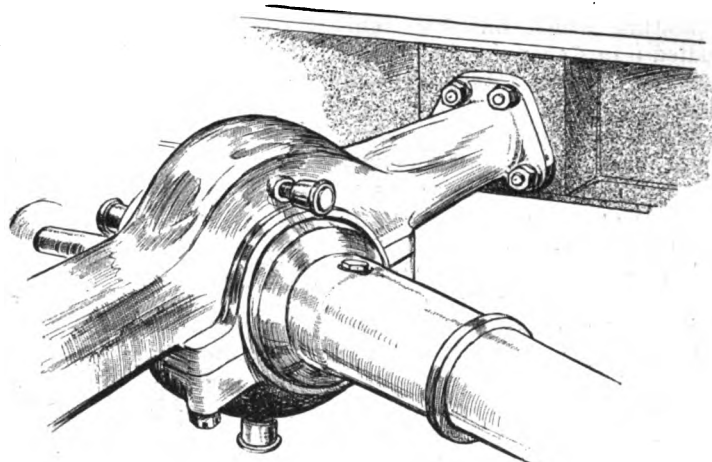
### Final Drive

The top worm for the final drive has increased slightly at the expense of the side chain and now appears on 53 per cent of trucks. Only one truck has the bottom worm, namely, the 7000-lb. A. E. C. chassis, which is intended primarily for buses and motor coaches. The A. E. C. is made by the Associated Equipment Company, the makers of 95 per cent of the London buses.

There are no internal gear-driven British truck chassis and only 20 per cent have a double reduction by bevel and spur gearing. One maker has introduced an unusual double reduction system. This appears on the Pagefield 9000-lb. truck designed specially for export, and includes worm and spur gearing in the rear axle, the first reduction being by a top worm. It is claimed



Cross member for Dennis torque tube supported by rubber bushes in frame brackets



Cast tubular cross member supporting spherical front end of Karrier torque tube

as an advantage for this arrangement that it gives an extremely big ground clearance at the axle center. Where the propeller shaft is open the Hotchkiss system is fairly general.

### Brakes

With the exception of the Cubitt converted chassis, no British truck has external wheel brakes. Seventy-five per cent have the pedal applying to a transmission brake and the lever operating internal expanding brakes on the wheels. Nineteen per cent have both sets in the wheel drums and 6 per cent have the pedal brake on the final drive shaft and the hand brake on the wheels.

The usual type of external brake located behind the gearset is of the locomotive pattern with cast ribbed shoes lined with fabric segments and linked together at the operating ends by levers. Cam action is used rarely. Where there are two expanding sets in the wheel drums they are arranged side by side.

### Springs and Wheels

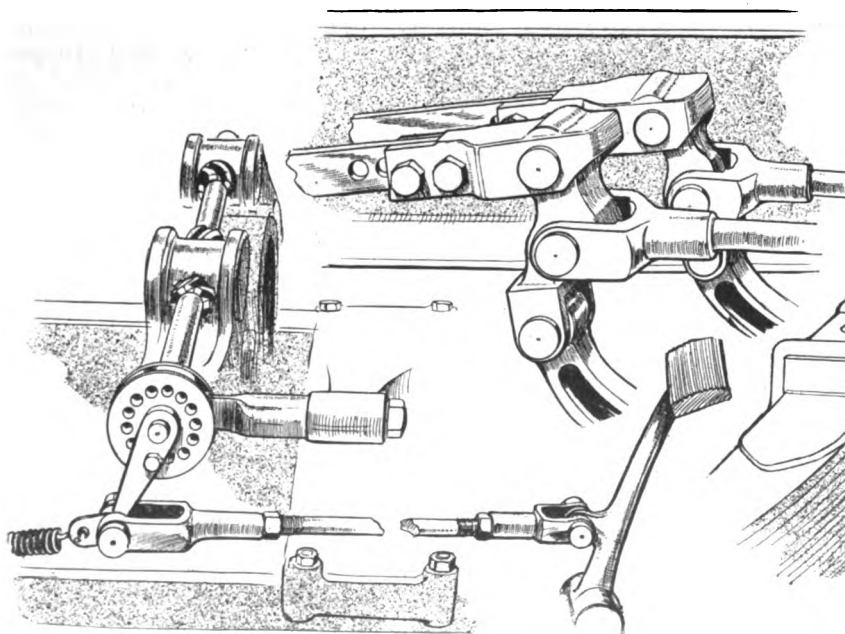
The half elliptic spring is practically universal, there being only two trucks with other types at the rear, one

having a three-quarter elliptic and the other a cantilever. The latter has its rear springs duplicated, one unit of each pair of full cantilever springs being above the other with a trunnion bearing between them at the center and the axle between them at the back.

At last year's Olympia Show it appeared as though the hollow spoked cast steel wheel was on the way to becoming universal, but since then it has fallen back slightly and now appears on 49 per cent instead of 55 per cent of trucks. The disk type has also receded (12 per cent against 21 per cent), but the webbed cast steel pattern has gone ahead and now represents 21 per cent of the total. Wood wheels are used with two chassis, the Churchill truck previously mentioned and the Beardmore 1800-lb. van.

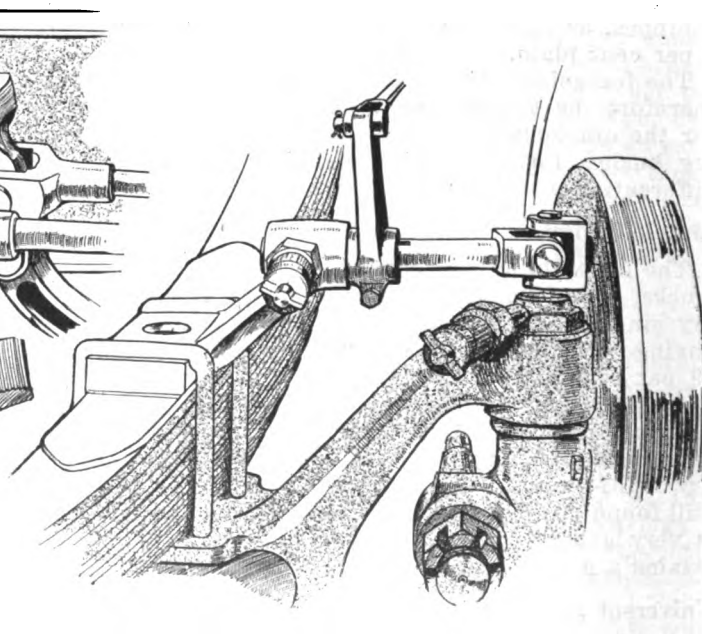
### Rear Axles

The two most popular types of rear axles are (1) the banjo forging arranged horizontally, with an aluminum sump and an aluminum or cast steel top section carrying the worm gearing and differential as a unit (or double-reduction gearing if it is used) and (2) the cast steel casing with a large top opening for the gearing



Method of operating Thornycroft transmission brake and adjustment for worm shaft

Brake coupling yokes of Straker truck and flat steel connections to rear wheel brakes



Front wheel brake connections and support on Burford motor coach chassis

mounted as in the other case. Axles are almost invariably of the full floating type, the wheel bearings being mounted on the banjo extensions when the center is a forging. When the center is cast various forms of extensions are used; in some cases the latter are flanged

and bolted on to the ends of the center piece, but in as many others the center has integral extensions for the wheel bearings, while some have seamless steel tube extensions to carry the bearings, the tube being shrunk into the main casing.

## Refinements in Design Feature New Air Compressor

**A** NEW air compressor designed for car and other similar applications is shown in the accompanying cuts. It does not depart from conventional design in most particulars, but certain refinements in detail are said to render it unusually efficient and to make it more durable than other similar equipment.

The cylinder, which is made from very close grain cast iron to prevent porosity, has a bore of  $1\frac{3}{4}$  in. and is  $3\frac{1}{16}$  in. long from the bottom of the flange to the under side of the cylinder head, which, like the top of the piston, is machined perfectly flat. The outside of the cylinder is provided with circumferential ribs which are machined all over and brought to a sharp edge. The cylinder head is cast integral and is machined to receive the valves which seat directly in it. The valve guides have long bearing surfaces, and the valves are inclosed by screw caps which are slightly undercut at the seat to form a sharp edge, which cuts into the cylinder metal when the cap is screwed home and thus forms a tight joint without gaskets.

The valves are made of Monel metal and are of the automatic poppet type. The inlet valve has a solid stem and is returned to its seat by a light, coiled spring. The exhaust valve is hollow and is necked at its lower end above the seat. The spring fits loosely into the hollow barrel of the valve and is kept cool and lubricated by oil which partially fills the opening inside the barrel.

The piston is of cast iron and has but one ring groove into which are fitted two concentric rings, each of which are made slightly elliptical when free, but are said to form perfect circles with uniform pressure at all points when in place in piston and cylinder bore. The outer ring is said to be made of semi-steel cast flat and rolled up after the ends have been trimmed to form a stepped joint. The joint on the inner ring is made at an angle

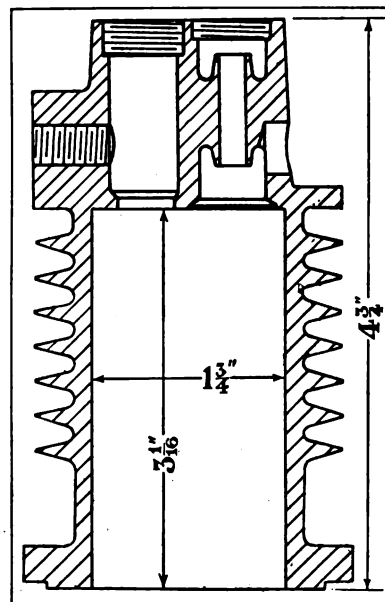
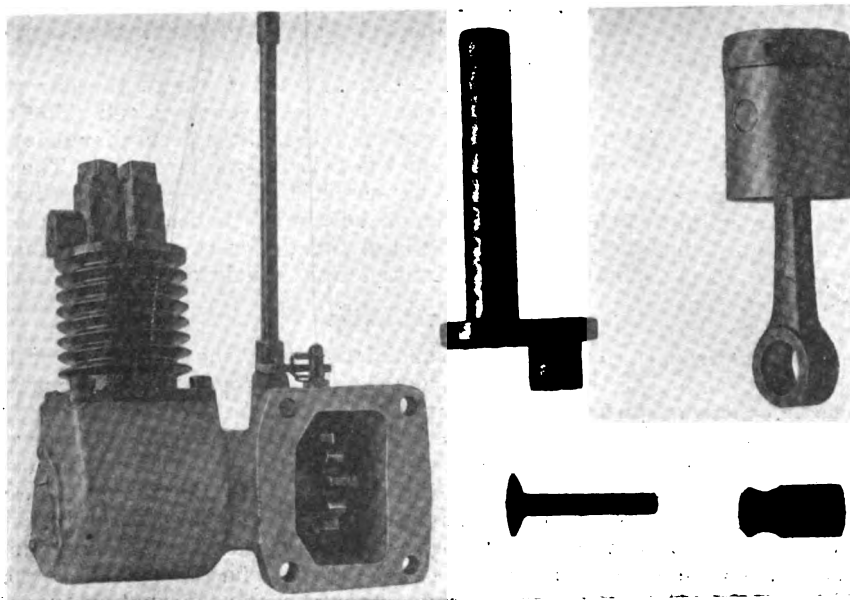
in more conventional fashion and is placed at 180 deg. from the joint in the outer ring.

The crankpin is overhung, being integral with the flange at the end of the crankshaft. A split connecting rod bearing is therefore not required. All connecting rod and crank bushings are of liberal proportions and made of bronze.

The compressor has a stroke of  $1\frac{1}{2}$  in. and can be run, it is claimed, at speeds as high as 3000 r.p.m. It will pump to pressures in excess of 400 lb. and is therefore capable of inflating easily even the largest pneumatic tires used in truck service. Lubrication is effected by Gredag, with which the crankcase is filled, and there is said to be no leakage of lubricant past the piston. H. E. Pelletier, who is responsible for the design and development work, states that he has run one compressor continuously for nine months, pumping against a pressure of 50 to 100 lb., and that there was no carbon or other deposit on the cylinder, piston head or valves at the conclusion of the test, also that there was no appreciable wear on any part.

The crankcase of the compressor can be made from cast iron or aluminum, as desired, and is furnished with a gear drive for application to standard gearbox flange, or in removable unit with connections and support for attachment to the front of a car with drive direct from the crankshaft of the engine. It is also made up in a portable unit with  $\frac{1}{3}$  hp., 1800 r.p.m. electric motor driving the compressor through a 2-to-1 gear or chain reduction.

**T**HE rural schools in the United States operate 12,000 motor vehicles transporting children to and from school.



Assembly and parts of the Pelletier air compressor. (At right) Sectional view of cylinder, showing position of valve seats and long valve guides



# Wills Sainte Claire Car Has Engine of Original Design

Has been in production for several months, but engineering and production features have never previously been made public in detail. Drive of overhead camshaft is an unusual feature, as is the automatic fan release in the cooling system. Departures from conventional design are noted.

By J. Edward Schipper

**A**LTHOUGH the Wills Sainte Claire car has been in production since March, and just prior to that time a few of the general specifications of the car were printed, the trade has never had the opportunity of studying the engineering and production features in detail. In this article AUTOMOTIVE INDUSTRIES presents for the first time the details of construction. The car is noted for its many departures from conventional practice, particularly in the engine and in the body design and equipment.

An interesting feature in connection with the design of the engine is that it has been worked out by a man who, as chief engineer and production manager of a company noted for its extremely large production of a low-priced car, naturally has had the problem of low-cost production continuously in mind. At the same time, the engine has been designed as a high-class unit in which the utmost has been done to secure smoothness and good performance. The use of eight cylinders and overhead camshafts demonstrates this clearly. The combination of the two objects in design—that is, of quality of performance and economy of production—makes this engine worthy of close study.

In the arrangement of the cylinder block a 60-deg. angle has been adopted for balancing reasons. This arrangement gives a radial, rotating resultant inertia force of constant magnitude, as opposed to a horizontal, reciprocating resultant inertia force in the 90-deg. V eight-cylinder engine. In other words, the cross vibrations for which 90-deg. eights are noted are eliminated with the 60-deg. angle.

## A Solid Head Engine

While an exterior view of the engine gives the appearance of a detachable head, this is in reality a solid head engine with a detachable camshaft housing. The tops of the cylinder blocks are machined flat to form a seat for this housing. The intake manifold is cast integral with the cylinder block and surrounded by water, and the exhaust manifold is a separate casting bolted to the cylinder block. A little kink in design which is interesting is the fact that the top and bottom piston rings overlap the cylinder bore in the top and bottom dead center position. This is done to keep the cylinder bore smooth and to avoid the formation of rings, due to wear. The cylinder bore is beveled at the bottom to facilitate slipping the cylinder blocks over the pistons. The lower part of the cylinder barrels extends down into the upper crankcase to reduce the overall height of the engine. Each cylinder block is held down by studs screwed into the upper crankcase.

In common with other engines recently developed, the combustion chamber in the Wills Sainte Claire engine is highly polished to prevent the formation of carbon. It has been found that by the elimination of dead corners and rough spots deposition of carbon is prevented from starting.

A question that arises in connection with the solid head type of engine is in regard to difficulty in grinding the valves. It is claimed that it is easier to grind the valves on this particular solid head engine than on a detachable head engine, because it takes no longer to remove the block from the crankcase than it does to remove the ordinary type of detachable head because the same number of nuts and cap screws are used. With the detachable blocks the grinding operation can be performed on a bench, and this makes it readily possible to thoroughly clean the blocks after grinding.

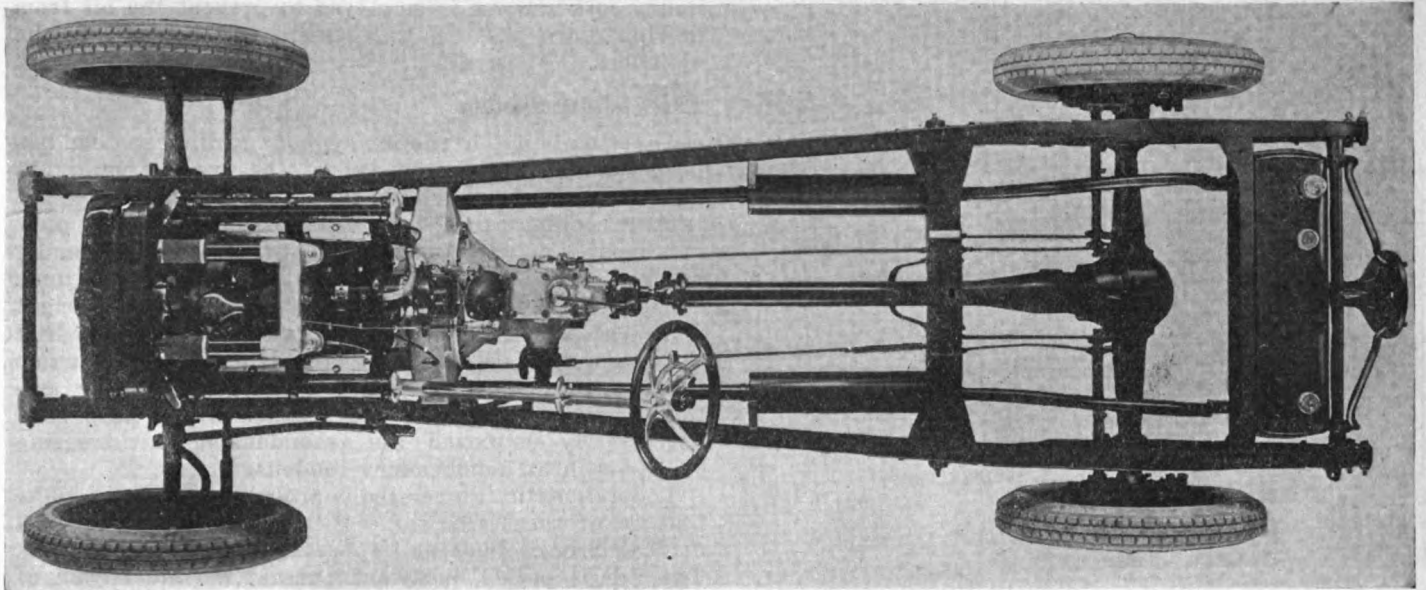
The cast iron pistons are a light-weight type with flat, polished heads. Three rings are used, two being placed above and the other below the piston pin. The piston pin is hollow and held in the piston boss by a set screw.

In accordance with usual practice for eight-cylinder engines, the articulated type of connecting rods is used. The connecting rods, both forked and plain, are of H section and machined all over. The inside of the bronze connecting rod bearing is babbitted, the bearing being accurately machined to size and requiring no scraping or fitting.

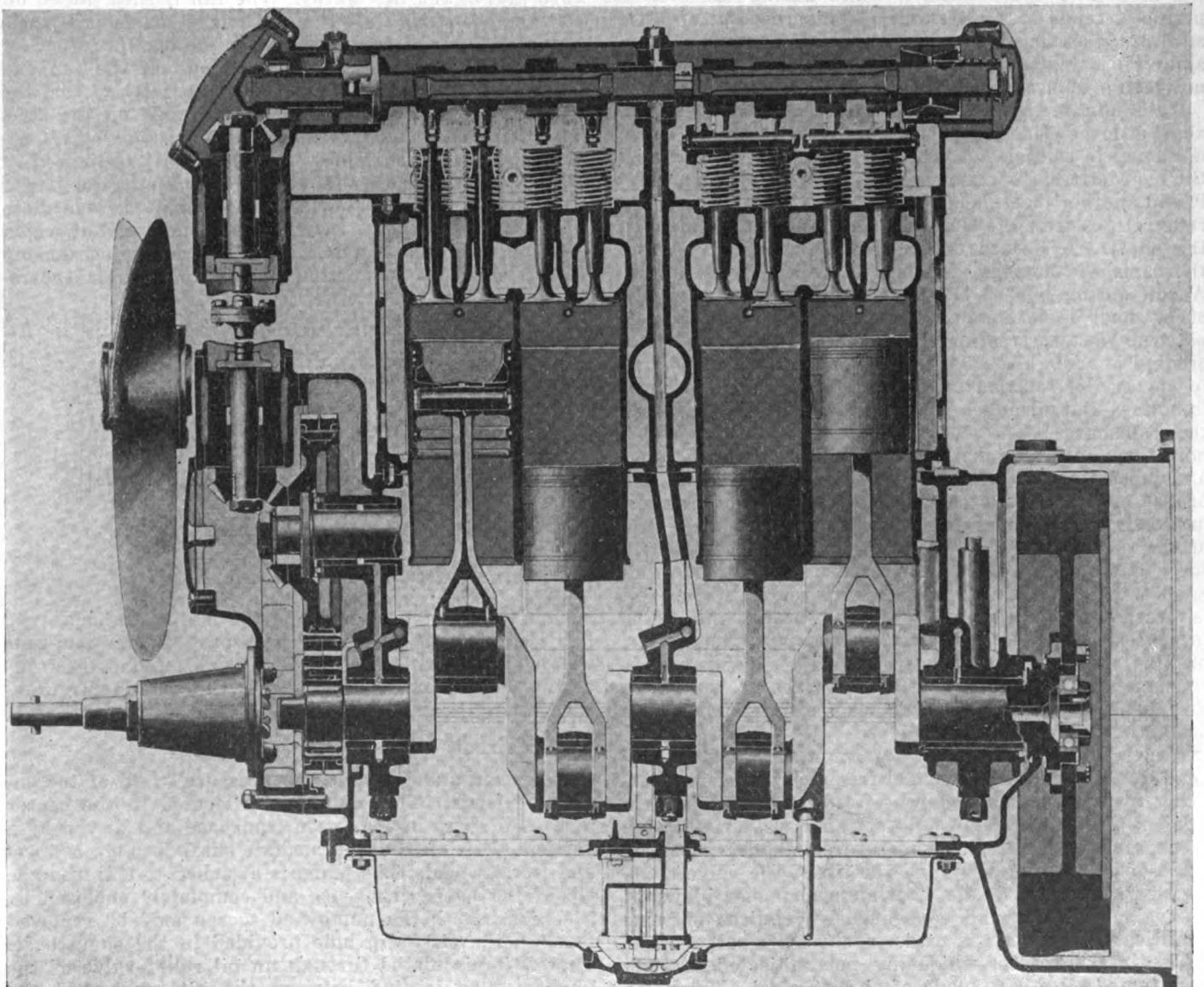
The crankshaft, like all other parts of the car which are highly stressed, is of molybdenum steel. The shaft is carried on three main bearings, the dimensions of which are given in the tabulation herewith. The caps are held to the upper part of the crankcase by two through-bolts to each bearing. In bearing replacement the entire bearing is changed, the two halves being machined to close limits for fit and interchangeability.

## Overhead Camshaft Drive

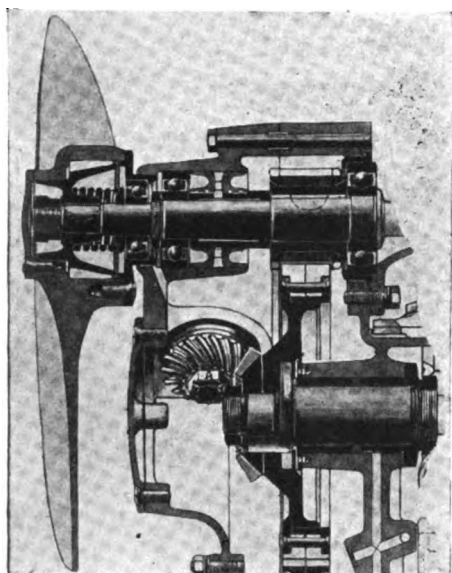
One of the unusual features of the engine is the drive of the overhead camshafts. From the crankshaft there is a drive by spiral bevel gear and pinion to an intermediate shaft, and spiral bevel gears and inclined shaft take the drive from this shaft to the two overhead camshafts. Inserted in the drive is an Oldham coupling with offset driving lugs, so that it is impossible to reassemble the camshaft driving members incorrectly and thus disturb the timing of the engine. The camshafts are molybdenum steel, and each camshaft is carried on three plain bearings, the rear bearing being of special design to eliminate noise due to unsteady rotation of the camshaft.



Plan view of Wills Sainte Claire chassis



Longitudinal section through Wills Sainte Claire 60 deg. eight-cylinder engine



Details of fan and  
generator shaft  
drive

This variation in rotative speed of the camshaft is a source of noise and wear. During the opening period of the valves the valve spring pressure tends to retard the motion of the camshaft, while during the closing period it tends to accelerate it. This reversal of pressure produces an unsteady rotation and is often responsible for a clatter in the camshaft drive, particularly noticeable at low speeds.

To eliminate the unsteadiness of rotation of the camshaft at low speeds, the camshaft steadying device, which is shown in section herewith, is employed. The end of the camshaft has a male steel cone forged integral with it and another male steel cone is keyed to it. The latter cone rotates with the camshaft, but may slide axially on the shaft. A bronze double female cone is keyed to the camshaft housing, but may slide axially within it. A coil spring pushes the keyed steel cone toward the other steel cone, compressing the female bronze cone between the two rotating steel cones. The friction thus created is enough to give the desired braking effect and to steady the rotation of the camshaft. The camshaft is hollow, and oil under pressure from the oil pump fills the camshaft bore. Oil comes out of the camshaft bore through a hole drilled between the two steel cones and lubricates the surfaces in contact on the steel and bronze cones. As the camshaft rotates, the oil is automatically forced from the small end to the large end of the rotating steel cones by the action of centrifugal force and the increased oil pressure. As the flow increases with the speed of camshaft rotation, more oil is forced out between the cones as the speed of the engine increases, lessening the friction between them. The braking effect, which is only needed at low speed, is consequently reduced as the speed increases.

A good example of the care taken throughout in the design of this engine is furnished by the exhaust valve. In order to keep down the expansion of the stem and head, invar, a nickel alloy steel frequently used in measuring instruments and characterized by a very low coefficient of expansion, is employed. The valve rim, which is exposed to the high temperature exhaust gases, is made of a tungsten alloy and the tip of the valve stem, which is subjected to the continuous hammer blows of the valve follower and consequently requires extreme qualities of hardness, is made of chrome-cobalt steel.

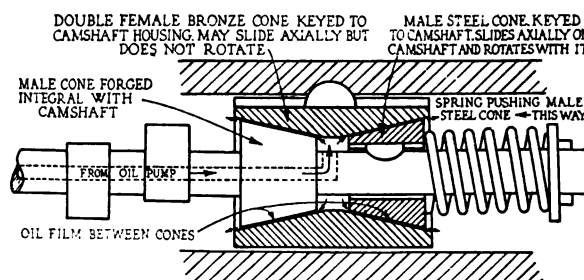
The intake valves, which are not subjected to such high temperature, are made of chrome steel. The valve springs are held on the valve stems by a split collar,

and a cork washer is employed to prevent the oil from flowing down past the valve stem and guides into the cylinders.

### The Cooling System

For simplicity, a thermo-syphon cooling system has been adopted. The capacity of the system being 6½ gal. The radiator is of the tubular type made up of 155 copper cooling tubes with 135 horizontal cooling fins. It is flexibly mounted on two coil springs. For unusually hot regions, the cooling system is supplemented by a condenser placed under the front end of the right splashier. The condenser operates on the principle that the recooling of the radiator creates a sufficient vacuum to draw the condensed water back to the cooling system. This is similar to the systems which have been successfully employed for recondensing anti-freezing solutions in an independent condenser.

The automatic fan release is probably the most unique feature of the Wills Sainte Claire cooling system. A conical bronze bushing is pressed into the fan hub. The fan is pulled backward against the steel cone of the fan shaft by a spring. When in action the fan tends to move ahead on its shaft, and when its speed reaches a certain value the forward pull of the fan, due to the reaction of the air, is stronger than the backward pull of the fan spring. The fan is then pulled off the steel cone and slips on it like a disengaged cone clutch. When the fan speed drops the backward pull of the spring overcomes the forward pull of the fan and the fan reseats itself. To prevent any seizing from the constant slipping of the bronze fan cone on the steel fan shaft cone, both surfaces are lubricated by oil delivered through the hollow fan shaft. As the speed of the fan cannot exceed a certain set limit, the power absorbed for driving the fan is also limited, regardless of how fast the engine may rotate. The speed at which the fan is released is regulated by the spring tension and is generally about 2000 engine r.p.m., which corre-

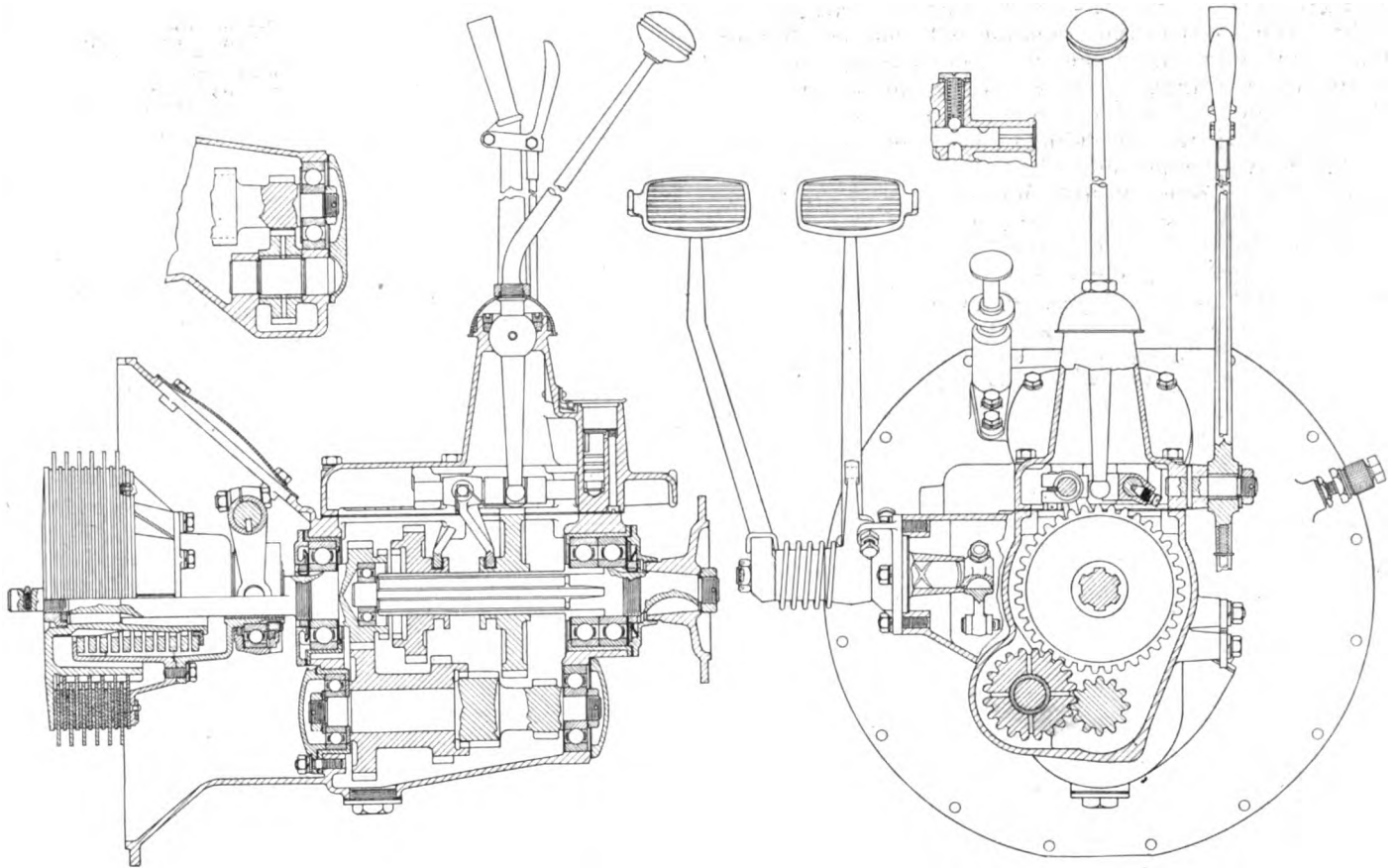


Sketch of camshaft steadying device to eliminate fluctuation in camshaft speed

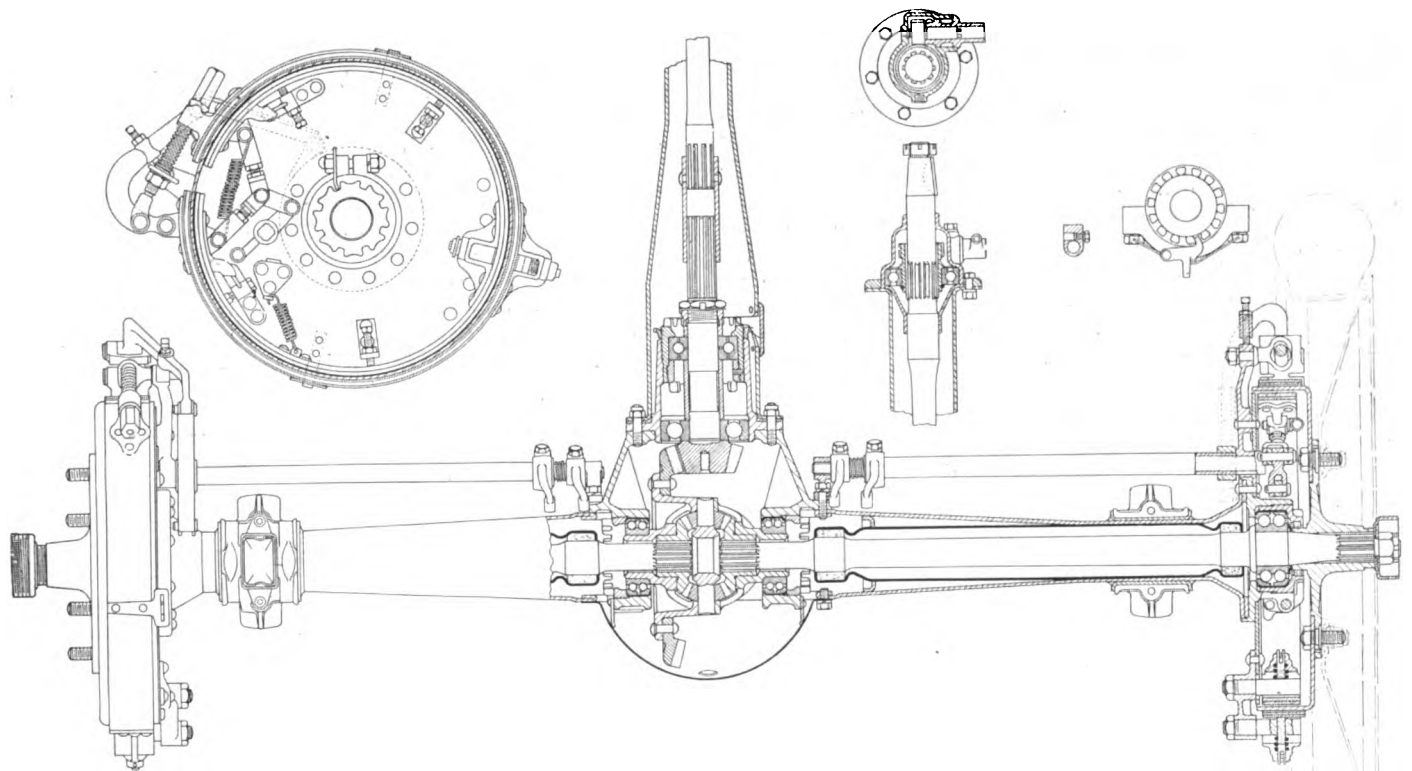
sponds to 3000 fan r.p.m. The fan is a three-blade type and is driven off the timing gearset. The fan-and-generator drive gear is of Fabroil and is located at the front of the motor and enclosed within the aluminum crankcase timing gear cover.

### Oiling Circuit

Oil is fed under gear pump pressure to all of the engine bearings. The oil pump is located in the center of the oil sump in the lower crankcase and driven by a vertical shaft off the intermediate shaft through a worm and worm wheel. The pump is attached to a transverse rib of the lower crankcase and completely enclosed by a screen. Both the pump and screen may be removed through the oil drain hole provided in the sump base. The oil is circulated through an oil relief valve of the plunger type located between the oil pump and the crankcase oil header. From this header it branches off



Sectional assembly of clutch and transmission gearset



Eaton axle used in Wills Sainte Claire car. The standard gear ratio is 4.4 to 1



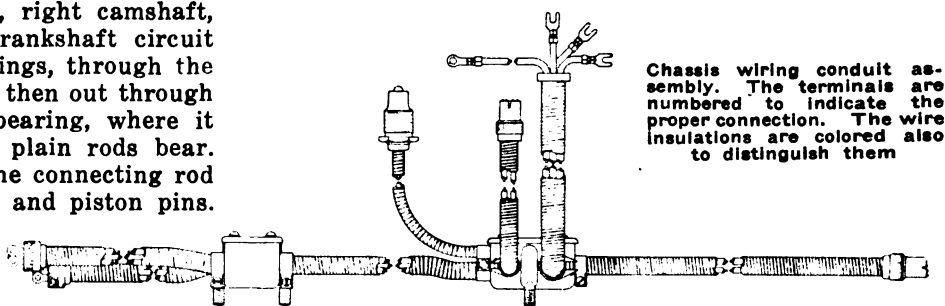
into four circuits for the crankshaft, right camshaft, left camshaft and fan shaft. The crankshaft circuit includes leads to the three main bearings, through the hollow crankshaft to the crankpin and then out through holes drilled in the connecting rod bearing, where it lubricates the surfaces on which the plain rods bear. The oil thrown off the crankpin and the connecting rod bearings lubricates the cylinder walls and piston pins. A detail in connection with the crankshaft oil holes is that instead of being drilled in the customary way, they are drilled off-center and the opening is formed like a scoop which greatly assists in picking up the oil.

The camshaft oil circuit is so arranged that the oil flows from the oil header to the center camshaft bearing through a lead drilled in the upper crankcase half, then through a tube inserted in the cylinder block and through a lead drilled in the camshaft housing. It then flows from the camshaft center bearing to the inside of the camshaft, through a hole drilled radially in the camshaft. Two tubes with expanded ends are pressed into each camshaft, one tube being on each side of the center bearing. Each of these tubes has one radial hole through which oil, coming from the center bearing flows to an annular space between the tube and the camshaft bore. From this space, oil is delivered to the cam face through a hole drilled in the base of each cam, lubricating the cam face, the valve followers and the valve stems. One hole in each tube thus delivers oil to four cams and the oil supply consequently is limited to the required amount.

Oil flows to the front and rear camshaft bearings through the hollow camshaft. The rear end of the camshaft is closed by a plug and the front end is closed by the camshaft front nut. Oil flows out through two holes drilled in the camshaft front nut and lubricates the camshaft drive spiral gear and the camshaft spiral pinion. Excess oil in the camshaft housing is returned to the crankcase through leads inserted in the front and rear ends of the cylinder blocks.

In lubricating the fan shaft the oil flows from the oil header to the fan plain bearing through an oil lead drilled in the upper crankcase half and through a copper tube cast in the timing gear cover.

The clutch is a multiple dry disk, central spring type with six driving and six driven disks. The driving disks carry the clutch lining, which is made of asbestos cord and strands woven into the disks. The particular advantage claimed for this construction is that with the asbestos cord lining, the friction surface is built up of



Chassis wiring conduit assembly. The terminals are numbered to indicate the proper connection. The wire insulations are colored also to distinguish them

a number of cords placed alongside each other. When the clutch is thrown in, the top of the cords come first in contact with the unlined disks and then flattens out as the pressure increases, giving a smooth engagement. It is claimed that with the usual riveted clutch lining, after the car has been driven some time, it is worn down to a smooth surface, and when the clutch is engaged the entire surface comes into contact at once.

The gearset is of selective type with three speeds forward and one reverse. The gearset is housed in an aluminum casing, the front end of which is cone shaped to form the clutch housing. The gears and shafts are made of molybdenum steel. The countershaft is forged integral with the low and reverse speed gears.

There is only one universal in the drive, this being at the front end of the propeller shaft. It is an all metal universal of the yoke type. The universal pin is carried in bushings welded to the housing and is connected to the yoke keyed to the propeller shaft by a two-piece ring. A torque tube of seamless steel tubing encloses the propeller shaft which is connected with the driving pinion through a splined sleeve. The rear axle is semi-floating, with spiral bevel drive. The differential assembly, including the driving gear, the four differential pinions, the differential spider and the differential side gears, is supported in the carrier by two double row ball bearings. Both the pinion and the driven gear are adjustable. There is an inspection plate on the torque tube, giving access to the driving pinion adjustment.

Steel disk wheels are used as standard equipment. The wheels, which are dished outwardly, are of Wills design and made by Budd. The tire equipment is 32 by 4½-in. straight-side cords. The front axle is an Elliot type, the front wheels being supported by double row ball bearings. The steering gear is worm and full wheel and is fully adjustable. The turning radius of the car is 20 ft. 5 in., which is unusually short.

The electrical equipment comprises a starting, lighting and ignition system, which has been specially de-

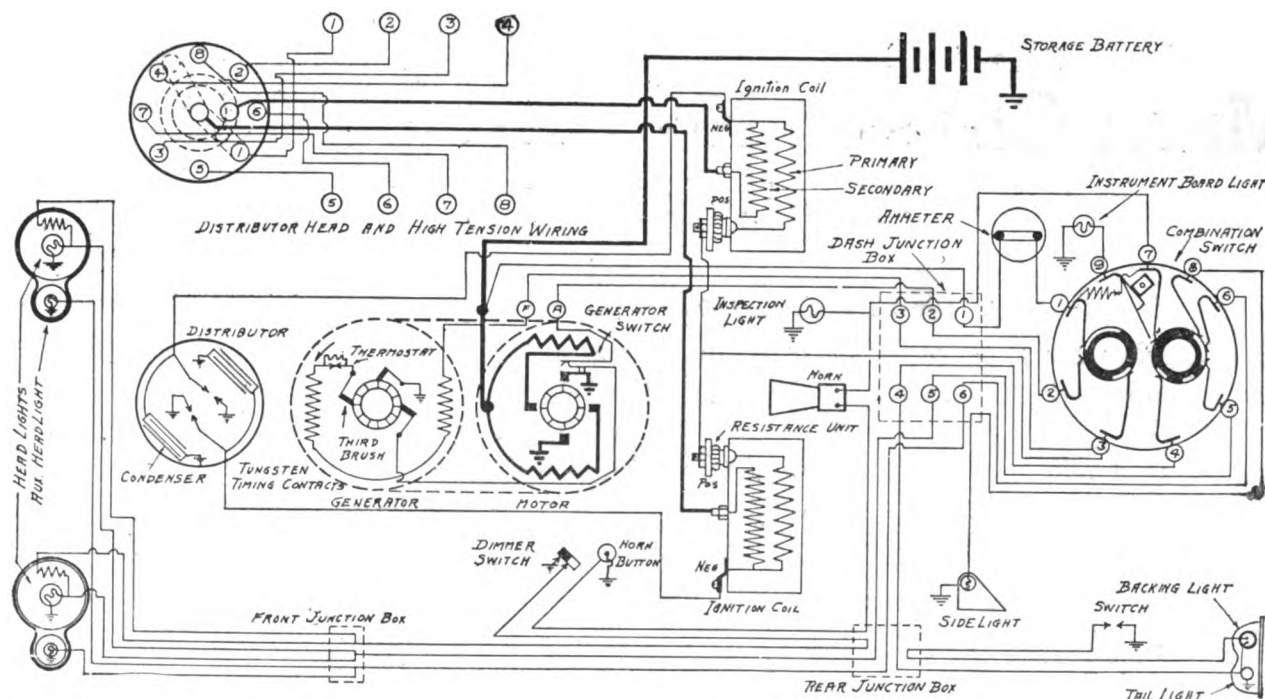
### General Specifications of Wills Sainte Claire

Number of cylinders: 8.  
Angle between the cylinder blocks: 60 deg.  
Bore: 3¼ in.  
Stroke: 4 in.  
Piston displacement: 265 cu. in.  
Compression ratio: 4.1:1.  
Brake horsepower developed:  
30 b. hp. at 1000 r. p. m.  
60 b. hp. at 2000 r. p. m.  
65 b. hp. (maximum) at 2700 r. p. m.  
Specific power: 4 cu. in. per b. hp.  
Rated horsepower for taxation: 33.8 hp.  
Crankshaft bearing length:  
Front 2¼ in.  
Center 2¼ in.  
Rear 3½ in.  
Connecting rod bearing length: 2.02 in.  
Diameter of crankshaft and connecting rod bearings: 1¾ in.  
Transmission reduction:  
High 1:1.  
Intermediate 1.70:1.

Low 3.02:1.  
Reverse 4.02:1.  
Rear Axle reduction:  
Touring 49:11 or 4.46:1.  
Closed model 49:10 or 4.90:1.  
Diameter camshaft bearing: 1½ in.  
Diameter piston pin: 11-16 in.  
Capacity gasoline tank: 15 gal.  
Capacity oil sump: 1½ gal.  
Capacity cooling system: 6½ gal.  
Capacity condenser (full): 1½ gal.  
Front spring:  
Length, 36 in.  
Width, 2 in.  
Number leaves, 6.  
Flexibility, 465 lb. per in.  
Rear spring:  
Length, 54 in.  
Width, 2 in.  
Number leaves, 7.  
Flexibility, 135 lb. per in.

Battery: 6 volts, 145 amp. hr.  
Candlepower of lamps:  
Headlight large 21.  
Headlight small 2.  
Courtesy (side) 21.  
Tail light red 2.  
Tail light white 21.  
Instrument board 2.  
Trouble 2.  
Braking surface:  
Service, 82 sq. in.  
Emergency, 68 sq. in.  
Wheelbase: 121 in.  
Turning radius:  
Right 20 ft. 5 in.  
Left 20 ft. 9 in.  
Road Clearance: 9¾ in.  
Steering wheel diameter: 17 in.  
Tire size: 32 by 4½ in. Cord. Millimeter size.  
Weight, touring, fully equipped: 3200 lb.





Wiring diagram of Wills Sainte Claire car

signed for this car by Delco. The distributor and motor generator are driven by the fan shaft. The battery is a 6-volt Willard. All the wires in the car are protected by armored conduits, and the junctions are made in pressed steel junction boxes. Complete wiring is made up in two units, the chassis wiring harness containing all of the wire from the instrument board to the various lights, to the backing light switch and to the steering gear, and the motor wiring harness containing all the wires from the instrument board to the distributor and motor generator and from distributor to plugs.

The lamp equipment is unusual, the headlights being equipped with a magnetic control for tilting the reflector and, in addition to the usual lamp equipment, there is a courtesy or side light located on the left-hand side of the body in line with the windshield post and at about the height of the fender crown. This side light has a 21 cp. bulb and throws a beam directed downward and backward. The purpose of the side light is to illuminate the left side of the road to protect the passengers while entering, leaving or standing alongside the

car at night, and to show clearly to approaching drivers how much clearance they have while passing. In addition to the red tail light, there is a backing light combined with it which is automatically switched on by going into reverse.

The open bodies are built by the Budd company of Philadelphia. They are of pressed steel panel construction, spot welded together. The upholstery is genuine leather with Marshall springs in the cushions. All of the cushions are re-enforced on the bottom by heavy steel wire screening to hold the shape. The upholstery is detachable, the cushions, backs and sides being replaceable quickly and securely in case it is necessary to repair a body panel.

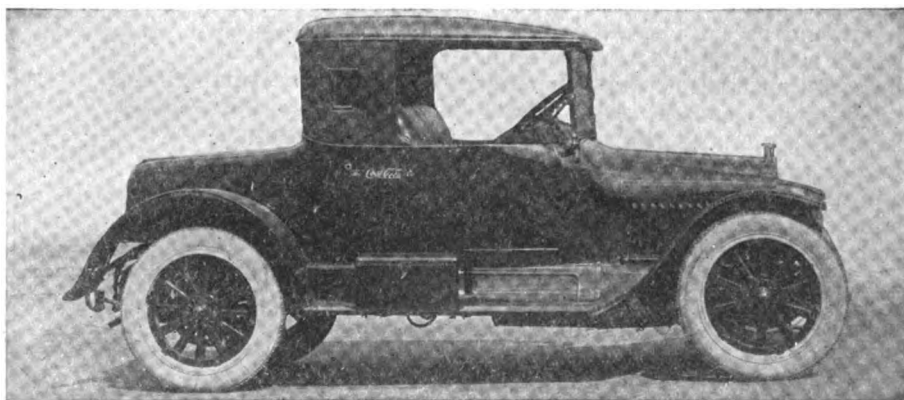
The coupé seats four passengers and is distinguished for its lowness, the distance from the top of the roof to the ground being only 73 in. The instrument board is of harmonious design and carries the Delco switch with lock, Waltham speedometer, Weston ammeter, oil pressure gage, choke button, ventilator button and instrument board light.

## White Company Brings Out a Business Car

**T**HE use of automobiles by salesmen and men whose duties make it necessary for them to travel over sparsely settled territory has increased to an extent that the White company, Cleveland, has developed a special car for this purpose. The new car is a development of the White taxicab, and it has an engine with bore of  $3\frac{3}{4}$  in. and stroke of  $5\frac{1}{8}$  in.

A permanent top gives protection against the weather, and there is ample room for baggage back of the seat.

The price of this business car, including both the chassis and the body, has been set at \$3225. It is understood that the White Co. will not re-enter the passenger car field again and this new model comes in a strictly business class and



A salesman's car

will be merchandised as far as possible in multiple units or fleets.

# Mack Chassis Now Adapted for Use as Rail Cars

Vehicles used for railway work have special axles, wheels and reverse gears, but most other parts of the chassis are identical with those used in standard Mack trucks. Special bodies seat from 25 to 35 passengers.

By Herbert Chase

**S**EVERAL Mack rail cars have been in operation on short line railways for a number of months and are reported to have resulted in such material savings as to assure their early utilization by some of the great railways of the country, chiefly for branch line service. The New York, New Haven & Hartford Railroad has in fact recently ordered three Mack rail cars and has announced that these will be put in service on their branch lines when delivered. These three cars will be constructed largely of components used in the heavy model AC Mack trucks. The Mack rail cars now in the hands of users have all been modified AB chassis, which is the lighter of the two chassis types built by the International Motor Co. Both of the rail cars use, so far as practicable, standard Mack truck chassis units, but both incorporate a number of special features required to adapt the standard chassis to rail service, and both have bodies designed especially for railway use.

The smaller or model AB rail car is designed to carry from 25 to 31 passengers, according to the seat arrangement, grades to be negotiated, etc., but a portion of the body space can be used for a baggage compartment if needed, or a baggage container can be slung under the rear end of chassis frame if desired. When the grades do not exceed 1 per cent a 31 passenger body is recommended. This car makes a speed of 25 to 28 miles per hour on a level track and about 18 miles per hour on a 1 per cent grade. With a 25-passenger body a speed of about 22 miles per hour can be attained on a 1 per cent grade.

The frame of the AB rail car is similar to that used in the AB bus chassis described in AUTOMOTIVE INDUSTRIES for Sept. 15, 1921, and is reinforced with an oak stringer and steel truss rod similar to that used in the bus. The front end of the chassis frame is mounted on a four-wheel leading truck made specially for the purpose by the International Motor Company. The frame of this truck is of considerably lighter material than that used in ordinary railway trucks, but is of a much higher grade of steel. A swinging bolster is employed and the springs are fastened to the body bolster by standard spring pads and spring clips. The body bolster rests in a center bearing in the swinging bolster about which the whole leading truck pivots. The swinging bolster is mounted on swing links which allow side motion and give better riding qualities when rounding curves at high speed.

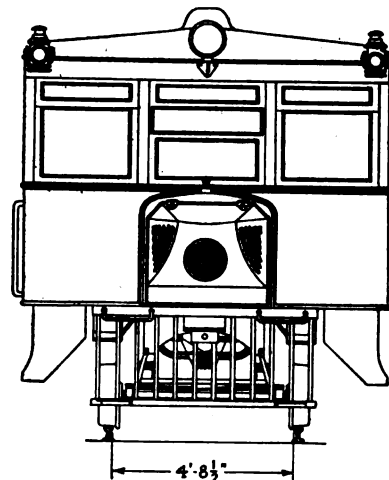
The wheels of the leading truck are steel forgings 20 in. in diameter with standard Master Car Builders tread and flange. They are mounted on roller bearings and rotate about fixed axles made of high-grade steel. This is in marked contrast to railway practice in which the

wheel is rigidly attached to the axle and the latter rotates in plain bearings. An all-metal pilot is designed in accordance with railway practice and is fastened to the front end of the chassis frame.

The standard Mack double reduction banjo-type axle housing is used. The full floating live axle shafts and double reduction gearing are retained, but the differential is eliminated. A spur gear with large hub is used, the latter being connected by splines direct to the axle shafts. The rear wheels which, of course, do the driving are 38 in. in diameter and have locomotive specification rolled steel tires, with M. C. B. flanges and tread. Tires are pressed on and securely fastened by wedge rings.

A gear ratio of 5.88 to 1 giving a maximum speed of 28 miles per hour on a level track is used in most cases, but other gear ratios are available and can be varied to meet different load, speed and grade conditions.

The standard four-speed transmission is employed, but without the usual reverse gear. A special reverse transmission mounted in a separate housing directly back of the regular transmission is used, but some of the parts used in this are standard transmission parts. The drive through this transmission is direct when the car is running forward. When reverse drive is desired the direct drive-shaft of the special transmission is divided and the power is transmitted to a layshaft and through a reverse gear back to the rear half of the main drive shaft as in a conventional transmission. The special transmission is connected direct to the propeller shaft, which drives direct to the rear axle. By this arrangement it is possible to operate the car at high speed in either forward or reverse direction and on any of the four gears in the



Front view of AC Mack rail car

main transmission. The reverse transmission is operated by a separate lever. When this is in reverse position the regular transmission is operated in the conventional manner.

The standard hand brake operating on the propeller shaft and foot brake operating on the rear wheel drums are employed. In addition the standard steering gear is used to operate four shoes one of which bears on each of the four wheels of the leading truck. These brakes are used in service as much as possible in order that the foot and hand brakes may be held in reserve for emergency purposes.

Sanders for use when traveling in either forward or reverse direction are provided. They are operated by a lever from the driver's seat.

Bodies are of substantial wood construction and are made by experienced railroad-car builders. The 31-passenger body is 21 ft. 6 in. long inside. With this length of body the wheelbase is 198 in. The 27-passenger body is 19 ft. long inside and is used on a 180-in. wheelbase chassis.

The larger or AC type rail car is designed to carry 36 passengers and about 1000 lb. of baggage and to have a maximum speed of 35 m.p.h. on level track. It has the following special features:

The frame has 5/16 in. chrome-nickel heat-treated side members 31 ft. 10 in. long. To the outside of these are riveted substantial steel re-enforcement members. In order to lower the frame the springs are hung under the rear axle and are attached to the frame by rubber shock-insulators in place of shackles. These insulators are used at both ends of both springs. They tend to improve the riding qualities and prevent the shock of passing over rail joints from reaching the frame of

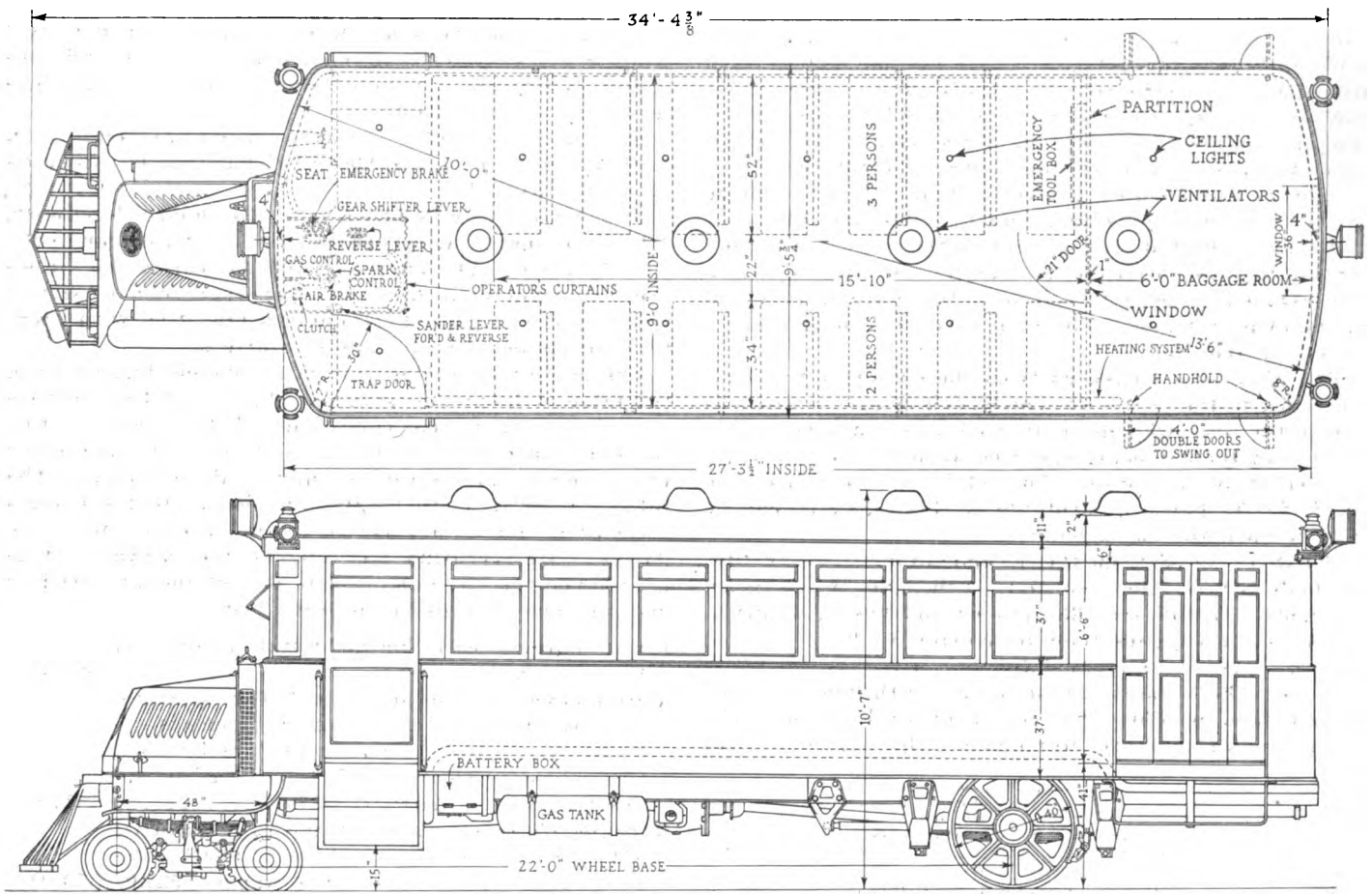
the vehicle. All springs are of the half-elliptic type.

The front end of the chassis is carried on a four-wheel leading truck of the same size and design as that used on the smaller AB rail car.

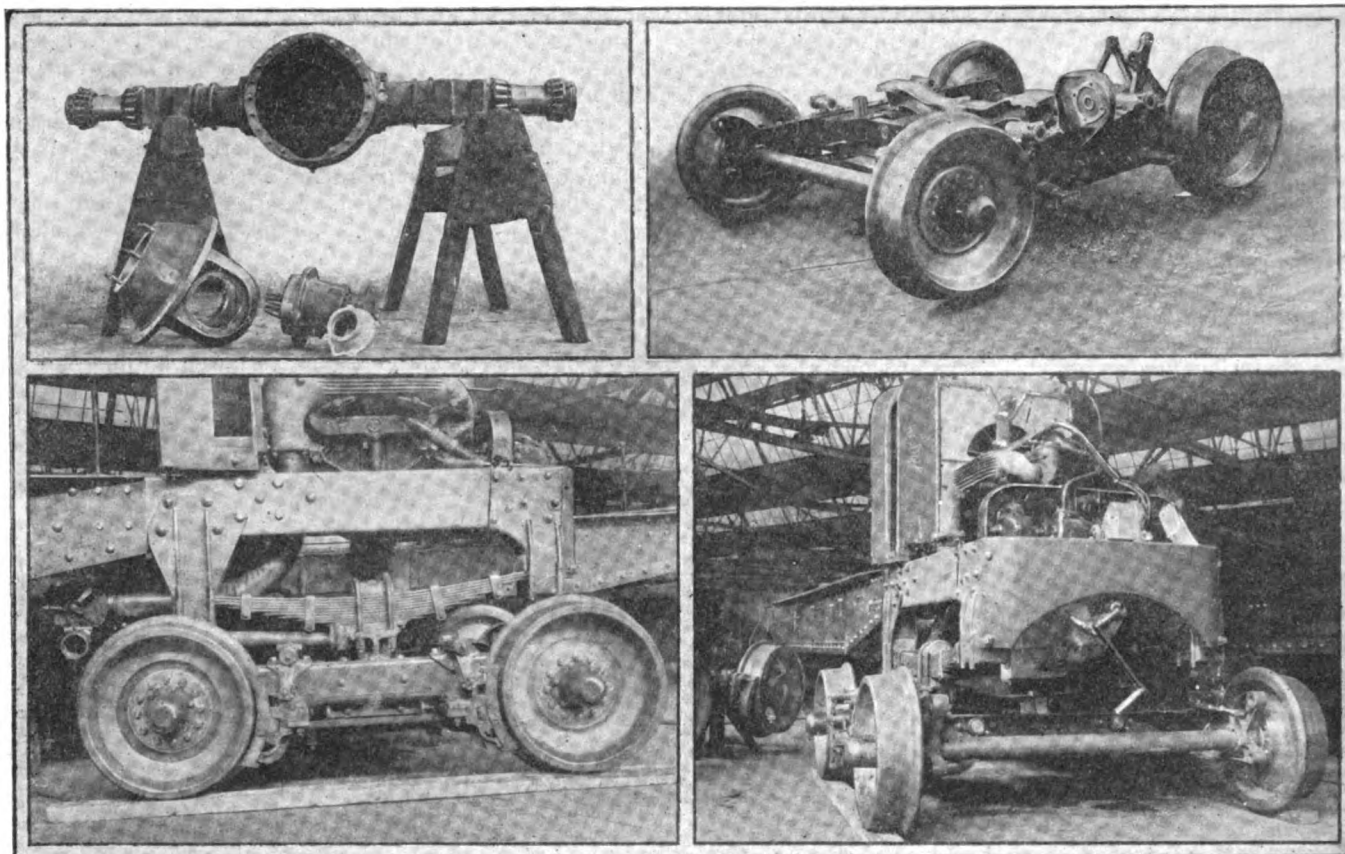
The rear axle is of special design since the large gear reduction obtained by the chain drive employed in the AC Mack truck is not required for railway work. The axle housing is of cast steel, and a single reduction bevel gear drive is employed. A simple flange to which the ring gear is bolted replaces the usual differential, which is not required, and drives the two live full-floating axles through splined connections. The wheels are of cast steel 40 in. in diameter and have rolled steel locomotive tires shrunk on. They are mounted on the axles with large Timken bearings with considerable space between the inner and outer bearings of each set. Timken bearings are also used each side of the ring gear and on the bevel pinion shaft. The standard 56½-in. gage is employed. Special tubular radius rods 5 ft. long are used.

The standard four-speed AC transmission is used but without the usual reverse gear. However, the rear end is modified to take a propeller shaft connection instead of the jackshafts and bevel gears used on the chain-drive truck. A reverse transmission identical with that used in the AB rail car is employed, but in this case it is mounted between the engine and the standard transmission. As in the smaller rail car it enables high speed operation in either direction and is controlled by a separate operating lever.

No conventional automobile type brakes are used on this car. In place of these there are brake shoes acting on the periphery of all six wheels. These are arranged to be operated normally by air pressure as in ordinary



Plan and side views of Mack AC rail car with baggage compartment and seats for 36 passengers



Upper left—Axle housing and parts used in the Mack AC rail car. Upper right—Leading truck used on both AC and AB rail cars. Two lower views show front end of AC rail car. Note heavy frame reinforcement and brackets for carrying rubber shock insulators in place of spring shackles

railway work, but in an emergency can be operated by a wind-up hand mechanism. It has not yet been decided what means for compressing air will be employed, but a special air compressor driven off either the engine or the transmission, or accumulators using compressed gases from the engine cylinders may be employed.\*\*

A spark and throttle control column is used in place of the steering gear column which is not required.

Sanders operated by a lever from the driver's seat and similar to those used on the smaller car are employed. The exhaust gases are carried to the extreme rear end of the chassis frame. The pipe used is so long that no muffler is required.

The wheelbase measured from the center of the leading truck to the center of rear wheels is 22 ft., which is within the fixed wheelbase allowed on locomotives. This permits of the car being operated at moderate speeds on a curve of 40 ft. radius. The total track length of the car is 24 ft., hence a turntable of this diameter can be used to turn the car around.

It will be noted from the accompanying drawing that the body is 9 ft. wide and 27 ft. 3 in. long, inside measurements. It will seat 36 persons and has in addition, at the rear, a baggage room measuring 6 x 9 ft.

Both sizes of rail car have provisions for exhaust heating. The exhaust can be bi-passed through guarded pipes extending along the inner body walls of the body.

Electric starters are provided for the engine in both

sizes of car and both are fitted with miniature 12-volt train lighting systems driven from the engine and consisting of dynamo, a dynamo-lamp regulator, storage batteries and 10 dome lights.

The chassis weight is 13,675 lb. The total weight with body, 36 passengers and 900 lb. of baggage is estimated at about 26,000 lb.

The AB rail car is fitted with a standard 4-cylinder, 4 by 5-in. engine, governed to run at a maximum speed of 1450 r.p.m. The engine in the AC car is the standard 4-cylinder 5 by 6-in. type governed to a maximum speed of 1250 r.p.m. Both engines are fitted with high-tension magnetos with impulse starters.

The cost of operating rail cars depends largely upon the price of labor and supplies, the size of the crew required and other local conditions. Either car is suited for one-man operation if this is desired and permitted under Federal and State laws and local ordinances. The following items serve to give an idea as to the operating cost over a 24-day period in the case of one of the AB rail cars operating over a short line railway. (Figures cover the car only. They do not include fixed or maintenance charges on the road bed.)\*

Fixed charges, including amortization, interest and insurance .....	\$88.55*
Maintenance, including roundhouse charges, \$20; Washing and polishing, \$5; chassis repairs, \$10;* body repairs, \$1;* repainting, \$5;* chassis overhaul, \$7;* lubrication, inspection and adjustment, \$3.50*.....	51.50
Running charges, gas (11 m.p.g.) at 25c. gal., \$50; oil (200 m.p.g.) at 60c. gal., \$6.60; running supplies, \$5;* operator's wages, \$92.40.	154.00
<b>Total operating cost (24 days).....</b>	<b>294.05</b>
<b>Cost per mile (2200 miles total).....</b>	<b>.1336</b>

\*\*The AC rail car is not yet completely developed. An experimental car has been under test for some time, but several changes, most of which have been covered in this description, have been made partly as a result of experience gained with the experimental car and partly to meet the views of the railway which is purchasing the three cars now being built to their order.

\*Some of the items here given represent actual costs in a particular case and others are estimated and pro-rated for the twenty-four day period, basis of estimated yearly charge, but they are said to serve as a reasonable basis for comparison.



Steam train operation is said to cost in the neighborhood of \$1.50 per mile, but this cost also varies greatly with local conditions. However, the difference in operating costs is very much in favor of the rail car.

On the other hand the rail car is not expected to fill the field of the steam passenger train when this can be run to capacity, carrying, for example, 70 or more passengers. Its field appears to be in localities where traffic is relatively light and is spread over the day without

pronounced peaks, exceeding the car capacity, especially where service must be provided without respect to the volume of traffic. Under these circumstances the saving in operation as compared to steam is considerable.

The manufacturers of the Mack rail car do not recommend the use of trailers unless much lower speeds on grades are not objectionable and it is permissible to reduce the seating capacity of the leading car, but trailers have been used with satisfaction in some instances.

## New Line of Internal Gear Truck Axles

**D**URING the past year the Russel Motor Axle Co. took advantage of the lull in business to develop a new line of motor truck axles of the internal gear type. This development work has now been completed and the axles have been placed in production. All of the models possess the same characteristics and embody a good many improvements over previous designs.

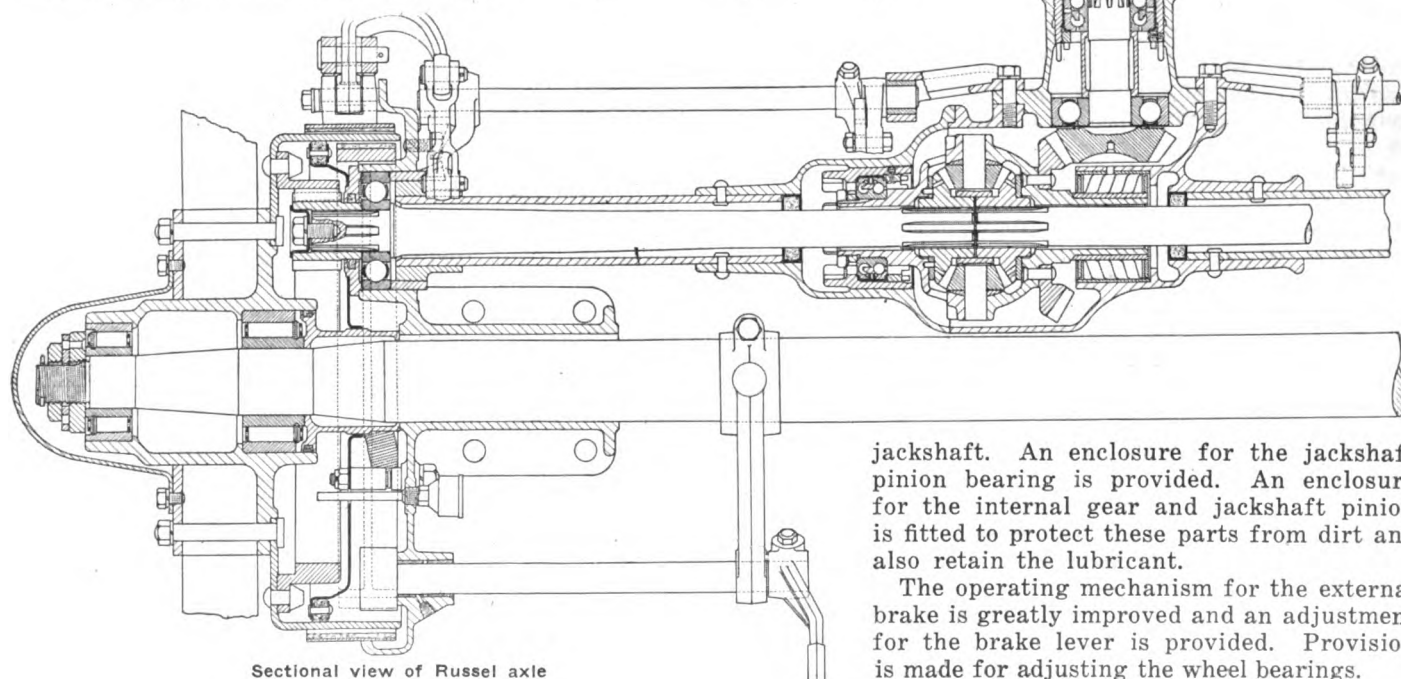
The new models will be made for 1, 1½, 2 and 2¾ ton trucks. With the exception of the 1½-ton they will

replace previous designs, the Models P, S and U. The 1½-ton model is an entirely new design, gotten out to meet a demand for that size which has been felt recently. A drawing of the Model 6000 axle is reproduced herewith, and, except as regards dimensions, will serve to illustrate all of the different sizes. The improvements incorporated in this new line of axles may be briefly enumerated as follows:

Spiral bevel driving gears are used for the first reduction set on all models, which insure a degree of quietness not obtainable with straight tooth bevel gears. On Models 3000, 4500 and 6000 the pinion shaft is machined with ten splines for the universal joint flange. Model 8500 has a taper for the flange. An improved four-pinion type of differential gear is used on all models, this differential incorporating hardened and ground thrust washers.

The jackshaft pinions are mounted upon the jackshaft in such a manner as to permit removal without disturbing the

	3000	4500	Models 6000	8500
Nominal capacity in tons .....	1	1½	2	2¾
Weight, without wheels .....	450 lb.	575 lb.	656 lb.	735 lb.
Max. weight on spring pads .....	4500 lb.	6500 lb.	8000 lb.	11000 lb.
Max. torque input in inch-lbs. for dif-	7:1-5000	7.45:1-8250	7.4:1-8250	9.3:1-10000
ferent gear ratios .....	6 pitch	5 pitch	5 pitch	4½-6 pitch
Internal gear and pinion .....	1½ face	1½ face	1½ face	1½ face
Bevel drive gear .....	4/5 pitch	4½ pitch	3¾ pitch	3¾ pitch
Differential .....	7/8 face	1 face	1½ face	1½ face
Dead axle .....	4 pinion	4 pinion	4 pinion	4 pinion
Outer spindle diameter .....	1½	1¾	1¾	2
Inner spindle diameter .....	2	2½	2½	2¾
Spring seat diameter .....	2¾	2¾	2¾	3
Bevel pinion shaft .....				
Diameter .....	1½	1¾	1¾	1¾
Univ. jt. fitting .....	1½-10 spl.	1½-10 spl.	1¾-10 spl.	1¾ taper
Hubs .....				
Barrel diameter .....	4¾	4¾	5½	5½
Flange diameter .....	9¾	11¼	11¼	11¼
Bolt circle diameter .....	8¾	10	10	10
Brakes .....				
Ser.—Diameter .....	14	15½	16½	18
Ser.—Width .....	2½	2½	3	3
Emer.—Diameter .....	13½	15	16	17½
Emer.—Width .....	1¾	2	2	2



Sectional view of Russel axle

jackshaft. An enclosure for the jackshaft pinion bearing is provided. An enclosure for the internal gear and jackshaft pinion is fitted to protect these parts from dirt and also retain the lubricant.

The operating mechanism for the external brake is greatly improved and an adjustment for the brake lever is provided. Provision is made for adjusting the wheel bearings.



# Automatic Declutcher Introduced at Paris Show

Gear shifting accomplished by taking the foot off the accelerator pedal and waiting until engine slows down to a point where it is sure to be uncoupled by the new device. The gear lever is then shifted without disengaging the friction clutch. Makers claim fuel saving as an advantage.

A NOVELTY introduced at the recent Paris show is the free-wheel or automatic declutcher known as the "Autodebrayage T. L.," which is incorporated in the line between the friction clutch and the transmission. The device is fitted to the latest model of Chenard-Walcker car. Its effect is that whenever the car tends to run ahead of the engine, the latter is automatically disengaged, but as soon as the car has slowed down to a speed corresponding to the throttle setting the connection between engine and drive is automatically re-established.

## Leads to Fuel Saving

The chief advantage claimed for the automatic declutcher is that it helps to save fuel. In city driving, car control is almost entirely by the throttle. When the car speed has to be slackened, the throttle is closed as far as possible while still keeping the engine running, and the engine may then be turned by the car at, say, 1000 r.p.m., while the throttle is set for, say, only 400 r.p.m. Although the throttle is nearly closed, the suction on the gasoline nozzle will be fairly strong and much gasoline will be wasted.

The device is claimed to have a favorable influence also on the manipulation of the change gear lever. In changing from a lower to a higher gear, the foot is taken off the accelerator pedal and the driver waits a moment until the speed of the engine has come down to a point where the engine is sure to be uncoupled by the auto-declutcher; he then merely shifts the gear lever into the slot corresponding to the speed which he wishes to engage without disengaging the friction clutch. In the case of a change from a higher to a lower gear it is only necessary to shift the gear lever from one slot to the other as fast as possible, without disengaging the clutch. It is sometimes an advantage to slightly release the accelerator pedal before shifting gears, so as to insure that the "autodebrayage" has become disconnected in advance.

Referring to Fig. 1, consider a female cone M secured to the driving shaft, which is adapted to engage a male cone C, this latter forming a nut screwing over a slow-pitch thread cut on the driven shaft (in this case the primary shaft of the transmission). Suppose that the whole assembly is turning in the direction indicated by the arrows and that the screw is a right-handed one,

as shown; then, if the driven shaft really opposes considerable resistance to the motion, the combination of the male and female cones forms a solid block which tends to move in the direction from y to x. But both the driving and the driven shaft are held against endwise motion; the only piece which can move in an axial direction is the male cone C, and the latter is forced into the female cone with a force proportional to the resistance to motion of the driven shaft.

Now suppose the rôle of the two shafts reversed, that the driver becomes the driven shaft and vice versa. This occurs when the car is under way and the accelerator pedal is then released. The shaft R then tends to run ahead of the flywheel M, and, contrary to what occurred in the previous case, the flywheel and cone assembly then tend to move in the direction from x to y. The

flywheel being fixed against endwise motion, only the cone is displaced toward y, and uncoupling of the engine takes place. The flywheel is then free with respect to the cone and of the driven shaft which is integral with the latter, this state of affairs continuing as long as R turns faster than M in the direction of the arrows.

With such a device it would ordinarily be impossible to make use of the engine for braking purposes in descending long hills. This objection is met by the argument that the four-wheel braking system is coming into use, and with brakes on all four wheels there is no danger of the friction bands being injured by overheating on long downgrades. Attention is also called to the great waste of fuel due to descending hills on the engine. However, the inventors of the device have evolved an arrangement by which the automatic uncoupler comes into action only on the two higher gear combinations, so that it is still possible to use the engine as a brake on the low gear.

## Operative on Higher Gears Only

When it is desired that the "auto-declutcher" shall operate only on the high and intermediate speeds it is located inside the intermediate speed gear on the sliding or splined shaft instead of between the clutch and the primary shaft of the transmission. In that case, when the low-speed gear is in use, the power does not pass through the intermediate-speed gear and the auto-declutcher is then non-effective.

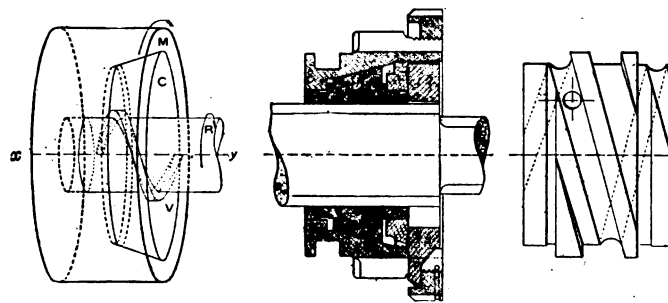


Fig. 1—(Left)—Diagram of automatic declutcher. Fig. 2—(Center)—Automatic declutcher located inside intermediate speed sliding gear. Fig. 3—(Right)—Out-side view of threaded sleeve

# Standardizing Differential Gears

Committee of American Gear Manufacturers' Association working to bring about similarity in design to permit interchanging of differentials of different makes. Committee also studying methods of gear improvement.

**I**N the past the suggestion that differential gears be standardized has repeatedly been made in these columns, and it seems that now something is going to be done along this line, as the American Gear Manufacturers' Association Standards Committee has appointed a sub-committee on differential gears. The bevel type of differential gear, which has now been used in automobile construction without important change for more than twenty years, and which at the present time is used on probably more than 90 per cent of all the cars turned out, lends itself well to the standardization of a few of its important dimensions, so that differentials of the same capacity rating but of different make are interchangeable on the same car. There are now a number of firms specializing in the manufacture of differentials, and if the dimensions referred to were standardized and the standards were given wide publicity, designers of cars, trucks and tractors would not bother about designing special differentials but would adopt a design conforming to the accepted standard, which not only would save the differential manufacturers much unnecessary outlay for patterns, dies and fixtures, but would redound to the advantage of the whole industry.

At the recent meeting of the A. G. M. A. a preliminary report of the new subcommittee on differentials was received, which contained a program of the proposed work of the committee, together with comments on the different topics, and furnished an interesting outline of the problems confronting the manufacturers of differentials. The report is due to S. O. White of the Warner Gear Co.

It is the intention of the committee to standardize the internal parts of differential gears so that these parts from different factories are interchangeable. As far as the work of the committee is concerned, the driving bevel gear is included within the scope of its activities. The form of this gear is, of course, largely determined by the diameter and lateral location of the flange on the differential housing to which it is fastened. Attention is called in the report to the importance of choosing the proper section for these gears, as some sections do not distort as much as others under heat-treatment.

The subject of close-fitting inside gears and pinions demands investigation, as it is bound up with the backlash and noise of the axle. The buying public has become very meticulous with regard to noises in the transmission, and any knocking or clicking noises, even at the lowest car speeds on direct drive, are strongly objected to. This means that every bit of play or lost motion from the motor clear back to the rear wheels must be done away with if at all possible. The driving bevels, which are constantly in operation, must of necessity have a certain amount of backlash for smooth running, but it has been found that the inside gears of the differential, which operate only occasionally, can be fitted up tight.

It is the purpose of this committee to gather from all members manufacturing differential gears data of unsuccessful or troublesome designs for guidance in future work. Much of the trouble with differential gears at pres-

ent is due to improper mountings, and it is the purpose of the committee to recommend properly designed mountings adequate for the load to be carried. Trouble has been especially prevalent on axles with spiral bevel gear drive, as many designers have attempted to use substantially the same mountings as they formerly used with straight bevel gears. With the spiral bevel gears the end thrust loads are greatly increased, and unless allowance is made for this in the mounting the mesh and alignment of the gear and pinion are apt to be disturbed. As a general thing, lightness is desirable in a rear axle for a number of reasons, but it is very easy to overshoot the mark in this direction. This will inevitably lead to dissatisfaction of the owner, and it is far better to err on the side of too much weight.

Excessive end thrust loads, or inadequate provision for them, being one of the causes of trouble with differential gears, the factors affecting end thrust are to be investigated. As regards thrust on the pinion shaft, this is in part due to the sliding joint on the propeller shaft, and is affected also by the method of springing or hanging the axle. Naturally, the nearer to the straight line drive the car approaches, the less will be the thrust due to the slip joint. Bearing loads depend to a certain extent on the adjustment of the gears, and easily accessible adjusting means should be provided on each axle. It has been proved that a bevel and pinion which will run quietly when transmitting the load for which they were designed, will operate noisily when crowded on the end of the pinion shaft. In traveling over uneven roads it is impossible to completely prevent this crowding action, but the bearings and mounting should be sufficiently strong to take care of it, and the outside connections should be so arranged as to minimize this action.

Occasionally, in conjunction with the Hotchkiss drive, fabric universal joints are used without any slip joint in the line, and unless this design is very carefully laid out so that the drive is very nearly in a straight line when under normal load, there is apt to be excessive end thrust on the pinion shaft.

Improper lubricants are often used in rear axles. Some owners seem to think that any old grease will serve the purpose, and generally the more noisy the axle the heavier the grease that is put in. The best results from the standpoint of lubrication are obtained with a lubricant that is comparatively fluid, but unfortunately some axles are so designed that a lubricant of this kind will run out onto the brake drums. Axles should be so designed that a fluid lubricant will not run out. As regards the lubrication of the parts of the differential itself, it is believed that a good purpose would be served by formulating standard practices as to oil holes, oil grooves and channels.

In the inspection of differential gears one of the most difficult things is to make an accurate determination of the noise of operation of the gears, that is, the driving gears located on the differential. It is the hope of the committee that a sound recording device will be worked out that will be simple enough for ordinary shop use.

# A Remedy for Spring Breakage

Majority of spring failures are clean breaks of the top leaf. The cause of this is probably because this part takes the driving and braking forces in addition to carrying the load. A thin top leaf has proven more efficient than those made the same thickness as the other leaves.

By Frederick Franz

**T**HERE are only a few structural combinations in engineering which can be made stronger by decreasing their size, but the top or main leaf of a Hotchkiss drive spring, puts these springs in this category.

The failure of springs in service is due to a break in the eye, in the top leaf, in the bottom leaf or in an intermediate leaf. Men who made repairs on army trucks used in the war have declared they have had the upper leaf of the spring doubled over on itself without breaking. But the overwhelming majority of Hotchkiss spring failures which came under my observation were clean breaks of the upper leaf just outside of the spring cap and on the driving half of the spring, that is, the half opposite the shackle end. Upon inquiry the manager of one of New York's largest spring repair shops told me that almost all Hotchkiss drive springs brought to him for repairs had the top leaf broken.

Why does the top leaf break? Because it takes the driving and braking forces in addition to carrying the load.

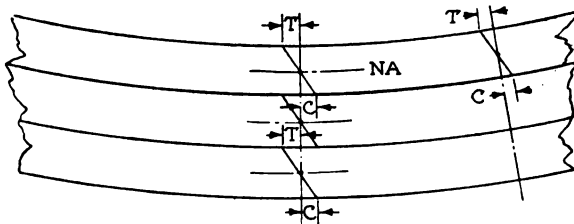


Fig. 1

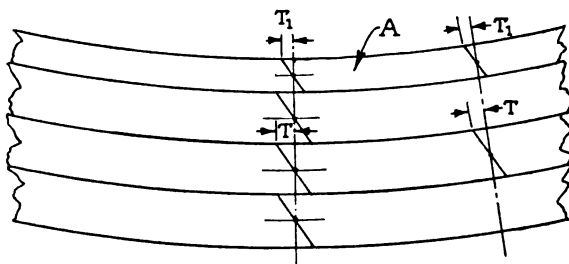


Fig. 2

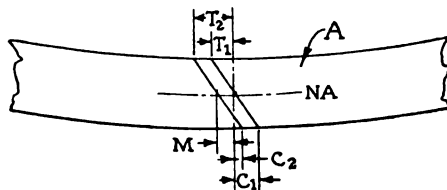


Fig. 3

Fig. 1—Stress in spring under simple vertical load. Fig. 2—The thin top leaf in its relation to the other leaves. Fig. 3—An enlarged view of the thin top leaf

How natural, then, to say, make it a gage number thicker to resist the extra stress. But since, under simple vertical loading, all leaves have the same curvature (all being in contact throughout their length), the thick top leaf already has a greater maximum fiber stress than the thin remaining leaves, so that when the compression due to starting or the tension due to braking is thrown upon it, the maximum fiber stress is further increased, resulting in a rupture. We will consider this in detail later.

Spring makers did not recognize this phenomenon, but knew that the breakage was due to the driving and braking forces, so they hit upon the method of "cambering" the leaves which put initial stress in the spring, in such a way as to favor the top leaf, which was kept thick. Cambering consists of forging the individual leaves so that the upper leaves are not curved as much as the lower leaves, which has the effect, when the leaves are clamped together by means of the clips, of putting "negative" stress in the upper leaves but "positive" stress in the lower leaves with no stress in a leaf somewhere near the center. The amount of camber is determined by judgment. If too great, the bottom leaf breaks; if too small the top leaf breaks. The initial stress lowers its capacity for carrying a load. The scheme is a combination of so many variable and illogical factors that any different results cannot be expected.

## The Remedy

The remedy is to make the top leaf thinner than the rest and omit the camber, coming back to first principles. Under simple vertical load, then, the maximum fiber stress in the upper leaf is less than that in the other leaves, leaving a margin for the additional stresses which are applied when starting and stopping the vehicle.

The practice of a thick upper leaf is so universally accepted that a prominent Chicago spring maker almost refused to supply me with springs for an electric truck I designed having the top leaf thinner than the remaining leaves calling my attention to the "unusual procedure" and stating he "felt sure that it is advisable to make the main leaf somewhat heavier stock than the other leaves." The first set of springs designed on the new principle has now been in operation almost a year under heavy service and shows no signs of breaking. Springs of the old design with thick upper leaves broke in exactly the same service about once every two months.

## Qualitative Analysis

The stresses in a spring under simple vertical load are shown in Fig. 1, the arrows showing the direction of the bending moment acting on the spring. The sloping line shows the variation of stress in each leaf, from the maximum stress in tension  $T$ , to no stress at the neutral axis  $NA$ , and to the maximum stress in compression  $C$ . In a properly graduated spring, with all leaves of equal thick-

ness, the maximum stresses are equal in all leaves and at all points in the same leaf as  $T$  and  $C$ . The slope of the line showing the variation of stress depends upon the amount that the spring is deflected, but not upon the thickness of the leaf. See any text-book on Strength of Materials. Therefore, a thin leaf, on top of these leaves, as  $A$  in Fig. 2, has a maximum fiber stress of only  $T_1$  as compared with  $T$  for the remaining leaves (this diagram is exaggerated to show the difference—in practice the top leaf is only a few gage numbers thinner).

Fig. 3 shows the enlarged view of leaf  $A$ . If the leaf is under bending stress as shown, and a tensile pull is placed on the leaf in addition, the maximum fiber tensile stress will increase from  $T_1$  to  $T_2$ , the stress at the previous neutral axis will increase from zero to  $M$  and the maximum fiber compressive stress will decrease from  $C_1$  to  $C_2$ . For the correct spring  $T_2$  should not be greater than  $T$ , Fig. 2.  $M$  is equal to  $T_2 - T_1$ , and is the margin that must be allowed for the driving stresses.

#### How to Calculate the Thickness of the Upper Leaf

The thickness and number of leaves should first be determined on a basis of all leaves having the same thickness, under maximum load on vehicle and maximum torque on wheels. The forward thrust for propelling and the retarding force due to braking should then be determined and divided by the sectional area of one leaf to obtain the unit stress, assuming uniform distribution of stress. This is the margin  $M$ , Fig. 3, which, if subtracted from the maximum safe stress  $T_2$ , will give us the maximum stress  $T_1$  to which the upper leaf may be subjected under simple

vertical load. Knowing the rate at which the fiber stress increases from zero at the neutral axis to  $T$  at the surface of the leaf a thickness can be chosen on the sloped line at which the stress will be  $T_1$ . This is the thickness of the upper leaf.

For example, if the thickness of the leaves, all being uniform, calculates to .3125 in., No. 0 gage, and the width to 2 in. with a maximum allowable fiber stress of 75,000 lb. per sq. in., and the maximum thrust on each spring is 2000 lb., the sectional area of the leaf, .3125 in. x 2 in., or .625 sq. in., divided into the 2000 lb. gives 3200 lb. per sq. in., the margin for thrust. The stress in the upper leaf due to vertical load should then be 75,000 — 3200 or 72,800 lb. per sq. in. The thickness of it would be  $(72,800 \div 75,000) \times .3125 = .3033$ . The nearest thinner standard size is No. 1 gage, .281 in. thick.

In designing Hotchkiss springs on this new principle I have made the first leaf under the top leaf the same length as the top leaf, to avoid overhang of the thinner top leaf at its ends. The advantages of springs which are flat under normal loads are now fully recognized, and this type is being incorporated in new designs, but since it has a reverse bend under maximum load, care must be exercised not to make the top leaf too thin in order that crippling or buckling of the top leaf under compression thrust may be avoided.

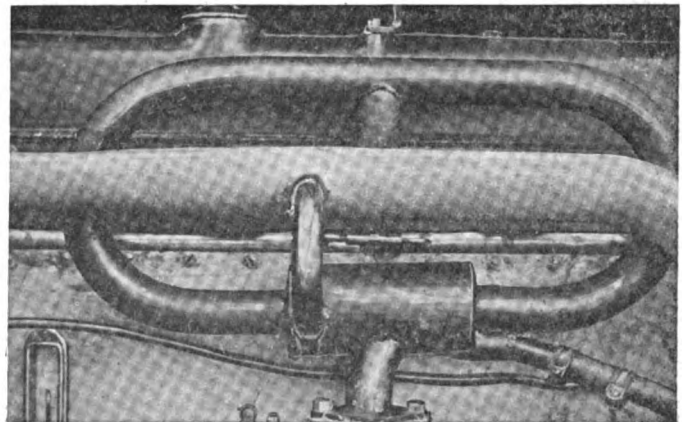
This principle is given to the automotive industry to help eliminate the great annual waste due to spring breakages, not only in new designs, but in repairs also, and to suggest a new line of thought and action for still further improvements.

## A Uniflow Manifold

**A**N interesting form of intake manifold is under development by the Brookins Mfg. Co., Inc. This manifold is designated as a uniflow type because the gases are continually circulating in one direction. This circulation is induced by the velocity head of the intake gas, the advantage claimed being the elimination of surge.

The manifold is intended to eliminate pulsation and condensation within the intake passages and to help prevent crankcase dilution without the application of excess heat. It is claimed that this type of manifold, which keeps the intake gases in continual circulation, eliminates irregular running at various throttle openings when accelerating.

The sketch herewith, Fig. 1, is a diagrammatic representation of the intake manifold. As will be noted, the gases are led past the cylinder ports and around back into the manifold again through a venturi formed in the outlet end of the intake passage. This outlet end



Experimental installation of uniflow manifold on Marmon car

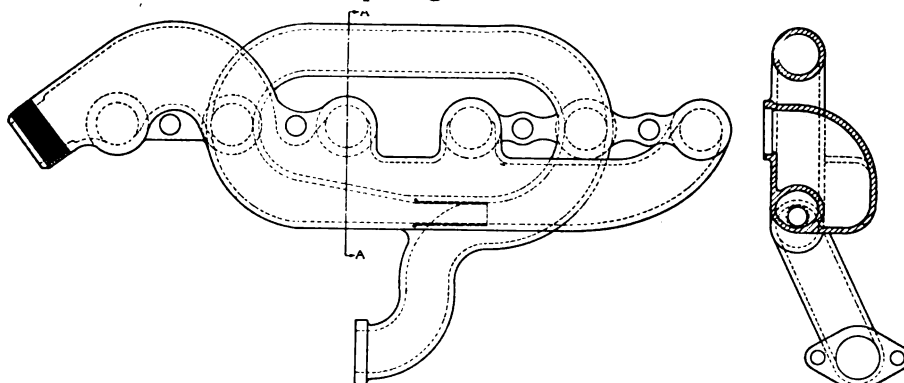


Diagram of principle of Uniflow manifold being developed by the Brookins Mfg. Co.

is led directly into the center of the stream at the intake end of the inlet.

This manifold has been tried out extensively on racing cars on the Pacific Coast and is also being used in experimental work at the present time at McCook field. In a test made on the manifold by the General Motors Laboratory, a 1-in. uniflow manifold was used in comparison with a 1 3/16-in. conventional type on a Northway light-six engine. No heat was applied to either manifolds. The material increase in economy obtained was due, it is claimed, to better distribution.

# Automobile's Influence on Machine Tool Industry

Old shop methods discarded to make way for machinery of the most modern type that is demanded in the up-to-date automobile factory. The demand for speed in production has brought out numerous machines equipped with mechanical speed-change heads and multiple cutting tools

By F. K. Hendrickson\*

**D**URING the years 1910 to 1913 the automobile industry began to exert a great deal of pressure on machine-tool manufacture and design, and about this time several concerns found it necessary to make extensive and very expensive changes in their systems of production to meet the rapidly increasing demand for cars. To arrive at the best conclusions and in order to secure the most modern installations, they invited many of the best engineers and machine-tool manufacturers in the country into conference with them. Each individual piece was considered separately and at times in the presence of two or more representatives from different firms, with the result that highly specialized machines were rapidly developed.

A brief study of the developments in machine-tool building attributable to the demands of the automotive industry, therefore, seems desirable at this time, taking up in their order the following elements which go to make a successful machine: (1) Materials and their proper distribution; (2) precision and specialization; (3) power; (4) manipulation; (5) speed; (6) lubrication; (7) safety devices.

## Materials

Every mechanic is fully aware of the extremely rigid construction which has been demanded, due to the ever-increasing strains to which machines are subjected. In addition to the extra weight thus entailed, materials of high tensile and torsional capacity have been substituted. A few examples will suffice to indicate the trend.

Lathe spindles originally 30- to 40-point carbon steel are now made of 15- to 20-point steel, being carbonized and hardened to produce glass-hard surfaces. The diameters also have been greatly increased.

Lathe centers formerly quite small, unhardened and of low-grade tool steel are considerably increased in size and hardened at the point on both head and tail stocks.

High-speed cutting tools generally supported in special rigid holders are replacing almost entirely carbon-steel lathe and planer tools, twist drills, reamers, milling cutters, taps and dies.

Babbitted journals or bearings are rapidly being replaced by the best-quality bronze metals, and the tendency is toward the application of ball bearings. Certain types of machines have already been forced to incorporate them on their main spindles and with success, which indicates that the same conditions will ultimately obtain in other machines.

Cast-iron gears for speed and feed changes have been discarded in favor of the hardened steel gears, except in a few machines where the speed changes are accomplished by the engagement of friction clutches, thereby permitting the gears themselves to remain constantly

in mesh their full depth and width of tooth, and eliminating the shock that otherwise results.

Clash gears, either of the sliding or tumbler type, have proved absolute failures when made of cast iron or soft steel, but are satisfactory when made of the proper steel and subjected to suitable heat treatment.

In addition to producing gears of wear-resisting qualities, it has also been necessary to develop their efficiency and to produce much quieter running. To accomplish these conditions, several machines are to-day equipped with helical or herringbone gears to produce smooth action and silent running under high speed and strain. New forms of spur gears are also being developed which are claimed to successfully meet the requirements.

## Precision and Specialization

Grinding machines have been brought to a high state of perfection and produce a truer and finer quality of work on all revolving and sliding parts much more rapidly than ever before. Closer limits and tolerances have been demanded, with the result that the one-time all-around mechanic has been replaced by the present specialized expert in order to obtain the highest grade of precision in quantity.

## Power

Along with the added strength and rigidity of the machines must necessarily be considered their power. The automotive industry has accomplished much in the direction of insisting that the drive shall be either of the geared or silent-chain type to prevent slippage, usually prevalent when machines are belt-driven. The

\*A paper read before the American Society of Mechanical Engineers.



individual motor installation has also come into common use, and at the same time the horsepower of the motor has been increased sufficiently to care for the extreme loads.

For example, a few years ago a 14-in. geared-head lathe was equipped with a  $\frac{3}{4}$ -hp. motor, while to-day the machine must be provided with a motor of 2 hp. at least and preferably 3 hp. This proportion may not be general for all classes of machines, but is a fair criterion of the present condition.

### Manipulation

One of the very essential features demanded in present-day machines by the automotive industry is easy manipulation and the convenient location of the operating levers, handwheels and cranks. Speed- and feed-changing mechanisms must be located within easy reach of the operator and must not cause him any undue exertion or unnecessary delay.

Where there is a sufficient quantity of pieces and the parts lend themselves to magazine or hopper feed, these must be included in order to assist in the handling of work. If the parts are heavy or bulky, mechanical or electrical handling devices must be provided in order to secure high production.

### Speed

Several years ago speed bosses were practically unknown, but with the advent of the automobile era has come this type of functional foreman and with him a demand for readily obtaining in a given machine the proper speed and feed for the work. To meet this ever-increasing demand machine-tool manufacturers have in general incorporated mechanical speed-change heads and quick-change gear boxes for feed variations in their machines. Motors of the variable-speed type are used when mechanical changes are not available.

It is interesting, however, to note certain specific conditions which, although contrary to the general demands, have worked out in the most gratifying manner. During 1912 and 1913, in a well-established automobile plant in Detroit, the production of transmission parts was receiving the most careful consideration as to the best method to adopt to materially increase their already heavy production. It was finally decided to adopt a single-purpose lathe having one speed and one feed, properly calculated to obtain a maximum production for each individual piece.

The Reed-Prentice Co. of Worcester, Mass., placed the first of these single-process automatic lathes into actual operation, and, much to the satisfaction of all concerned, the production was increased from 25 to 50 per cent. Additional machines of the same type were then installed in larger batteries and in each case the production was increased proportionately.

The theory of establishing a single speed and single feed was to eliminate the judgment of the operator and to predetermine the day's output. If this was not obtained the cause was readily detected and almost as readily remedied.

In the machine referred to certain features were introduced which permitted the increase in production. The spindles were much shorter than in a standard lathe, while the bearings and journals themselves were longer than ordinary and much larger in diameter, with the journal bearings of the spindle carbonized, producing glass-hard surfaces.

The driving gears were extremely wide and of the herringbone type to permit smooth action under high speed without any perceptible vibration. The rack and pinion were hardened, as it was discovered that under

actual production conditions the severe strains to which these parts were submitted finally bent the teeth very perceptibly and caused them to wear out rapidly.

The hand-wheel type of tail-stock was replaced by a cam attachment for quick approach and withdrawal of the spindle, permitting a travel of from 1 to 3 in., according to the requirements of the work.

In order to obtain the squaring of the shoulders during the actual process of turning, a back-arm attachment was incorporated, actuated by the travel of the carriage, so that when the longitudinal turning was completed the shoulders were simultaneously finished, thus producing the squaring operation at practically no additional cost. This, however, was not an absolutely new feature, having been previously employed.

To further assist in speeding up production multiple tools are used, and when the pieces are in sufficient quantity and adapt themselves to multiple operations, single-purpose machines of special design are brought out.

A very simple but most efficient method for securing quantity production is to use several arbors, some for loading while the others are working. Also, when applicable, a punch press is used for an arbor press, simultaneously loading one arbor and unloading another, this, of course, being used only where a battery of machines are operating on the same kind of work and call for a number of arbors of the same size, and where a conveyor is used to carry the work from the press to the lathes and return.

Air cylinders and quick-action, mechanically operated chucking or gripping devices are used wherever possible. Magnetic chucks and plates are also in extensive operation.

### Lubrication

The seriousness of having 25 to 100 separate oil holes spread out promiscuously all over a machine is beginning to be realized. The neglect of any one oil hole invariably causes a hold-up of production and may mean the entire dismantling of the machine. Therefore, it becomes obvious that to control the lubrication from one point is decidedly advantageous. This is accomplished either by supplying a reservoir having gravity feed, by gear pumps delivering lubrication to the various bearings, by the use of the splash system or by use of force-feed oilers. In fact, there are several methods, all of which are worthy of consideration.

### Safety Devices

The working forces of automobile factories comprise many who never saw a machine tool prior to their employment, and it is this class of help that has made it necessary to safeguard every moving part of a machine to prevent them from getting injured. Years ago gears were left exposed and shafts allowed to run in the open, but the machines of to-day must include guards over every part that is in the least dangerous. Projecting shafts must be guarded, and where it is impossible to supply guards as part of the machine, rails or nettings must be secured around the machine to prevent any possibility of injury.

A SWISS correspondent states that the advanced Swiss import tariff cannot be continued, as its effect is already causing consternation among Swiss traders, who are in fear of retaliatory measures from which the country would stand to lose far more than any hoped for gain. Automobiles would be very badly hit by the new tariff. A revised schedule is expected to be issued very soon. The new rates only came into operation in July last.

# Present Status of the Farm as Motor Truck Market

United States Department of Agriculture survey shows that 95 per cent of eastern farmers, on various types of farms, consider their truck investments profitable. The time saving element and ability to get to better markets are greatest advantages, while poor roads present a drawback.

**T**HE farm as a market for motor trucks has long been recognized. Many farmers, almost as soon as other industries adopted motor transportation for commercial work, purchased trucks, although it has only been in recent years that their use has been anything like general. There is still a large market among the farmers, especially in districts where road improvement is well developed. It is true that a great many men in the agricultural districts have refrained from purchasing trucks because the highways in their section were such as to prohibit motor traffic during a considerable period of each year. On the other hand, some farmers, unwilling to take the initiative, have waited to see whether or not the truck would prove valuable for farm purposes, even though they were blessed with good roads.

The United States Department of Agriculture recently conducted a survey among farmers in the New England and Middle Atlantic states to obtain information as to whether or not the use of trucks on farms in those sections is satisfactory. While the purpose of the survey was to enable the farmer to benefit by the experiences of others, the data obtained will prove valuable to the manufacturer in marketing his product in agricultural communities. At the outset it is interesting to note that 95 per cent of the farmers replying said their trucks bade fair to be profitable investments. The greatest disadvantage of the truck on the farm was given as poor roads by 59 per cent of the farmers. The size of trucks most prevalent in the rural sections is also of major importance to the manufacturer. Over half of the total number accounted for in the survey are of the one-ton size, while only about 2 per cent are rated at more than two tons. The sizes range from one-half ton to five tons.

## Types of Farms

There were 753 answers received to the questionnaire, divided by states as follows: New York, 241; Pennsylvania, 235; New Jersey, 92; Massachusetts, 63; Maryland, 40, and lesser numbers in the states of Maine, New Hampshire, Vermont, Rhode Island, Connecticut and Delaware.

The following table shows the division of these trucks among the various kinds of farms and the average distances of each kind from the market:

Kind of Farm	Average Size	Number of Trucks	Distance from Market
Truck .....	64 acres	149	12 miles
Dairy .....	234 acres	129	6 miles
Fruit .....	111 acres	113	11 miles
Crop .....	237 acres	48	8 miles
General .....	210 acres	314	11 miles

Crop farms in the above table indicate that only general crops are raised, and there is no dairying or live stock. General farms are those on which there is no predominant enterprise, but on which all have a part. The fact that there are more trucks used on this latter class does not indicate that the percentage of such farmers who own motor trucks is larger than that of men who follow special types of farming, but that in this region there are more general farms than any other type. It will be seen that practically every phase of the farming industry is covered in this questionnaire, and the fact that most of the farmers considered their trucks a profitable investment suggests the conclusion that motor trucks are practical on nearly all farms in territories supporting passable highways for a reasonable period in each year. Of the few farmers who found trucks unprofitable most of them were those who said their machines were unreliable, out of order when needed, or expensive to keep in repair. A few said they did not have enough work to justify investment in such an expensive piece of equipment.

## Advantages Set Forth

Just why the farmer finds his truck valuable was shown in the answers to the question, "What have you found to be the principal advantage of a truck for farm work?" The answers were divided as follows:

Saving time, 92 per cent.  
 Saving horses, 3 per cent.  
 Better markets, 2 per cent.  
 Convenience, 2 per cent.  
 Reduction of expense, 1 per cent.

The time-saving element, it will be seen, is the most important one to the farmers, but it should be borne in mind that this element combines practically all of the other four reasons, or at least has a direct bearing upon them. Certainly, better markets should play an important part in the farmers' economic scheme of things, and it does. The motor truck has played an important part in securing better markets, for while the replies do not place this item at the top of the list, nearly one-fourth of the total are now selling at better markets than they did before. The farmer who lives four miles from a poor market and 15 miles from a better one can ill afford to spend the time driving horses to the one 15 miles away for the sake of a comparatively small difference in the price he receives for his goods. But with the motor truck at his disposal the difference in time consumed is small, and the better market is available. Thus, time plays an important part in the life of the farmer, as with any other enterprising individual. It enters into convenience and saving of expense. Those preferring the truck because it saves horses are to be commended

for their humane attitude and, at the same time, sensible one, for under ordinary conditions the horses can be put to some other task while the truck is doing the road work.

### Some Disadvantages

As to the disadvantages of the truck for agricultural purposes, as was stated before, poor roads head the list. There were a few who said they were unable to get competent drivers, and about one man in 35 said troubles due to mechanical defects presented the principal drawback. Other reasons, with the percentage of those replying declaring them to be the greatest disadvantages, were as follows:

Cost of operation, 17 per cent.

First cost, 5 per cent.

Inability to operate on soft ground, 9 per cent.

The question of poor roads is a serious one to the farmer who buys a motor truck. Even those who live on the best roads face certain periods of the year when their trucks must stand idle. Snow is one of the principal obstacles, while the farmer whose land is on certain types of road is more seriously handicapped in that heavy rains, spring thaws and other elements enter into his transportation problem. Consequently practically every farmer is forced to keep horses to supplement the truck when the roads are in poor condition. However, there remains the fact that at periods of the year when the roads are bad the horses are seldom needed for work in the field, and unless used for road work they would be standing idle.

In discussing the question of roads it was important to learn just what sort of highways the farmers who replied to the questionnaire were using. The survey showed that 29 per cent of the trucks travel usually on dirt roads only, 46 per cent on roads that are part dirt and part improved, and 25 per cent on roads which are wholly improved. On the average there were 10.7 weeks during the year when the trucks which travel only on dirt roads could not be used, 7.8 weeks when those which travel partly on dirt roads and partly on improved roads could not be used, 3.5 weeks when those which travel solely on improved roads could not be used.

In all, less than 25 per cent of the men found it possible to use their trucks every week in the year, and between 35 and 40 per cent reported that there were more than eight weeks during the year when they could not use their trucks. About one-half of the men with wholly improved roads stated that they could use their trucks any time during the year, but only 9 per cent of those with all dirt roads were able to do so, and there were more than eight weeks during the year when 55 per cent of these men with all dirt roads were unable to use their trucks.

As to cost of operation, the questionnaire showed that the costs varied from an average of 8 cents a mile for the one-half-ton truck to 20 cents a mile for the two-ton machine. Whether or not this cost is overbalanced by the saving in time, convenience and other advantages must be determined by the farmer himself to his own satisfaction. It is quite probable, however, that, although 5 per cent of the farmers consider this the greatest disadvantage, the same 5 per cent are included in those who consider time-saving the greatest advantage.

The first cost of the truck, in most cases, represents to the farmer an investment in added equipment. Few, especially those who have only from two to four horses, are able to sell their animals in order to replace them with a truck. On large farms, where horses are kept for road work only, this might be practical, but it would

be only in isolated cases. The costs of the trucks in the districts investigated varied from under \$1,000 to over \$3,000. This means that the farmer must be shown that his investment will yield a profit through the advantages set forth.

A majority of farmer truck owners still use horses for hauling in the fields and around their farm buildings. Many stated that they did not consider the truck practical for such work, but only a small percentage considered this the greatest disadvantage. When it is remembered that the smaller trucks predominate in these sections, it will be seen that they are not capable of hauling the loads that are sometimes necessary around the farm. Many others stated they did not use the truck for this work because they saw no particular advantage in doing so. The principal time consumed in hauling about the farm is in loading and unloading, and the percentage of the total time saved by the use of the truck for such work would be small compared with the time saved in road hauling.

### Hauling in the Fields

At the same time many reported that they used the truck to some extent for such work. It was shown in some instances that trucks would save time on hauls of 150 rods or more if the body was suitable for the material to be hauled, and no difficulty was experienced in obtaining traction over the fields. Figures were compiled showing that the men who do use their trucks for farm work hauled only an average of 45 tons of crops and 37 tons of fertilizer per year with them, while the average amount of crops hauled to market per year totaled 119 tons, and the average amount of fertilizer hauled on the road is 55 tons a year.

There are various other elements to be considered in selling trucks to the farmer. While time-saving in road hauls is an important factor, the farmer will want to know whether or not he can haul as much with the small truck, that apparently has proved itself the most practical, as he could with horses and wagon. The average load hauled with horses is about 1500 lb. The average load hauled with a one-half-ton truck is about 950 lb., while with trucks of from one to one and a half tons it is about equal to the average horse load. The average load of crops with two-ton trucks is 4950 lb., or about 10 per cent greater than the one hauled with horses.

There is, of course, the question of the two-way haul, but the survey developed that a comparatively small percentage of trips made to market returned with a full load.

It will be seen from these facts that the farmer truck owner is not at all bashful about pointing out the disadvantages of the motor truck in his particular business, but neither is he reluctant to give the good points. The fact that 95 per cent of the answers to the Department of Agriculture survey stated trucks were a profitable investment, even under present conditions, shows the farm offers a great potential market, especially for trucks of two tons and under.

A VERY thorough investigation is under way in the Metallurgical Division, Bureau of Standards, dealing with the microchanges which occur during the tempering of hardened steels. Some idea of the work involved in this investigation may be gained when it is remembered that it is necessary to take hardness measurements and make microscopic examination of all the specimens of each type of steel for each tempering treatment. Over 800 specimens are involved in the investigation and the time necessary for the mere polishing for examination is very considerable.

## Exports of Automobiles and Tires for September, 1921

COUNTRIES	COMMERCIAL				PASSENGER				Parts	TIRES			All other Tires
	Complete Cars		Chassis		Complete Cars		Chassis			Casings	Inner Tubes	Solid Tires	
Europe													
Austria									\$568			\$95	
Azores and Madeira Islands									10,579	\$8,027	\$1,149		\$18
Belgium	30	\$14,225			102	\$55,928	11	\$4,590	182				
Czechoslovakia					4	10,966			101,823	8,984	895	892	
Denmark										4,316			100
Estonia					1	2,000			443				
Finland					13	18,177			18,022	12,604	328		
France	2	874							700	442	97		
Germany					1	1,200			605				
Gibraltar					2	1,808			4,102	3,478	83		
Greece	1	1,770							1,130	982	36		
Iceland and Faroe Islands									1,389	52			
Italy					2	5,580			525				
Jugoslavia, Albania, etc.					1	1,000				988			
Malta, etc., Islands					3	3,000			9,842	10,948	839		1,646
Netherlands	16	11,983	2	\$3,500	16	5,426			11,043	26,489	1,572	2,741	
Norway					9	9,500			2,812	12,303	1,987	248	
Poland and Danzig					1	1,800			4,488	920	59		
Portugal					2	2,150			420		176	750	
Roumania					1	1,250			12,741	8,095	851	191	1,952
Spain					3	3,616			24,282	41,252	1,736	430	462
Sweden	5	7,500			26	28,164			1,794	549	72		575
Switzerland					10	13,136			633				
Turkey in Europe													
Ukraine	1	600							701,131	299,990	48,201	15,847	469
England	14	30,704	40	48,967	15	20,441			493				
Scotland									8,750				
Ireland					4	1,250							
North and South America													
British Honduras									45	375	5	30	
Canada	63	64,520	32	52,480	337	377,234	2	1,531	677,544	23,947	2,814	9,329	626
Costa Rica	2	2,423							962	317		15	
Guatemala					5	5,560			2,989	6,313	633		300
Honduras					4	1,871			4,980	2,543	354	142	
Nicaragua									67	64	135		
Panama	6	12,330			25	24,071			6,097	9,839	686	1,518	1,776
Salvador									1,392	2,373	49	1,390	
Mexico	45	35,144	27	15,887	441	376,852	66	21,293	92,495	79,152	7,152	2,572	4,239
Newfoundland and Labrador									3,299	463	127	253	67
Barbados					1	745			206				
Jamaica	5	2,953			15	9,731			4,647	2,090	742	1,985	8
Trinidad and Tobago	10	4,371	1	1,200	9	7,790	3	3,350	6,387	9,613	697	2,463	
Other British West Indies					6	2,123			2,343	792	74		425
Cuba	16	7,056			87	69,495			29,498	74,800	7,806	17,901	1,029
Virgin Islands of U. S.					1	491			409	579	287	760	
Dutch West Indies					5	2,192			6,064	1,325	173		
French West Indies									811	892		137	
Haiti					1	441			2,520	4,742	540		81
Dominican Republic					2	2,200			3,517	9,415	726	225	129
Argentina					4	10,698			479,450	55,223	1,602	5,040	
Brazil			2	2,200	1	1,200			14,766	27,806	127	893	
Chile					1	2,000			3,291	2,550	393		
Colombia					10	8,133			4,585	2,033	361		166
Ecuador			1	2,138					4,161	1,115	290	487	
British Guiana									2,031	1,667	296	937	
Dutch Guiana					3	1,492			1,119		131		530
Peru					1	580			15,139	5,162	180	3,113	
Uruguay									5,686	9,979	12		
Venezuela					7	3,897			7,681	9,563	1,329		
Asia													
Aden									107				346
China	4	8,283	1	3,000	14	13,366	8	8,946	6,855	10,556	1,169	19	
Kwantung	1	2,503							121				
Chosen									5,447	2,386	698		
British India					55	63,960	1	200	11,516	2,030	169	5,147	
Straits Settlements									2,135	5,784	411	8,779	
Other British East Indies									608				
Dutch East Indies	3	5,055	9	36,000	42	65,523			37,783	31,545	3,718	1,408	
French Indo China									765				
Greece in Asia					2	3,140			85	539		47	
Hejaz, Arabia, etc.					20	9,237			167		253		5,576
Hongkong	1	500			4	5,600			160	7,911	13		
Japan			102	55,286	6	8,900	205	94,907	65,610	16,279	1,407	569	686
Palestine and Syria	3	1,435	1	500	143	47,445			6,591	1,896	267		
Persia									5,087				
Russia in Asia													360
Siam					3	2,424			291	49			
Turkey in Asia									60				
Australia	6	9,735	3	4,125	68	74,378	266	239,450	41,550	6,177		817	10
New Zealand			3	8,400	20	21,208	3	3,016	14,954	7,196	671	1,229	
Other British Oceania	1	2,168							1,120	266	58	145	
French Oceania					3	2,833			741	797	58	206	20
Other Oceania									4,103	742			
Philippine Islands	3	12,000	2	2,615	6	7,674			11,872	33,518	1,933	3,820	4,925
Africa													
Belgian Congo									872				
British West Africa									21,055	5,792	393		53
British South Africa			5	5,756	39	50,080	1	468	14,979	11,932	208		
British East Africa					15	15,600			843	1,672	10		
Canary Islands					5	2,338			674	3,134			
French Africa	1	478			1	490			547				
Kamerun, etc.					1	1,800							
Morocco									184	1,000	211		
Portuguese Africa			2	1,030					609				
Egypt					2	1,835			10,697	3,981	32		
Total	239	\$238,610	233	\$243,054	1,631	\$1,493,019	566	\$377,751	\$2,570,960	\$940,333	\$97,528	\$97,523	\$26,574

COUNTRIES	January		February		March		April		May		June		July		August		September	
	No.	Dollars	No.	Dollars	No.	Dollars	No.	Dollars	No.	Dollars	No.	Dollars	No.	Dollars	No.	Dollars	No.	Dollars
Austria.....											13	4,581						
Azores and Madeira Islands.....											1	125						
Belgium.....	36	12,459	44	17,422	42	16,667	137	48,723	38	12,771	26	6,373	84	24,849	11	3,350	18	4,931
Bulgaria.....			2	453														
Czechoslovakia.....	14	4,534					19	6,170										
Denmark.....	250	82,896	16	6,129	163	57,501	54	18,953	59	20,232	12	2,480	11	1,680			1	200
Estonia.....													2	427	3	665	8	2,900
Finland.....	5	1,063			54	19,460	51	21,087			1	250						
France.....	60	18,802	18	3,834	27	7,320	81	25,312			38	7,192	15	3,893			53	12,925
Germany.....			2	575	1	450	1	407			2	618						
Gibraltar.....																		
Greece.....	20	7,003			1	384											1	300
Hungary.....																		
Iceland and Faroe Islands.....																		
Italy.....	85	22,699	202	64,357	32	11,357	41	15,494	34	6,895	24	7,145	11	4,200	12	3,925	36	10,098
Malta, Goso and Cyprus Is.....																		
Netherlands.....	717	242,451	300	100,508	10	3,946	166	57,760	175	58,587	66	17,774	152	42,201	4	1,010	252	62,771
Norway.....	127	45,969	35	11,713	160	55,483	1	350	28	11,079			22	6,799	1	250		
Poland and Danzig.....																	1	271
Portugal.....	7	2,734	3	628	2	908					2	746			3	1,154		
Roumania.....																		
Russia in Europe.....							2	840	1	395	4	1,000						
Spain.....	110	38,876			2	574	4	1,229	6	1,392	2	383			50	13,571	54	15,310
Sweden.....	1,060	354,731	7	1,714	107	32,386	47	9,694	46	9,621	23	5,615	12	2,215	4	1,500	3	815
Switzerland.....	13	5,125			11	4,103	30	11,090	12	5,400	10	4,500	8	2,736				
Turkey in Europe.....																		
England.....	355	118,732	2	713	20	10,516	26	8,365	4	1,154	6	1,225	3	600	5	1,400	7	1,810
Scotland.....	4	1,198																
Ireland.....													1	275	1	50	1	150
Yugoslavia, Albania, etc.....																		
Bermuda.....																		
British Honduras.....																		
Canada.....	45	19,633	20	6,406	122	38,461	113	40,516	76	23,811	28	6,863	17	3,966	17	4,244	68	4,796</



# Promotion by Careful Educational Methods

The man who is made a supervisor or foreman should know more than the factory rules and how to do his work. He must be given a knowledge of the reasons for all such rules and be possessed of power to break them in an emergency. Quality of leadership is often more valuable than skill.

By Harry Tipper

**T**HERE is a general complaint among business men that they are not securing from their organizations enough men of the broad judgment necessary to undertake supervisory work of considerable importance. This lack has become very visible, and the present problems have emphasized it, so that its real importance is being recognized more fully.

In the same way all through industrial establishments the character of the supervisory work varies very greatly and it is evident that the present methods of promotion do not provide a thorough basis for co-ordinated supervisory activities.

In almost all the establishments in the regularly recognized methods of selecting for promotion the main qualities demanded of the supervisor are those related to skill in connection with the work and a knowledge of the processes undertaken in the department.

Recently attempts have been made to provide some records of the qualities which might affect the ability to handle men and keep them working at a maximum speed, but these attempts have not worked the problem out thoroughly, and they have not considered in the least the elements of preparation of an educational character which should be undertaken in order to keep men of supervisory capacity actually prepared for the work.

The man who is working in association with other men at a specific job does not have the opportunity to use the capacities that are called for in a supervisory job, and his idea of the requirements of that job is almost entirely the result of the supervision under which he himself has been working. Lacking any education upon the matter except that which he can secure by his daily experience as a subordinate, the capacity of the man must be very unusual if he is able to step into a supervisory position and secure the fullest results therefrom.

The promotion methods to be employed in the industrial plant should contemplate the selection of the most likely individuals, their preparation, so that the elements of the supervisory job are understood, and their preliminary testing, so that the responsibility is put upon them as they prove their capacity of answering it.

The usual method of promoting in industry has contemplated only the education of the potential supervisor in the rules and regulations of the shop and its practices, the choice because of his skill and the development of himself by virtue of the responsibility that has been thrust upon him. These methods of promotion do not fulfill the requirements thoroughly.

The improvement in efficiency must come from the enlargement of the man's capacity to judge, to co-ordinate and to modify the general requirements to the individual item. It is not sufficient that the supervisor should understand the general system adopted in the factories, the general rules and regulations and the general methods governing the work. It is necessary that he should understand the reasons for these general systems and methods, so that he will be able to use his judgment in connection with them.

The sub-foreman, foreman and the factory supervisor have been very much neglected in the movements of applied education in the past twenty years. Much educational work has been developed in order to enable the subordinate in the office, sales, advertising, accounting and other departments to prepare himself for a position as supervisor, and this education has done a great deal in improving the outlook and developing the potential capacity in such departments. Even this educational work is not entirely adequate, and it still remains, as the dean of an engineering college remarked not long ago, that a student might get almost 100 per cent in many schools without having thought originally about the matter.

All educational work has a tendency to become dogmatic and to cause a reaction like that of the boy who, when his father was helping him with a mathematical problem, remarked, "That can't be right, because it's not done the way the teacher did it."

## Dogmatic Educational Methods

In the factory, with its centralized systems of inspection, its highly subdivided work, its array of rules and regulations, the natural education received by the subordinate is dogmatic in the extreme. Most of it is concerned with saying, "You must do this, and you must do it this way." There is little opportunity for an understanding of the systems and consequently the rules become bigger than the object of the rules.

The subordinate who has felt the lash of the slave-driver foreman and been annoyed by it is quite liable to imitate the same method when he is placed in the same position. It could hardly be otherwise, when his education has been confined to that method of supervision. The same thing is true of the necessities of the supervisory work in any other direction. The foreman and the sub-foreman and all direct supervisors of small groups of employees are the most important elements in the chain of management, as they are constantly associated with the subordinate workers and their methods

of supervision provide practically the whole idea of management as secured by the subordinate.

The supervisor who applies the rule strictly and without exception, regardless of the circumstances, suggests that the company regards the rules as unbreakable and subject to no modification.

The methods of promoting from the subordinate ranks to the supervisory ranks in the first capacity of supervision is of the utmost importance, and yet it has been almost entirely neglected.

### Promotion Methods

The promotion method should cover the following elements:

First, the relative skill of the subordinates in their work.

Secondly, their relative adherence to duty—that is, their attitude to hours, their concentration on the work, and so forth.

Thirdly, their qualities of leadership, either in the shop or out of the shop. These individuals vary greatly in their tendency to lead the gang or a small group. Some of them are constantly leaders in the activities in which the groups of workers engage, and probably their leadership can be discovered in the relaxing hours more usually than in the working hours.

Fourthly, the preparation of the subordinate by an education in the objects, the character and systems of the work, and his relative capacity as indicated by the response to that education.

All records that can be accumulated concerning the previous work of the employee are of value in determining his capacity, but they should be examined more carefully for the qualities they indicate than for the skill suggested, particularly the action of the worker in an emergency, such as the absence of the foreman, the necessity for a change not contemplated by the rules, or some other item depending upon the immediate judgment.

Sufficient notice should be taken of the activities of the workers to permit a record as to their relations and the leadership displayed in their outside activities, both as to the character and the extent of the leadership. This will give an indication of the potential qualities of the subordinates for the work of supervision, their capacity to co-ordinate the efforts of a group and to keep

that group working with reasonable content and efficiency.

The proper type of supervisor will not be secured, however, until the activities include a careful measure of educational work in connection with the job that is being done, the reasons for it and the value of it with particular relation to the systems employed and what they mean.

No man can work as well with things he does not understand as with things of which he is fully aware. Particularly is the supervisor hampered by any lack of understanding. If he must operate under rules that are mysterious and in connection with systems whose purpose is not fully understood, his decisions will be less valuable, his opportunity to co-ordinate will be limited and his ability to lead the group will be very much less.

Some work has been done along these lines in the last two or three years, but it has not become sufficiently general as a part of the industrial practice to enable the management to select from among the employees supervisors of real capacity for these jobs of intimate supervision.

It must be remembered in all cases as to methods of promotion that the potential capacity does not rise to the surface in connection with the job at all times. The limitations of the work do not provide much opportunity for this development, yet the potential capacity of judgment, decision and the ability to leadership may be more important than the skill in connection with the work.

It is particularly necessary to observe the character of the man's thought in its justice. The supervisor must be able to give credit to his workers for their work, encourage the development of improvements in their work and see that the glory and reward are apportioned in connection with the importance of the improvement. No amount of skill or capacity in the work will keep an orderly group in operation unless they believe the justice of the immediate supervisor.

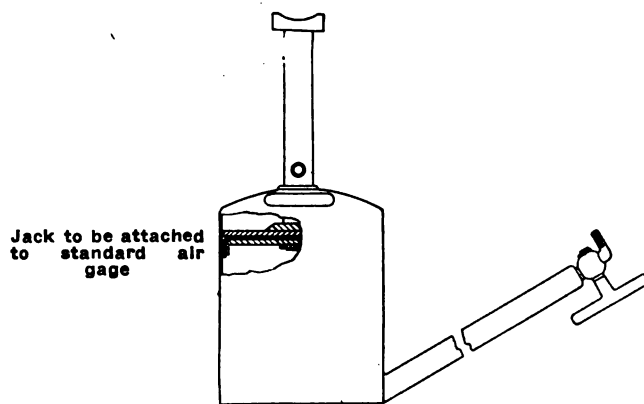
No one system of records or observation will give the entire view of the subordinate's qualities constituting a probable capacity entitling that individual to promotion. The various records and the various activities and actions must be considered together in order that a true picture may be secured of the skill and quality of the man and not merely of his operating capacity.

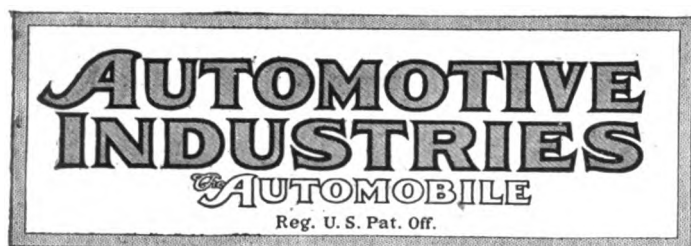
## An Air Operated Jack

**A**N automobile jack operating by compressed air is useful in factories and garages where compressed air is available. The drawing of the jack shown in the accompanying cut does not make it clear which of the two heads of the cylinder is removable, but presumably it is the lower one. An 18-in. hollow handle connects to the cylinder at the bottom and extends up at an angle of about 30 deg. At the end of this handle are located an air cock and a hose connection. The piston is of the leather-cup type.

This jack, which is manufactured by the Avery Engineering Co., is made in two sizes, 6 in. and 8 in. The 6-in. jack has a piston head area of  $28\frac{1}{4}$  sq. in., and, with an air pressure of 100 lb. per square inch, will lift 2825 lb. The 8-in. jack has a piston head area of  $50\frac{1}{4}$  sq. in., and, with 100 lb. air pressure, will lift 5250 lb. By attaching a standard air gage with special dial graduations to the cylinder of the jack the latter may be used as a weighing device, indicating directly the weight

on the tires. The particular advantage claimed for this type of jack is quickness of operation. It is said to take only 5 seconds to raise a car off the floor.





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## Air-Cooled vs. Water-Cooled Cars

THERE has been much talk recently regarding the air-cooled car and its merits as compared to the water-cooled variety. This, together with more or less positive statements that one or more manufacturers are soon to produce air-cooled cars in quantity and the well known fact that some prominent makers are doing intensive development work in this line, has tended to heighten interest in the subject.

There is no doubt that the air-cooled job possesses certain inherent advantages. These include freedom from freezing and such troubles as are involved in keeping a water cooling system in condition, rapid warming up upon starting, with consequent decrease in troubles from fuel dilution of lubricant, and probably some material saving in weight, most of which is not in the engine itself, but in the cooling system.

In theory at least there is no doubt that air-cooling can be made as effective as water cooling, for, since the air is the ultimate cooling medium in any case, the maximum temperature difference is also the same.

It then remains only to provide air fast enough and in sufficient quantity, and to bring it into close enough contact with an adequate cooling surface to accomplish the desired results. This involves some nice engineering problems, but they are certainly capable of ready solution.

The question of relative cost is an important one but one which it is not easy to answer in an abstract way. However, there appears to be reason to believe that the air-cooled power plant (with its self-contained cooling system) will cost little if any more than the water-cooled plant with its cooling accessories. It does not follow from the fact that the oldest and most successful air-cooled car is usually considered as belonging in the high-priced class, that all air-cooled cars must be in the same price class. Smaller and lighter cars costing about half as much per pound as existing air-cooled jobs are considered by some competent judges to be well within the bounds of possibility. There are indications that we shall have both high and low-priced air-cooled cars just as we now have cars in both price classes of the water-cooled type. There appears to be nothing inherently cheaper in either type.

The subject is fraught with many interesting possibilities. The present day motor car is not necessarily the ultimate type. We are certain to see lighter, more dependable, more efficient and more economical cars than we now have. There are many routes to these ends and few are bold enough to predict which route is the most promising.

It is practically certain, however, that at least one new air-cooled job will be given a real commercial trial within the next few months.

## Motorcycle Export Figures

EXPORTS of American motorcycles by months and by countries since Jan. 1, 1921, are published in this issue of AUTOMOTIVE INDUSTRIES. These figures are being compiled in this detailed form by the Bureau of Foreign and Domestic Commerce for the first time, and the data given brings the figures up to date.

Beginning with the October figures, AUTOMOTIVE INDUSTRIES will publish these monthly motorcycle export figures, showing countries of destination in the same table with the export figures of cars, trucks, tires and parts which it has published monthly for a number of years.

Exports have constituted a very large percentage of total motorcycle business during recent years, so that these figures should be of great importance to the industry. Available in this detailed form, they give a basis for study of foreign markets and examination of merchandising possibilities that will be of very definite value.

## Phantom Insurance

THE utter inadequacy of present automobile insurance methods was further attested the other day when a man in New York obtained a \$500 policy on a car which did not exist. The successful attempt

to secure insurance on a fictitious car was made by a representative of the office of the Commissioner of Accounts of New York City, in connection with an investigation of automobile insurance which is being made.

In addition to this policy the representative obtained from another insurance agent a policy for \$500 on a broken down chassis from which the engine had been removed.

Just what is to be the solution of the automobile insurance problem is not entirely clear, but that it is worth the study of every agency within the industry is certain. The co-operation of the insurance companies is a prerequisite to any immediate improvement and this is being accorded in certain instances. No real progress can be made, however, so long as loose methods of writing policies are comparatively common.

## Shortsighted Economy

IT was perhaps inevitable that Budget Director Dawes would make some mistakes in his commendable efforts to economize by pledging various Government bureaus not to use certain funds appropriated for specific purposes by Congress. One of these was made, we feel, when the Bureau of Mines appropriations for research work in connection with new methods of cracking petroleum oils in such a way as to yield larger percentages of motor fuel, and with methods of producing shale oil, were placed under the ban.

Those who have followed the trend of petroleum production and consumption in this country know that for several years domestic consumption has exceeded the domestic supply by very considerable and increasing amounts. The gap has so far been filled largely by imports from Mexico, but the production of Mexican fields has fallen off from some 600,000 to about 350,000 bbl. daily, and the best-informed engineers believe that the present Mexican fields are rapidly nearing exhaustion. If this proves true it is difficult to see how an adequate supply of motor fuel for this country can be maintained without imposing conditions (as to decreased volatility, for example) which it will be extremely difficult for the automotive industry to meet.

Under these circumstances it would seem to be short-sighted economy, to say the least, to curtail any governmental or other activity which is intended to help in the solution of a problem of so great import as that of furnishing an adequate motor fuel supply, not only in the distant, but in the very near future.

The recent abundance of motor fuel resulting from a distinctly temporary over-production of crude which could not well be stored, together with the general business depression and the consequent lower price of petroleum products, has apparently blinded many people who should know present conditions in the petroleum world. The Bureau of Mines is awake to the situation, but those in higher authority are either not awake or are indifferent concerning a matter of grave public concern. The day is not far distant when the automotive manufacturer will face a fuel situation which will make him no little trouble. The

Government as a whole can and must be made to appreciate the gravity of the situation, and its various agencies put to work with adequate funds to seek the solution. Let this be made clear to the cabinet members who are charged with handling matters of this kind, in particular the secretaries of the Interior Department and the Department of Commerce, and then see that congressional representatives appropriate the necessary funds.

## The Motor Bus Market

THE development of motor bus lines as aids to electric railways in solving particular transportation problems offers, perhaps, the best possible bus market of the immediate future. Such a market cannot open widely, however, unless the electric railways' interests are sold on bus transportation.

Sentiment at the recent electric railway convention in Atlantic City was largely one of antagonism to buses and could not be said to be encouraging. There was a strong undercurrent of progressive thought, however, which was distinctly favorable toward the bus, which recognized that in any given case the transportation system to survive would be the one which operates most economically and renders the best service to the public. In many cases such a system would include electric lines as well as buses, cooperating to furnish the most efficient arrangement.

A distinctly encouraging note is sounded along this line by the *Electric Railway Journal* in a recent editorial announcing the beginning of a monthly supplement devoted to motor buses, which said in part:

"It has been recognized for some time that this newly developed agency must be a permanent factor in urban and interurban transportation of passengers, and there has been an earnest desire on the part of most railway operators to be informed about its potentialities and accomplishments for the double reason of knowing how to meet the new agency in competition and how to use the new agency in co-ordination with existing rail systems.

"It is of value to make or obtain actual analyses of cost of operation of various trackless vehicle installations for the edification and education of the operators of these systems and for those who would undertake such operation. The leading operators of such systems, as well as railway men, are in thorough sympathy with such a program, for they both are anxious to know exactly where the bus is going to fit in ultimately in the passenger transportation business.

"The bus manufacturer is also vitally interested in all these matters. He wants to work closely with the operator to determine the fundamentals of design that will insure the most economy in operation. There must be considerable research and expenditure of money before there is any degree of finality in bus design principles. Some special designs have been developed, though some manufacturers still hold to the use of the standard truck chassis."

This desire for co-operation on the part of the electric railways is worth the attention of truck manufacturers. There is a definite opportunity for mutual profit in the working together of manufacturers and electric railway interests.

# Predict 1,700,000 Output in 1921

## Cars and Trucks Included in Figure

**Production Has Held Up Monthly  
Although November May  
Show Decline**

NEW YORK, Nov. 8—Conservative estimates of motor vehicle production in the United States for 1921 forecast a total of 1,700,000 passenger cars and trucks. This compares with 1,928,000 passenger cars and 348,000 trucks in 1920. Inasmuch as it was predicted that 1921 would be a "million car year," this output would be highly gratifying to the industry, for it would demonstrate conclusively that the sale of motor vehicles is established on a solid foundation regardless of general industrial conditions.

Shipments of motor vehicles for October were only 11 per cent less than for September, and they were 96 per cent of shipments in October last year, which showed a 26 per cent decline from September. The output last month exceeded general expectations. It marked the eighth consecutive month in which the production line remained practically stationary.

An even more striking illustration of the fact that there has been little deviation in production from month to month is found in a report of the business done by members of the Motor and Accessory Mfrs.' Association for September, which showed an aggregate gain of 1.9 per cent. There was a change for the month of only \$10,000 in the total of past due accounts, which aggregated \$4,358,000, an increase of 0.22 per cent.

Reports from Detroit are to the effect that manufacturers there, however, expect a certain reduction in output for November. Some of the companies making the higher priced cars believe it will be necessary for them to increase their output. Ford, whose production for October approximated 85,000, expects to build the same number of cars and trucks this month. Most truck manufacturers are confident that November business will be better than either September or October.

It is probable there will be a seasonal falling off in the number of sales for the next two or three months. Heavy demand for enclosed cars will

tend to hold up the volume of business as measured in dollars.

Attention of manufacturers has been centered of late on the used car problem, and a careful survey of the field is being made in an attempt to find a solution. After the investigation has been completed it is proposed to make recommendations to manufacturers which will be designed to minimize the evil, although it is not expected it can be eradicated. Overproduction has been one of the causes of trouble in the past and car makers will hold their future output more closely to an order basis than they have done in the past. There is hope that a large proportion of the used cars on the market can be disposed of before the early spring business begins. Reports of the number of these cars on the market are believed to have been very much exaggerated.

Another general reduction in the price of tires is expected to follow the action of the Firestone Tire & Rubber Co. in announcing a cut of 20 per cent on cords, 10 per cent on fabric and 10 per cent on truck tires. Announcement of this reduction merely gave formal sanction to a discount which had been given dealers some time ago. Other large manufacturers are going over their schedules, and it is generally believed they will meet the Firestone action.

Renewal of demand in the truck field is evidenced by the large number of price reductions on commercial vehicles which have been made in the past few weeks. Truck makers are now entering a period of competition as keen as that which has prevailed for several months in the passenger car field.

## Dunlop Stockholders Will Not Be Assessed

LONDON, Oct. 21 (*By Mail*).—Chairman F. A. Szarvasy of the Dunlop Co. categorically denies a report that the stockholders will be called on to meet an assessment on their holdings.

Reduction of capital is believed to be imminent. In one quarter it is reported that this excision will amount to half the ordinary stock capital. By reducing the nominal value of the £1 share by half and the capital stock by £6,500,000 it is said that resumption of dividends on both the preferred and common stock would be possible.

Meanwhile, it is officially declared that the position of the company is materially improved.

## Irvine Will Confer with Manufacturers

**Will Visit Automotive Makers in  
This Country Prior to  
World Tour**

WASHINGTON, Nov. 7—Preparatory to making a world-wide campaign for the development of foreign markets for automotive products, William I. Irvine, trade commissioner of the Department of Commerce, specializing in the automotive industry, will leave here Nov. 22, for conferences with representative automobile, truck and accessory manufacturers in a score or more cities of the country.

His plans call for a stay of two years and six months abroad. A large portion of this period will be devoted to an intensive cultivation of Far Eastern markets. The campaign which he will undertake is perhaps the most extensive ever considered by the Government in connection with assisting American manufacturers in the selling of their products in foreign fields.

### Will Visit Far East

It is Irvine's purpose to ascertain what the manufacturers want to know about Far Eastern markets by way of doing business with existing distributors. It is his intention to study highway conditions in order to show logical development of increased sales which may be looked for as a result of highway extension.

His knowledge of the various factors in the American automobile industry will be adapted to his studies overseas in order that American manufacturers may have specific information on which to base plans for Far Eastern markets. Export managers of domestic concerns will be questioned about credits, organization, territorial division, shipping practices, terms of contract and schedule of arrangement, advertising, service requirements, competition, and the nature of sales promotion work. The trade commissioner will have information for dealers abroad and will show them the way to estimate markets, selling practices, etc.

### Leaves in December

Irvine will probably sail from San Francisco in December. His itinerary calls for studies in Japan, Korea, Vladivostok, Manchuria, Mongolia, China, Philippine Islands, French Indo-China, Strait Settlements, Federated Malay States, Dutch East Indies; Islands of Java, Batavia, Borneo; India, including Burma and Ceylon.

(Continued on page 940)



## Winter May Exceed Trade Expectations

**Credit Conditions Easier—Much Unemployment Will Be of Voluntary Nature**

NEW YORK, Nov. 7.—With the coming of November there have appeared within the automotive industry evidences of an attitude of uncertainty and doubt as to what the next few months may bring in the way of business. AUTOMOTIVE INDUSTRIES has predicted frequently that trade will be better the coming winter than is generally expected. Nothing has appeared on the horizon to change this belief.

### Fundamentals Improving

The fundamentals of general business are steadily improving. While there undoubtedly will be a considerable amount of unemployment until spring it is not likely it will increase to a greater extent than has been the case in more normal winters. The outlook for the building trades, for example, is more hopeful than it has been in several years because a greater volume of building operations is under way throughout the country than at any time since the war.

It is becoming apparent that a considerable part of the unemployment for the next two or three months will be voluntary. Further reductions in wages are being fought vigorously in various trades and in many cases workers probably will strike rather than accept them. Their contention is that the decline in the cost of living has not been commensurate with the wage reductions proposed.

### Labor Situation Gratifying

The labor situation in the automotive industry is highly gratifying and the relations between employer and employee seem to be more satisfactory than in almost any other line. In some industries, however, employers are showing a disposition to take advantage of the present opportunity to force wages lower than their employees are willing to accept.

The industrial survey conducted by the United States Employment Service showed only a slight slowing up in automotive plants for October as compared with September. The decrease in employment was 2.8 per cent, or an actual falling off of 4883 in the establishments which reported. There was an increase of 1.01 per cent in employment by the 1428 companies in all industries reporting. These firms usually employ more than 500 workers each, or a total of 1,600,000.

The report shows that the industrial situation, as represented by employment conditions, showed a steady improvement in October. An outstanding feature was

the marked increase in the basic industries such as iron and steel, metal products and the railroads. These gains more than offset the decrease in the automotive industry which is a seasonal condition, and in the miscellaneous group, caused largely by the slackness in the shipyards. Reports from 231 of the principal industrial centers indicated that public improvements were absorbing some of the common labor released from agriculture, canneries and other seasonal activities.

Total employment in Detroit fell off only 192 last week, as compared with a decrease of 3900 the previous week. The monthly trade letter of the National Bank of Commerce of Detroit shows that 14.10 per cent of all lines of trade in that city were normal in October as compared with 11.25 per cent in September, making 85.90 per cent below normal as compared with 88.75 per cent the month before. A forecast of future business conditions made by the bank shows 42.31 per cent improvement in October as compared with 43.75 per cent in September and 44.87 per cent stationary as compared with 47.50 per cent the previous month. Bank clearings in Detroit for September, 1921, were \$406,698,000 as compared with \$416,711,000 in 1919 and \$561,592,000 in 1920.

(Continued on page 942)

## Expect Reorganization of Maibohm on Nov. 14

SANDUSKY, Nov. 7.—Reorganization of the Maibohm Motors Co. and the discharge of the voluntary receivership will be accomplished on Nov. 14, it is expected. On that date the sale of the property is scheduled to take place and it is expected that the reorganized company will take charge.

There has been no interruption of manufacturing operations and none is anticipated. The plan of reorganization comprises the payment of current obligations with preferred stock, and it is stated that nearly all of the company's purveyors have agreed to the plan and will become interested in the reorganized company. The assent and co-operation of the balance is expected.

### STAR MEETING POSTPONED

AKRON, Nov. 7.—The special meeting of the Star Rubber Co. stockholders, called for Nov. 5 to approve the refinancing and recapitalization plans, has been postponed until Nov. 25. The plan as outlined to the stockholders by letter provides for decreasing the capitalization of the company, exchanging existing \$100 par common stock for no par and increasing the directorate from five to seven.

### WALTHAM GOES TO BARRIE

TORONTO, Nov. 5.—The Waltham Motors Corp. of Canada, with head office in East Toronto, is to manufacture its motor trucks in Barrie, Ont., negotiations having been completed whereby it acquires the property of the Barrie Carriage Co.

## Sales Tax Adoption Seen in Near Future

**Effort Probable to Pass It As Substitute for New Revenue Bill**

WASHINGTON, Nov. 7.—Although the manufacturers' sales tax and a general sales tax have been rejected by the Senate and House, it appears that it ultimately will be adopted as a substitute for the new internal revenue bill. The manufacturers' tax of three per cent, sponsored by Senator Smoot of Utah, has the endorsement of the National Automobile Chamber of Commerce and various organizations of manufacturers. Senator Smoot offered it as an amendment to the tentative tax measure as a means of repealing special war assessments, including the excise tax.

### Immediate Move Likely

Statements made by several Senators and Representatives indicate that an effort will be made to replace the pending tax bill by a sales tax. The advocates of the sales tax plan say that it may be a leading issue at the congressional elections next fall. Business organizations and others proposing this method are expected to crystallize sentiment in the meantime.

The Senate has discarded the soldiers' bonus plan at this time. It is in accordance with the recommendations of the President. Chairman Fordney of the House Committee on Ways and Means and certain senators insist that it will be adopted at the regular session this winter. The President is opposed to this program, but representatives who are candidates to succeed themselves may override the objections for political reasons.

### Smoot Hopeful

As indicative of the trend of affairs, Senator Smoot said that talks with senators made it "quite evident that a sales tax will be imposed in the very near future, and every criticism that has been offered to the administration of the manufacturers' tax will apply as much next year, when it is said we will adopt a sales tax bill, as it would apply to-day. I have not a doubt in my mind that a bonus bill will be enacted into a law. In my opinion if the sales tax is to be imposed for the purpose of paying the soldiers' bonus, it ought to be put into operation as early as possible."

Ordinarily the internal revenue bill when revised endures during the four years allotted to each administration. However, the farmers' organizations and other groups are not entirely satisfied with the proposed measure, which will undoubtedly become a law late this month. The National Board of Farm Organizations has appealed to Congress in an effort to prevent the repeal of the excess profits tax and lowering of the surtaxes.

## Tire Trade Awaits Action on Prices

### Definite Stand by Manufacturers Following Firestone Cut Is Felt Necessary

AKRON, Nov. 7.—Possible tire price reductions occupied the entire stage in the Akron rubber industry during the past week. Firestone's cut of 20 per cent on cord tires and 10 per cent on fabrics and truck tires took the entire industry by storm and made up the reports of the industry for the whole week, and that without any tangible results.

Thus far none of the other large manufacturers have decided to follow his lead and at this time it is still uncertain whether they will do so. While the smaller Akron companies look to the Goodyear Tire & Rubber Co. and the B. F. Goodrich Co. as leaders who are to set the pace on tire prices at this time, these larger manufacturers turned toward United States to see what this corporation will do in the matter of following Firestone example.

#### Say Cuts Not Justified

Miller, Goodyear and Goodrich all state officially that further reductions in tire prices are not justified at this time and that they can only be made at the expense of wage and salary cuts, but feel that if other large manufacturers are to follow Firestone they will of necessity be compelled to do likewise.

The small manufacturers, such as the Mohawk Rubber Co., the General Tire & Rubber Co., the Swinehart Tire & Rubber Co. and those in the nearby cities express the same opinions. They do not feel that price cuts are warranted by present costs and that they will only cut when the large manufacturers compel them to do so.

Goodyear thus far has taken a determined stand against further reductions of prices. A week ago President E. G. Wilmer issued a statement in which he said he had not heard of any general movement to reduce tire prices and that Goodyear was not contemplating any such action. During the week, following the Firestone announcement, this was supplemented by a statement from the sales and advertising department that no steps have been taken looking toward any reductions and that under no circumstances will the company be stampeded.

#### Trade Disorganized

The Miller Rubber Co. toward the end of the week held a series of conferences regarding tire prices and costs but failed to come to any definite announcement regarding prices for the future.

If the other companies do not follow Firestone it will be the first time in recent years that any one large manufacturer has been permitted to cut the price and allowed to "go it alone."

The talk of possible tire price reductions as well as the Firestone announce-

ment has thoroughly disorganized the tire trade for the time being. Since the 20 per cent reduction was given the dealers confidentially during the latter part of October there has been a slowing up in business. Sales are reported to have fallen off materially and it will require either a definite statement by all manufacturers that they will not cut, or a cut to meet that of Firestone to put the trade back into normal position. But a flat refusal may not be sufficient without some additional guarantee of protection in case prices drop in the future.

That Firestone could make the cut more easily than the other manufacturers is pointed out by some of the others on the ground that Firestone's present business is largely that of the manufacturers, which is not affected by the cut to the dealers.

With the proposed cut tire prices are at the lowest point in the history of the automotive industry. The last cut brought them to the 1913, or previous low, level.

#### Kelly Tire Reduced

NEW YORK, Nov. 8.—Following the action of the Firestone Tire & Rubber Co., the Kelly-Springfield Tire Co. announced to-day price reductions on cord tires amounting to 20 per cent, on fabric 10 per cent, caterpillar truck tires 15 per cent, standard truck tires 10 per cent and tubes from 10 to 20 per cent. It was reported that the company would soon announce a special Ford size tire to sell at a popular price. Such a tire was put on the market several months ago and withdrawn.

### Automobile Blue Book Publishing Co. Sold

NEW YORK, Nov. 7.—The property of the Automobile Blue Book Publishing Co., which includes *Motor Life* and the *Blue Book*, have been sold to Joseph J. White of the Hill Binding Co. of Chicago. The sale was made for cash by the credit stockholders who have been operating the property for the past few months, in accordance with a resolution adopted by the stockholders, directing that the sale be made on Nov. 1. There will be an immediate distribution of the assets among the credit stockholders.

The property probably will be operated as heretofore both from New York and Chicago. It is likely the printing, mechanical work and distribution will be handled in Chicago. The business is in good hands and under the new ownership the *Blue Book* is expected to go forward to new records of usefulness.

#### BUTZEL BUYS HINKLEY

DETROIT, Nov. 7.—Henry M. Butzel purchased the property of the Hinkley Motors Co., valued at \$450,000, when it was sold at auction by the Security Trust Co. as receiver. His bid was \$300,000 and is subject to confirmation by the United States District Court. A conditional bid of \$10,000 for the Hinkley accounts also was made. Butzel stated the business of Hinkley Motors would be continued by a new company.

## Enclosed Car Show to Help New York

### Revival of Buying, Which Has Not Maintained September Level, Expected

NEW YORK, Nov. 7.—Passenger car dealers of the metropolis are looking forward to the enclosed car show, set for the week of Nov. 14, to break the mid-fall dullness which has settled upon the market and has made the day-by-day record of sales poorer than it was in September and somewhat below the retail movement of cars a year ago.

Definite October figures are not yet available but they are not expected to show a gain over September, except in the case of a few cars which have had notable price reductions or have brought out new models. Several distributors whose cars have remained unchanged in price and model for several months had an October business 10 to 20 per cent lower than September.

Enclosed car sales have dominated the medium and high price fields for the past two or three weeks and have made a good showing in the low priced classes. This fact, coupled with the statements of many prospects that they are going to wait to see what is in the show, which is now being advertised, leads the trade to expect good results from the show, in which dealers will have from two to four or six models each on display, according to the size of their spaces.

#### Sales Staffs Enlarged

A sensation of the week has been the salesroom show of the Maxwell Distributing Corp., which has presented the new Maxwell in a regular stage setting, attracting city-wide comment and big crowds of buyers and prospects. The show is being continued on its second and final week.

Several of the metropolitan dealers are enlarging their sales staffs for more intensive combing of the territory and nearly all of them are going thoroughly into salesmen's meetings and training of salesmen along scientific lines.

Used car prices continue low, with the market oversupplied and the trading problems of dealers who have not stopped trading acute. The truck business is keeping step with the gradual improvement in general business.

#### McKONE TIRE ORGANIZES

CHICAGO, Nov. 7.—The McKone Tire & Rubber Co. has been organized with general offices here and a factory at Millersburg, Ohio, to manufacture fabric and cord casings and inner tubes. A large part of the company's output is understood to have been sold in advance. A. L. Gustin is president of the company, C. W. McKone is vice-president in charge of production, L. C. Conley is secretary and treasurer, and O. L. Tweedy is sales manager. All are residents of Chicago.

## White Sales Show 20 Per Cent Increase

### October Business Is Better Than Average for Three Previous Months

CLEVELAND, Nov. 8—October truck sales by the White Co. were 20 per cent better than the average of the previous three months and the business indicates a general resumption of purchasing by the large industrial and distributing concerns in all parts of the country, according to company officials.

Walter C. White, president of the company, talked about affairs of the corporation and declared that August sales were better than they were in July, which was the low point; that September was a better month than August and that October outstripped September by a good margin.

Distributing concerns, packers and oil companies are purchasing trucks more readily than are manufacturing and producing interests. In his statement, White says that actual sales and orders for future deliveries have risen during October. At the plant production has gone up steadily since July 1.

Plans of the corporation provide for a gradual increase in production until Jan. 1, when it is purposed to have an output that will be more than twice as great as it was in July. Increased employee efficiency has been notable, for the greater production has been accomplished without the addition of a large number of employees.

#### Production Rearranged

Lately the company has availed itself of the situation to rearrange the plan of production. A progressive basis is used for the making of trucks, and that is attained by rerouting materials through the shops. No radical changes were made. It was brought about by a co-ordination of little improvement in methods and routing. As sales and orders increase and as production is speeded up to meet the demand, additional forces of workmen will be employed, but, due to improvements that have already been made, the production of trucks per man will be increased.

Collections are better to-day than they have been in several years. Approximately 90 per cent of the company's business is on a cash basis.

Inventories on Dec. 31, 1920, were placed at \$22,989,000 and this figure has been reduced several millions. Further cuts in the inventory are being made gradually. Bank borrowings have been reduced from \$8,750,000 on April 1 to less than \$5,000,000. The ratio of current assets to current liabilities is more than three to one.

#### QUALITY TRUSTEE NAMED

INDIANAPOLIS, Nov. 8—N. M. McCullough, an Anderson banker, was appointed trustee for creditors of the Quality Tire & Rubber Co., when credit-

ors attended a meeting and conferred with H. C. Sheridan, referee in bankruptcy. It was stated after the conference that stockholders of the company are progressing with a plan to raise \$200,000 by which they could meet obligations and arrange to operate factories of the Quality company here and at Elyria, Ohio.

## American Units Used in New Parker Product

MONTREAL, Nov. 8—A six-cylinder car known as the Royal Six has been placed in production by the Parker Motor Car Co., Ltd., of this city. The car is assembled from American units and is made in both the open and enclosed types. It sells for \$2,675 for the two, four and seven-passenger open types; \$3,275 for the sport type four-passenger car with California top; \$3,475 for the four-passenger coupé, and \$3,675 for the seven-passenger sedan. All models are on a 126-in. wheelbase chassis.

The engine is a Continental of 3½ x 5¼-in. bore and stroke, the clutch a Borg & Beck and the transmission a Warner three-speed, while the axles are Columbia. A Zenith carburetor is fitted. Ignition is by the Atwater Kent battery system and the starting and lighting is by Bijur equipment. Cooling is by means of a cellular radiator with pump and ball-bearing fan.

The frame is of Z section, 7¼ in. deep and with flanges 2½ in. wide. The running boards form an integral part of the frame members, being hot-riveted to the bottom flange of these members and also riveted to the vertical section at the front and rear where the running board curves up to meet the fenders at the top of the frame. Left steering is used. Five disk wheels with 33 x 4½ in. cord tires (non-skid tread for rear) is standard equipment. A very complete equipment is included in the price of the car.

## Acosta in Curtiss Wins Pulitzer Trophy Race

OMAHA, Nov. 8—Bert Acosta in a 400 hp. Curtiss navy racer won the Pulitzer trophy and a cash prize of \$3,000 here in the annual race for that well known aerial prize. The race was held over a triangular course 30 miles in length, which was covered five times.

Acosta's time for the 150 miles was 52 m. 9-1/5 s., which gives an average speed of 173 m.p.h. This is slightly below the record for the race, viz., 178 m.p.h., made last year by Capt. Corliss C. Mosley of the Army Air Service. The points of the triangular course were Omaha and Carson, Neb., and Loveland, Iowa, across the Missouri River. Second place in the race was won by Clarence Coombs of Houston, piloting a bright red colored plane known as the Cactus Kitten, whose time was 54 m. 7-3/5 s. Lieut. John A. Macready of the Army Air Service, holders of the world's altitude record, was third in 57 m. 27-3/5 s.

## Service Emphasized at Earl Convention

### Advertising Policy Outlined to Distributors at First Meeting With New Officials

DETROIT, Nov. 7—Addressing the first distributor convention of the new Earl Motors, Inc., Clarence A. Earl, president, emphasized the importance of taking care of customers, adding that a customer is a permanent asset and profits are legitimate only when a by-product of service.

To back up his selling organization he outlined an aggressive advertising policy and laid stress on the fact that he and his organization considered their distributors and dealers as members of their official family. Earl condemned the practice of justifying price cuts by eliminating advertising and accessories on cars as operating below the margin of safety.

The convention lasted for two days and was attended by all Earl distributors or their representatives. Hearty endorsement was given to the policy as laid down by Earl. Others who addressed the convention were John Fletcher, vice-president of the Fort Dearborn National Bank, Chicago; Kelly R. Jacoby, vice-president in charge of sales; D. Minard Shaw, advertising manager, C. D. Fray, and Charles Parlin of the research division of the Curtis Publishing Co.

An exhibit of the new cars was staged at the factory and a gratifying number of contracts for 1922 deliveries were made. Many sales were effected for immediate delivery on the new enclosed models.

## Amsterdam Will Hold Exposition Next Year

WASHINGTON, Nov. 8—Preliminary reports of an automotive exposition to be held in Amsterdam, Netherlands, in February and March of next year, have been made to the Bureau of Foreign and Domestic Commerce by Consul Frank W. Mahin, of Amsterdam.

The exhibition will be under the direction of and limited to the members of the Nederlandsche Vereeniging de Rijwielen en Automobielen-industrie, the Netherlands Automobile Society, but the regulations do not exclude foreign made cars.

#### NEW HEAD FOR ROCHESTER

ROCHESTER, N. Y., Nov. 7—LeRoy Kramer, formerly in charge of production for the Willys-Overland Co., Toledo, has been elected president of the Rochester Motors Corp. in addition to his duties as western representative of the T. H. Symington Co. Lorimer Dunlevy, formerly chief inspector of the Willys Corp. and later service manager of Rochester Motors, has been appointed works manager. C. J. Symington has been made chairman of the board.

## Service Convention Program Arranged

**Provides for Only Two Papers—  
Discussion Expected on Im-  
promptu Speeches**

NEW YORK, Nov. 7.—The program for the Service Managers' Convention which will be held here Nov. 15 and 16 under the auspices of the National Automobile Chamber of Commerce has been definitely arranged. The convention will be different from any previous convention in that instead of having a great number of papers read by various service executives there will only be two such addresses, the balance of the time being given up to topics for discussion on timely subjects and the service department. Some of these topics have been suggested in the program and the floor is to be entirely open so that anybody that wants to bring up any subject will have the opportunity.

Here is the program:

### PARTS SESSION

Address by prominent automobile official not as yet selected.

Report of Service Committee.

Topics for discussion.

How can we overcome the "pirate" parts evil?

Is it better to relinquish our parts service on obsolete models to underwriters?

What can be done to reduce the cost of parts to the owner?

Should parts prices cover tax and transportation so that owners can purchase parts at list anywhere?

### SERVICE POLICY SESSION

Topics for discussion.

Suggested improvements for Standard Service Policy.

Should special adjustments be based on time or mileage? If latter, on what basis?

How can we show more consideration for our customer?

### SERVICE SELLING SESSION

Address by Percy E. Chamberlain, presenting a plea for the flat rate plan.

Topics for discussion.

Which is better, the flat rate or some other way of charging for service?

Can piece work be applied in the garage to advantage?

Are service manuals and time studies on repairs by the factories helping dealers to give better service?

### GENERAL SESSION

Topics for discussion.

Should the factory provide facilities for training dealers' service men?

Should more information be given owners on making their own repairs?

How can we show dealers the sales value of well organized service?

There is no radically new subject to be brought up before the convention as far as the program is concerned, although there may be some such subjects introduced by the delegates to the convention.

It is probable that there will be a lively discussion on some points not included in the program. The subject of

## NORTHERN PACIFIC BUYS MACK TRAIN

ST. PAUL, Nov. 7.—The Northern Pacific Railroad has bought a motor train from the Mack Truck Co. for passenger service on the Gilmore & Pittsburgh line, a subsidiary of the main line in the mountain district between Armstead in Montana and Salmon City in Idaho. Economy and better and more frequent service are expected from the venture. The car will carry 18 passengers and baggage.

independent repair shops and the question whether the factories should cooperate with them or whether they should ignore them have been brought up at practically every convention held so far, and there is no doubt but what it will come in for a share of discussion at this time. The subject includes the question of allowing discounts to independent repair shops.

## Irvine Will Confer with Manufacturers

(Continued from page 936)

He will send back reports on current conditions and will try to make arrangements to have these reports continue. Instructions will be given representatives of the Government to give specific information desired by automotive exporters.

Many complaints have been received since the establishment of the automotive division to the effect that reports of consular agents are almost of no value owing to the lack of detail. Irvine means to correct this fault. These reports will be published in commerce reports, business papers and in the confidential reports for exporters, the latter to be sent in duplicate to exporters listed at the Department of Commerce. This service will be entirely without charge to American manufacturers, but all on the index must prove themselves bona fide automobile producers.

In his studies of the distributing system in the Far East and other countries, the commissioner will go to both seaboard and inland points to find out the conditions of roads, nature of country and the particular style of motor vehicle best suited for the purpose, freight rates, gasoline supply, garages, etc.

In an effort to compete with European manufacturers, who are cultivating Chinese markets, Irvine will go from Kalgan, China, to Urga, Mongolia, a distance of 700 miles. It was formerly a caravan route but recently has been devoted to automobile traffic. He will submit reports on conditions and value of equipment that will be required for motor transportation, and will recommend logical places for the establishment of dealers for American cars, and decide how the territory should be divided.

## Most Makers Join Government Agency

**Show Desire to Cooperate With  
New Division of Department  
of Commerce**

WASHINGTON, Nov. 7.—Although the automotive division of the Department of Commerce was established only two months ago, and completely organized Nov. 1, with a personnel of six people, it is pointed out that its major accomplishment has been the organization of 73 per cent of the entire automotive car and truck industry for cooperation with the division in furthering foreign trade interests. The division has also induced the Motor and Accessory Manufacturers' Association to consider the export field, to lay out foreign sales promotion plans and to assist in the selection of a committee to cooperate with the department.

In connection with the promotion of the aircraft industry, the division has secured a 100 per cent listing of the Manufacturers' Aircraft Association on the "Exporters' Index" and subscriptions to "Commerce Reports" and has arranged for a committee for cooperation. In the interest of clarification, the division has been partially responsible for the reclassification of export figures on a price and tonnage basis so that manufacturers can intelligently gage the class of exports comparable with their own production. It has also established trade information files for the purpose of collating specific automotive data of 109 automotive using countries.

Arrangement has been made with the National Automobile Chamber of Commerce to supply its members with data for a loose-leaf manual, containing concise export information for use of export managers of member companies and others in the industry. During the rail emergency, the division marshalled the resources of the truck and car manufacturers of the country and their trade associations for the purpose of solving transportation problems. It has also acted to prevent or delay the passage of legislation detrimental to the interest of American automotive manufacturers, contemplated in India, Switzerland, the Argentine and Canada.

## SEEKS RECEIVER DISCHARGE

STRATFORD, CONN., Nov. 8.—That the Liberty Motor Mfg. Co. has strong expectations of becoming a growing concern was stated in superior court here before Judge Frank D. Haines, when counsel pleaded that the City National Bank be discharged as a receiver, unpaid stock subscriptions amounting to an excess of \$17,000 be collected and a new loan be negotiated to pay off the mortgage of a like amount now held by the bank. The court denied a motion for an order for sale and continued the other motions.

## Essex Improvements Combined in New Car

### Model Does Not Represent Changes Made at Any One Time

DETROIT, Nov. 7.—The present Essex car, although quite different from the Essex of a year ago, has not been subjected to any great amount of change at any one time, but with the incorporation of the most recent improvements, the total changes amount practically to a refined model. Probably the two most important changes which have been put into effect are the new cylinder heads and the new pistons.

The cylinder head has been redesigned particularly with the idea of giving more combustion space over the exhaust valves. A pocket is provided in which the plug is placed. This completely isolates the plug from any location which is apt to be in the path of an oil throw and prevents fouling.

The intake passages are now arranged to give turbulence to the gases. The intake manifold now incorporates hot-spotting features, due to the arrangement of the water passages which are designed to permit higher temperature at certain points where it will assist in the evaporation of the fuel. The aluminum pistons are the diagonal-slit constant clearance type with three rings above the wrist pin instead of two as in the old model.

The pistons are split in such a way as to give a modified slipper effect. Due to changes in the chassis oiling scheme and the use of oilers instead of grease cups, the exhaust pipe has been altered to clear the oilers. A new muffler has been fitted incorporating a double cone expansion chamber and the springs have been regrated to improve the suspension. The Stewart-Warner vacuum tank is employed and the body finish is blue, giving an alteration in appearance of the cars.

DETROIT, Nov. 8.—Incorporating a number of simplified construction details, the Essex coach priced at \$1,495 is now being shipped to dealers. Priced at only \$300 more than the touring car, the new body is an exceptional example of economical manufacture. While incorporating up-to-date equipment and good workmanship, alterations in structural detail have made it possible to cut the cost of manufacture.

The new body is a two door design with individual folding Pullman seat in front and a three passenger seat in the rear. The cars are equipped with a dash control, ventilator, wind and rainproof windshield, sun visor, Dura crank handle, window lifts, four hinge doors, cord tires and the usual Essex chassis equipment.

#### MARTIN TESTING CARS

SPRINGFIELD, MASS., Nov. 5.—The Martin Motor Co. is trying out a third

model of its two-passenger car proposed to be manufactured here. From a competitive test of the three the most satisfactory will be chosen for commercial production. The special aim of the company is to reduce size and weight without loss of strength. Principal materials will be duralumin, aluminum and aluminum alloy. An exhibition will be made at New York, Boston and Chicago during the shows.

### Henderson Will Direct Martin Parry Branches

INDIANAPOLIS, Nov. 8.—R. P. Henderson, who has been vice-president and director of sales for the Western territory of Martin-Parry Co., has been transferred to a newly established office in Detroit, where he will be regional director of sales in charge of branches at Detroit, Cleveland, Columbus and Cincinnati. It is understood that other branches will be opened and included in Henderson's territory. Henderson has been prominent in Martin Parry affairs for several years, and was one of the sponsors of the Henderson Motor Car Co. Previously he had been identified with his brother, C. P. Henderson, in the Cole organization.

Mark Hamer, advertising manager for the company, has been transferred to the York, Pa., plant.

### Announce More Papers for S. A. E. Meeting

NEW YORK, Nov. 8.—The program of papers to be presented at the annual meeting of the Society of Automotive Engineers to be held here Jan. 11 to 14 will include the following papers in addition to those previously announced in AUTOMOTIVE INDUSTRIES:

Materials Session: Application of Chrome-Molybdenum Steel from the Consumer's Viewpoint, by C. N. Dawe, Chief Metallurgist of the Studebaker Corp.

Motor Truck Transportation Session: Economics of Motor Transportation, by M. C. Horine, engineer, International Motor Co.

The program of the meeting may be further extended to include papers on drop forging practice and on detonation studies, but this is as yet uncertain.

### Pilot Opens Branches in Distributing Centers

RICHMOND, IND., Nov. 7.—The Pilot Motor Car Co. will market its product in the major distributing points of the country through factory branches.

Two of the branches already have been established. That in New York, which is known as the Pilot Motor Co. is under the management of H. De Long Fry. The Chicago branch bears the same name and is managed by George F. Bates, formerly general sales manager of the All-American Truck Co. of Chicago.

It is purposed to open similar branches in Cleveland, Boston and Indianapolis.

## Arkansas Presents Promising Aspect

### Advancing Price of Crude Oil Contributes to Business Improvement

LITTLE ROCK, Nov. 8.—Business conditions in the automotive trade continue to hold out promising aspects over the State of Arkansas. Dealers are optimistic and are making plans toward further extending their trade. A number of firms are enlarging their quarters and many new firms have recently opened up for business.

The change in price of crude oil in the new oil fields in the southern part of the State has aided business materially in that section. Gasoline has been very cheap in this State for the past few months, but is advancing in cost. In fact, sales of gasoline and accessories have been better than sales of new cars. Crude recently went to \$1.50 a barrel at El Dorado and it is said that it may advance to \$2. Little Rock has been one of the cheapest gasoline cities in the United States from the standpoint of price.

Business conditions in Arkansas are better than in some other States for a number of reasons. The cotton crop is practically all gathered and most of it has been marketed, as a result of which there is some cash money in evidence.

All car dealers are thoroughly alert and are exerting every effort toward bringing in new trade. Buying is cautious but there is a marked lessening of the marked depression of several months ago.

The demand for enclosed cars is increasing with the approach of winter.

### Grant Motors Program Includes Enclosed Cars

CLEVELAND, Nov. 8.—The Grant Motor Car Corp. has extended the line of Grant Special models to the enclosed cars, a new sedan and coupé both selling for \$1,950 having been added.

The standard line of enclosed cars selling for \$2,450 is continued, but disk wheels, spare cord tire, nickel rim barrel headlamps, and front and rear bumpers have been added without increasing the price. The regular and special lines, both open and enclosed, are practically identical with the exception of some changes in the running boards and fenders, the difference in price being chiefly accounted for in the difference in equipment.

### DISTRIBUTORS ASK BANKRUPTCY

BRIDGEPORT, CONN., Nov. 7.—Hare's Motors of Connecticut, Inc., formerly selling agents in the state for the Locomobile Co., has filed a voluntary petition in bankruptcy in the United States Court at New Haven. The corporation lists its liabilities at \$59,302.55 and its assets at \$34,061.52. It had offices and a sales and parts station in this city.



## Winter May Exceed Trade Expectations

**Credit Conditions Easier—Much  
Unemployment Will Be of  
Voluntary Nature**

(Continued from page 837)

The easing of credit conditions is reflected in reductions of rediscount rates made by all Federal Reserve Banks. This has been reflected in corresponding reductions by member banks. The rate of the New York Federal Reserve bank now is 4½ per cent, which is the lowest on commercial discount since February, 1918.

A survey of general business and financial conditions issued in Washington by the Federal Reserve Board contains the statement that "some distinctly encouraging elements in the general business situation are to be noted. The outlook in the textile industries is among these. . . . Consumption of raw materials continues at a high figure and the total used in September was in excess of that reported for September 1920.

"In iron and steel an increase in both production and in unfilled orders has taken place, which although limited in amount, is regarded as of first rate importance marking the term from the low point.

"Better conditions are also reported in the lumber industry. . . . The activity in building has been particularly noteworthy because of its continuance beyond the time when the seasonal reaction would ordinarily occur.

"The better conditions in the agricultural districts combined with improved buying demand and the larger activities in manufacturing have naturally been reflected in increased activity in the wholesale trade.

"Retail trade has been well maintained in most parts of the country."

R. G. Dun & Co. in its weekly review of business, issued Saturday, said:

"Response to the constructive forces in the economic situation does not come quickly, but evidences of revival multiply. The recovery would be more rapid if fewer restraints were present, yet the gain is fairly steady and there is promise of its continuance. . . . While all statistical barometers do not reveal the improvement in business, records of production in several basic industries are distinctly better. . . . The trend of buying nearly everywhere is toward the staple and lower cost merchandise and the practically general resistance to price advances is added proof of the growing trend of economy."

Bradstreet's comment on the general situation said:

"Trade reports indicate rather more irregularity and some shifting of activities as November opens. For this varying weather conditions, the averting of the railroad strike, the apparent passing of the peak of fall distribution at big primary markets, the continuance of unsatisfactory prices for farm products at the West and a combination of lower prices and warm weather at the South are held variously responsible. The feeling is general that October as a whole was a fairly good month in wholesale and jobbing trades, that manufacture and industry made some notable forward steps and that unemployment decreased, but that collections rather tended to sag and that old past due pay-

ments, especially at the South, were not liquidated as well as expected."

The John V. Farwell Co. of Chicago says in a weekly review of trade:

"The wholesale dry goods business is manifesting a much greater activity than during the corresponding week of last year, the number and volume of road orders showing a large increase.

"General buying conditions have also improved it is reported. The larger retailers are making more complete commitments for spring in many lines. This is bringing about a much better and more normal percentage in a comparison of business volume with the number of orders received."

The monthly review of credit and business conditions, issued by the New York Federal Reserve Bank and dated Nov. 1, states:

"The volume of new building undertaken in the country as a whole in September was larger than in any previous month this year, and in this district was larger than in any previous month for which there are reliable records. This activity continued at a high rate during October.

"The production of iron and steel and of textiles shows a continued increase.

"The volume of the country's railroad traffic, especially shipments of manufactured articles, was larger during September and in early October than in any previous period this year."

The decrease in the number of idle freight cars continues steadily week by week. The decline last week was attributed largely to increased shipments of coal.

Interesting evidence of the better feeling among manufacturers is reflected in the large orders for new machinery to replace well worn equipment, which were placed by cotton manufacturers at the International Textile Exposition at Boston last week. It was reported that marked improvement in conditions has made necessary the speeding up of operations.

Probably the most significant indication of renewed confidence is the extraordinary strength of the bond market. Bonds of the United States and other governments have advanced rapidly in the past two weeks and their strength has been reflected in industrial bonds. The bond market is regarded as a barometer of industrial conditions.

The number of failures in October was 17 per cent greater than in September, but experience in past periods of depression has shown that the trend of business failures was steadily upward for months after business improvement began.

While there are no clouds on the business horizon which need give alarm to the automotive industry it undoubtedly is true that the coming months will bring a period of exceedingly keen competition in all lines of the industry.

### STANDARD DENIES RUMORS

PITTSBURGH, Nov. 8—Standard Steel Car Co. denies rumors that it would abandon the making of passenger automobiles and would concentrate its efforts on motor trucks. It states that "there is no change to announce in the policy of this concern."

## Shortening of Sales Is Reducing Output

**Factories Manufacturing Medium  
Priced Cars Reflect Hesitancy  
Shown By Dealers**

DETROIT, Nov. 7.—Reductions in manufacturing schedules at factories manufacturing medium priced cars indicate a gradual shortening of sales and a disinclination on the part of dealers to stock heavily against a winter and early spring demand. Although there are exceptions, most factories are already operating considerably under the October schedule and still further curtailments will be made.

Dodge Brothers, which has been operating on a 550 a day schedule since spring, will go upon a 400 a day schedule, Thursday, Nov. 10.

Buick has reduced operations to a three-day week basis, and Studebaker is also considerably below October marks.

Hupp is working upon a 10 car a day schedule.

Ford is continuing on the five-day week at the Highland Park plant, with a schedule approximating 85,000 cars set for November, but it is declared that the schedule is a flexible one and susceptible to sudden change, dependent on the market.

New models, new prices and other conditions are keeping most other factories on a strong production basis.

Maxwell, Chalmers, Oakland, Hudson, Essex, Packard, Cadillac, Chevrolet and Earl may be included as benefiting by these sales inducements. Maxwell is conspicuous in this list, the new models having created something bordering upon a furore in motor car circles.

## Firestone Is Reopened After 10 Day Shut Down

AKRON, Nov. 7.—The Firestone Tire & Rubber Co. has resumed plant operations after a ten day inventory shut-down on the basis of 18,000 produced a day. This is slightly less than the 20,000 which were on the production ticket when the factory was closed down.

The annual statement is being prepared and although official information is lacking thus far it is not unlikely that the company broke all previous production records and that a large part of the loss sustained last year through high priced inventory will be wiped out in the next statement.

Firestone has led in the production of tires throughout the past year, mainly because of the large amount of Ford business received.

### ANGLO-AMERICAN GETS SITE

TRENTON, ONT., Nov. 5.—A site of 32 acres has been granted by the rate-payers at this point to Anglo-American Motors, Ltd. Under the agreement the company will erect the first two units of its plant immediately.

## Islands Offer Field for Tractor Selling

### Manufacturers Advised to Turn Eyes to Philippine and Cuban Markets

WASHINGTON, Nov. 8—Officials of the Bureau of Foreign and Domestic Commerce are of the opinion that American tractor manufacturers should devote more time to the cultivation of Philippine and Cuban markets. Exports have fallen off sharply of late. Statistics show that there has been a decrease of \$618,950, due largely to the great slump in the demand for plows, cultivators and threshers, for which implements there has been thus far the best market in the Islands.

From April 1, 1921, complete tractors valued at \$34,378 have been sent to the Philippines, together with parts valued at \$31,945. Increase in the use of tractors has been remarkable. In 1917, 4 tractors were sold in the Philippines; in 1918, 6 were sold; and in 1919, 597 were sold, while during the fiscal year ended June 30, 1920, over 800 were sold. This great increase was largely in consequence of a tractor demonstration held at the Government demonstration farm at Alabang in October, 1919, where ten tractors were tested under the most exacting conditions. As a result of those trials, tractors won a place in Philippine agriculture.

Exports of agricultural implements to Cuba showed a decline amounting to \$270,669, for the first nine months of 1921. As tractors are not included in the total for 1920, and are included in that for 1921, the total decrease in exports of implements to Cuba, exclusive of tractors, is \$305,909. The value of tractors and parts exported is \$35,240, figures being for the period beginning April 1, 1921.

### LOWER MACCAR PRICES

SCRANTON, PA., Nov. 7—Price reductions have been made in several models of trucks manufactured by the Maccar Truck Co. The list follows:

	Old Price	New Price
Model L, 1½ ton.....	\$2,925	\$2,700
Model H-A, 2 ton.....	3,300	3,100
Model H-2, 3 ton.....	3,650	3,400
Model M, 4 ton.....	4,500	4,200
Model G, 5-6 ton.....	5,500	4,950

### STANDARD TRUCK DROPS

DETROIT, Nov. 9—The Standard Motor Truck Co. has reduced the price on its entire line:

	Old Price	New Price
Model 1-K, 1½ ton....	\$1,800	\$1,600
Model 76, 2½ ton.....	2,800	2,400
Model 66, 3½ ton.....	3,600	3,200
Model 5-K, 5 ton.....	5,250	4,400

### DAY-ELDER REDUCED

NEWARK, Nov. 8—Day-Elder Motors Corp. announces reductions ranging as

high as \$500 in the prices of its truck models. The list follows:

	Old Price	New Price
Model A, 1 ton.....	\$2,100	\$1,600
Model B, 1½ ton.....	2,300	2,000
Model D, 2 ton.....	2,750	2,400
Model C, 2½ ton.....	3,025	2,750
Model F, 3½ ton.....	3,750	3,150
Model E, 5 ton.....	4,250	4,250

### YUBA TRACTOR HIGHER

SAN FRANCISCO, CAL., Nov. 7—A revision upward in prices of the Yuba Ball Tread Products is announced by the Yuba Products Co.

	Old Price	New Price
12-20 .....	\$2,470	\$2,600
15-25 .....	2,945	3,100
20-35 .....	3,975	4,185
25-40 .....	4,417	4,650
Rodebilder .....	4,755	5,000

All prices are f.o.b. Benicia, Cal.

### FARGO REDUCES \$600

CHICAGO, Nov. 7—The Fargo Motor Car Co. has announced a \$600 price reduction on its 2-ton tractor, old price \$2,500, new price \$1,900.

### WETMORE REDUCES

SIOUX CITY, IOWA, Nov. 7—The Wetmore Tractor Mfg. Co. has reduced the price of its 12-25 hp. tractor from \$1,650 to \$1,585.

### CLEVELAND MOTORCYCLE CUT

CLEVELAND, Nov. 9—A new price cut of \$40 has been made on the Cleveland motorcycle, made by the Cleveland Motorcycle Co. This brings the price down to \$185. Electric lighting equipment is \$35 extra.

### NEW KENYON TIRES

NEW YORK, Nov. 7—The C. Kenyon Co., Inc., announces reductions ranging from 8 per cent to 10 per cent on its various sizes of cord tires and tubes. It also announces a new line of brown tubes the prices of which range from 30 cents to 90 cents less than its red tubes. The company announces a new line of heavy service tires and tubes. These tires range in size from 30 x 3½ to 36 x 6. The tubes for this line run in size from 30 x 3½ to 44 x 6.

## Validity of Gasoline Tax to Be Determined

HARRISBURG, Nov. 7—The constitutionality of the new state gasoline tax of 1 cent a gallon will be put to the test, according to state officials, as a result of the refusal of the Atlantic Refining Co. to pay the tax on gasoline sold for export, interstate commerce or manufacturing.

The company sent to Auditor General Lewis a check for \$39,426, representing the tax on gasoline sold for internal combustion or motor vehicle gas engine and similar purposes, but informed him it did so under protest, having been advised by counsel that the act was unconstitutional.

## Revenue Legislation Retains Excise Tax

### Bill in Conference Provides 3 Per Cent Despite Efforts to Remove It

WASHINGTON, Nov. 7—Efforts of Senator Townsend of Michigan to exempt automobile trucks and automobiles from the present 3 per cent excise tax failed and the Internal Revenue bill now in conference contains this feature, which is objectionable to the automobile industry. The Michigan senator used all available parliamentary tactics in order to secure consideration of his amendment which would strike out the proposal of the Senate Finance Committee to retain the tax. Senators opposing the exemption insisted that the Government needed this revenue and that buyers of trucks could well afford to pay it.

### Farmers Need Trucks

Senator Townsend said:

"I believe that automobile trucks and automobiles are two of the things that ought not to pay a tax, any more than any other vehicle of transportation should pay a tax. I think the prosperity of the country to a great extent depends upon these vehicles. They are already paying a heavy tax. The automobiles and automobile trucks pay, perhaps, a heavier tax than is paid by the various implements that are used by the people. They are practically supporting the roads; they are maintaining the roads, and in some of the states they are building the roads by the taxes that are put upon them.

"Every motor truck is used for a useful purpose, and not for pleasure. It is used in the business of the country and contributes very largely to the carrying on of the business of the country. There are hundreds of thousands, probably at least 200,000, of these trucks owned by farmers, and they are going to be more and more extensively owned and used by them for farm work."

According to Senator Penrose, chairman of the Senate Finance Committee, "if there is one feature of the tax bill that is not complained of, it is this. The tax furnishes a very substantial revenue; and if the Senate is going to begin to throw overboard taxes to this amount and of this character, we might as well stop entirely attempting to raise sufficient money for the requirements of the Government."

### Favors Exemption

In support of Senator Townsend's argument, Senator Heflin, of Alabama, said:

"The Senate should vote to exempt these trucks from the tax provisions of this bill. Surely if the great holding companies of the country can have their millions exempt and the profiteers can have \$450,000,000 handed over to them, the Senate can well afford to take the taxes off the automobile trucks. The automobiles that are used over the country generally should be exempt from the tax provisions of this bill."

Because of the widespread interest of the automotive industry in this question, Senator Townsend was successful in obtaining a record vote on the proposal to abolish the tax.

## Receiver Is Named for Lincoln Motors

### Company Files Voluntary Petition in Bankruptcy—Lelands Opposed to Move

DETROIT, Nov. 9—A voluntary petition in bankruptcy was filed in Federal Court here to-day by the Lincoln Motor Car Co. after a directors' meeting yesterday at which this action was decided upon by a vote of 6 to 3. The Detroit Trust Co. was appointed receiver by Judge Arthur J. Tuttle. Assets were estimated at \$14,800,000 and liabilities at \$8,237,280.

The directors who voted against the filing of the petition were President Henry M. Leland, Vice-President Wilfred C. Leland, and William T. Nash, secretary and treasurer.

#### Reorganization Considered

A statement by the Detroit Trust Co. says the assets include land, buildings, machinery and other plant investments valued at \$7,800,000; tools and merchandise, including finished cars and cars in process, valued at \$3,000,000; cash accounts and bills receivable amounting to \$800,000, and other assets valued at \$2,500,000.

The indebtedness includes merchandise accounts to the amount of \$1,868,000; obligations to banks, fully secured by indorsements, aggregating \$4,250,000; a mortgage for \$1,882,000 and land contracts involving \$237,280.

The trust company has taken possession of the company. The inventory which has been started will continue for several days and until completed manufacturing has been stopped. The service department of the factory will continue operations. Plans for a reorganization are under consideration.

#### Leland Wires Distributors

The following telegram sent by President Leland to Lincoln distributors voiced the undaunted courage of one of the "grand old men" of the automotive industry:

"Over our protest the board of directors of the Lincoln Motor Co. has consented to the appointment of a receiver. The Lincoln car during a period of unprecedented financial difficulties has demonstrated its supremacy in the automobile world, and while this receivership will compel a reorganization of the company we are starting with undaunted courage to build a greater and more united organization to carry the enterprise to complete success. We are confidently counting upon the loyal co-operation of our distributing organization and of the whole Lincoln personnel. We hope and expect that the receiver will carry on the manufacturing departments so that you can keep your business intact, and we will use every effort to hasten the time when the new Lincoln company can again give you the support that your splendid work deserves. With your advice and co-operation we are bound to succeed. Please tell your dealers and all our friends that the Lincoln company is taking a fresh start on the road to success."

Within a short time replies were received from distributors and dealers in all parts of the country, urging that the business be carried on vigorously and promising continued co-operation in the marketing of the car.

Ralph Stone of the Detroit Trust Co. issued the following statement in reference to the causes for the bankruptcy petition:

"The company perfected its models and incurred the initial expense necessary to place them upon the market just prior to the beginning of the period of depression which has adversely affected all kinds of business. This preparation involved the installation of factory machinery, special tools and the purchase of a large inventory at the peak of high prices. This placed a financial burden on the company which was more than its financial resources could properly sustain, in the absence of a volume of sales which, under conditions in the automobile industry and in business generally at that time, it was fully expected would be made. The management of the company was encouraged in this belief by the favorable reception of the new models by purchasers of high class automobiles, and this has been borne out by the fact that the sale of Lincoln cars has increased steadily, and for September and October has been the largest since the company started manufacturing."

#### Lost Stock B Control

No statement has been made by the Lelands covering plans for bringing about a reorganization of the company. They were the founders of the corporation and were understood to control a majority of the class B stock. There has been much speculation within the industry for several weeks concerning the fate of the company. A financial crisis was averted last year when the Lelands and the board of directors endorsed \$5,000,000 bank notes. In July a \$2,500,000 mortgage was authorized, of which leading directors purchased \$1,250,000. Recently another \$500,000 has been added.

(Continued on page 947)

## Seven Months' Goodyear Sales Total \$62,421,179

AKRON, Nov. 9—Net sales of the Goodyear Tire & Rubber Co. for the seven months ended Sept. 30, 1921, were \$62,421,179, according to a report issued to stockholders. Net earnings, available for interest and fixed charges, were \$6,838,486. Interest charges amounted to \$2,319,604, while other miscellaneous charges and adjustments, mostly losses on liquidation of fixed property and adjustment of inventories in subsidiary companies, aggregated \$1,123,028. The net surplus amounted to \$3,395,853.

The general balance sheet showed the company's ratio of current assets to current liabilities to be approximately 10 to 1. Its aggregate cash holdings, United States Treasury certificates and bank acceptances, totaled \$23,722,485.

Edward G. Wilmer, president of the company, in his remarks to stockholders, said sales of automobile tires during the first nine months of 1921 were in excess of the number of sales the same period last year.

## Gasoline Agreement Will Increase Output

### Standard Oil and Texas Co. Ac- cept Plan to Share Patents

CHICAGO, Nov. 9—Production of gasoline may be considerably increased by a business arrangement which has been entered into between two of the largest factors in the American oil industry. The Standard Oil Co. of Indiana and the Texas Co. have accepted a plan under which each has the right to operate under patents held by the other. These patents pertain to the pressure cracking of crude oil in relation to the manufacture of gasoline and other petroleum products. Furthermore, and of greater importance, either company may license others to operate under any and all of the patents under an agreed division of royalties.

The granting of licenses to other companies to use these patented processes, through which the greatest percentage of gasoline is produced from crude oil, should result in benefiting the oil industry as a whole and also increase the supply of petroleum products essential for the use of internal combustion engines. Larger production of gasoline should prove a stimulus to the automobile industry.

The Standard Oil Co. of Indiana owns Burton, Humphreys, Clark and other patent rights, while the Texas Co. holds the rights on the Adams, Holmes, Manley and other patents. Through the Burton process, which was largely developed by Dr. William Burton, new president of the Standard Oil Co. of Indiana, nearly 50 per cent in gasoline is obtained from crude oil, whereas in 1910 the average was about 11 per cent and in 1920 about 26 per cent. The Standard of Indiana is one of the principal refiners and the Texas company one of the largest producers of crude oil as well as a large refiner.

## Van Briggie Executives Plead Guilty to Charges

INDIANAPOLIS, Nov. 9—L. H. Van Briggie, former president, and Harry S. Rominger, former treasurer of the Van Briggie Motor Devices Co., pleaded guilty in Federal Court here to the use of mails to defraud. They previously had entered pleas of not guilty. The request that date for sentence be changed from Nov. 7 to Nov. 14 was granted in order that Van Briggie might return to Detroit to arrange his affairs.

Charles A. Taylor, former general manager of the Van Briggie company, who was also indicted with Van Briggie and Rominger, was in court but did not change his plea of not guilty. It is understood that the district attorney will petition the court to dismiss the case against him.

## Implement Trade Advances in Texas

**Predicted That Spring Will See 35  
Per Cent Increase Over Same  
Period in 1920**

DALLAS, Nov. 8.—The farm implement business in Texas, which has suffered an unprecedented slump during the past thirty months, is assuming a rosy hue and will show material increases in the spring of 1922, according to dealers from all sections of the State. It is generally predicted that the increase will be 35 per cent over the business for the spring of 1921, when a good increase was shown over the preceding year.

The dealers make these predictions after a close survey of the situation, personally and from reports of salesmen who are patrolling every nook and corner of the State. There appear to be no favored spots. The dealers alike are saying the business is on the upgrade and that the increases are coming.

### Farmers Over-bought

The cause of the phenomenal slump in the farm implement business according to practically every dealer in the State was due to two things:

First—Poor crops and money stringencies.

Second—The farmers over-bought themselves in 1918.

As to the first, the retailers say the situation is materially better now. There is more money in circulation and the farmers are in a better position to buy. The farmers are diversifying their crops and this calls for a variety of implements.

Of the second, the dealers say that the implements bought three years ago, many of them at least, are gone and must be replaced. They state that the farmers are making inquiries and that farmers do not make inquiries about implements until they need them and when they need them they are going to buy.

### Normal Conditions in 1923

From south Texas dealers, who sell to south and east Texas farmers, the predictions for retail farm implement business in the spring of 1922 are especially glowing and the dealers are more than encouraged.

The notes of better business, however, are not being poured out by south Texas dealers alone. The Dallas farm implement dealers see better business ahead. In fact, they have been enjoying a pretty brisk business for several months. Unlike the Houston dealers they have a large territory to cultivate and a great variety of implements to offer.

It is said that the farm implement business so far as Dallas is concerned, is much better at this moment, and has been for months, than the business in south Texas because of the varied territory sold and the fact that the grain, cane and north Texas and Oklahoma

### ALTHOUGH DURANT DIRECTOR, MINIGER SAYS HE WILL NOT LEAVE WILLYS

NEW YORK, Nov. 9.—The following statement has been received by AUTOMOTIVE INDUSTRIES from C. O. Miniger, president of the Electric Auto-Lite Corp. and vice-president of the Willys Corp., whose contract with that corporation will expire, it is understood, next July.

"There is positively no truth in the rumor that I am to leave the Electric Auto-Lite Corp. and my Willys connections to go elsewhere. I have never considered it in the past and am not considering it now. The statement which has gone forth is absolutely false. I have accepted a directorship in Durant Motors of Indiana and probably will become a director of Durant Motors, Ltd., of Canada, but that will only strengthen the business position of the Electric Auto-Lite Corp."

Miniger's election as a director of Durant Motors of Canada has been announced in the Dominion. Up to this time he has not been elected a director of Durant Motors, Inc., parent of the various Durant subsidiaries.

It was stated in AUTOMOTIVE INDUSTRIES of last week that he would leave the Willys organization some time before Jan. 1.

cotton farmers made more money than the rice, vegetable and east or south Texas cotton farmers. The farm implement business in Dallas is 67 per cent normal right now. An increase of 35 per cent in the spring of 1922 over the spring of 1921 would make the business at least 82 per cent normal, and with a good grain and cotton crop the business would probably get back to old strides in the spring of 1923, while it will probably be a year later with the south Texas dealers.

## Portland Continues Good Trade Record

PORTLAND, ORE., Nov. 8.—A surprising and most satisfactory continuance of good business has marked the automobile market in Portland during October. The first few days of the month were unusually good, due to the fact that another discount in the State license tax for the year went into effect at that time. After that, however, there was a falling off of business, judging from the daily reports of license applications and the statements of leading automobile men here.

After but a brief lull there was an improvement in business, however, which continued throughout the month. Drops in prices of a number of cars, bringing out of new models and continued fair weather are given as the causes, in addition to the general improvement in the tone of all business.

## Terminal Delays Costly in Britain

**Engineer Urges Adopting of Im-  
proved Loading and Un-  
loading Apparatus**

LONDON, Oct. 29 (By Mail)—W. Williamson, engineer to Walker Bros., makers of Pagefield trucks, in a paper at the Truck Congress during the recent Olympia truck show dwelt on the problem of reducing terminal delays—the greatest bugbear of road automotive traction in Britain.

The problem of reducing delays, terminal and intermediate, he pointed out, divides itself into three sections:

1—The provision of specially equipped bodies facilitating the rapid handling of loads in detail or the provision of detachable bodies with suitable mechanism enabling them to be run rapidly on or off the chassis.

2—The provision of special equipment at the motor user's loading stage, as, for example, cranes, ramps or runways.

3—The special equipment of the chassis itself, as, for example, the fitting of gear for operating a tipping body, an overhead crane for loading purposes, or a winch operated by the engine power.

A 7000-lb. truck at present averages about 30 shillings a day for standing costs, which is equivalent under normal exchange to 8 cents a mile per 90 miles daily; and 12 cents for 60 miles per day. This represents a constant loss of 4 cents a mile, and on a yearly mileage of 12,000 is equivalent to a cost of £100. To equip a truck with a gantry frame and runway and interchangeable skip, bodies would cost about this sum, yet it is the exception here to find a truck so fitted; at most, one sees only a power windlass and occasionally a derricking crane slung at the back.

### NAME BUCKEYE RECEIVER

INDIANAPOLIS, Nov. 9.—On application by John W. Lambert, one of the principal stockholders and creditors of the Buckeye Mfg. Co. of Anderson, Judge Ellis Madison of the Superior Court has appointed Linfield Myers, president of the Madison County Trust Co., receiver for the Buckeye company. The plaintiff alleges that the liabilities approximate \$175,000 with assets in excess of that amount. The condition of the tractor market is said to have been the cause of the receivership. The company originally manufactured automobiles.

### AUBLE SELLING DURANT

CHICAGO, Nov. 7.—W. C. Auble, under the firm name of W. C. Auble Motor Co., has been awarded the Durant franchise for the distribution of the new Durant cars in the Chicago territory. Territory included in the Auble contract consists of Illinois from Springfield north, northeast section of Indiana, river counties in Iowa to and including Dubuque, four counties in Missouri and southwest Wisconsin.

## G. M. Is Testing Air Cooled Motors

### Production Delayed Pending Conclusion of Preliminary Work on New Models

NEW YORK, Nov. 9.—The recent strength of General Motors stock in Wall Street is attributed by financial writers for the New York papers to a report that the corporation soon will bring out an air-cooled engine which "will revolutionize the industry." The fact that General Motors proposes to put an air-cooled car on the market has been known within the industry for months but details have been withheld pending the completion of experimental work.

In order to set at rest the various rumors in circulation about General Motors plans in connection with air-cooled cars, the following statement was made to AUTOMOTIVE INDUSTRIES by Pierre S. du Pont, president of the corporation.

"The General Motors Corp. has been experimenting for several years past with air-cooled types of motors, as also it has been developing other types of motors and improvements incident to automotive practice. This work is conducted by a subsidiary of the corporation known as the General Motors Research Corp. and located in Dayton, Ohio, under the direction of C. F. Kettering.

"The development of air-cooled motors has reached a point where experimental models have been completed and exhaustive studies and tests are now being conducted.

"As to when production will commence, what manufacturing divisions of the corporation will develop and sell these models, all this, of necessity, must be held in abeyance until such time as the experimental development work is finally completed and the corporation is assured that its new products, which it must necessarily stand sponsor for, are everything that might be desired."

## Farmers in Northwest Soon to Start Buying

SEATTLE, Nov. 9.—Farmers of Washington, Oregon and Idaho are going to spend the proceeds of bumper crops in part for automobiles and automotive supplies. This is evidenced by a survey made by representative farm journals of the three states—the *Washington Farmer*, *Idaho Farmer* and *Oregon Farmer*. Each of their 6,000 subscribers received a questionnaire covering his prospective purchases of all kinds. On the basis of returns an average was computed and applied to the total of 158,600, which is the estimated number of farmers in the three states.

In this way it is figured 7206 farmers will buy automobiles in the near future. No fewer than 38,249 will buy tires soon. Purchasers of dry batteries number

19,130, while 3085 need storage batteries. Accessory shops in the three States may expect to sell 5727 carbureters before many weeks are past. There will be 2352 motor trucks disposed of, also 828 tractors and 746 tractor plows.

Other accessories and gas engine equipment which will be sold, according to the survey, include 2542 magnetos, 15,050 piston rings, 4771 roller bearings, 5564 shock absorbers and 2688 gas engines.

## Owen Magnetic Property Is Sold by Receivers

WILKES-BARRE, PA., Nov. 9.—Negotiations for the sale of the plant of the Owen Magnetic Motor Car Corp., at Forty Fort, near here, were completed to-day and merely await confirmation of the court. The sale was conducted by the receivers. The ground and buildings were purchased by Frank F. Matheson, the local Dodge dealer, and a former member of the firm of Matheson & Co., makers of the Matheson Silent Six. He is a brother of C. W. Matheson, who is general sales manager for the Dodge Brothers Motor Car Co. The purchase price was \$94,000. Matheson announced to-day that he intends to remodel the plant and convert it into a garage. The main building is 80 x 600 ft., and there is an additional wing 80 x 200 ft.

The machinery was sold to A. Lamberg of New York for \$102,000. The cars in stock, patterns, drawings, jigs and materials in process were purchased for \$18,700 by D. S. Dryer of New York.

## Low Prices Clean Up Texas Used Car Stocks

DALLAS, Nov. 9.—There was no sagging in the automobile business with the retail dealers during the first week of November. In fact the retailers did more business during the first week of the month than they did during the closing week of October.

While low priced cars were selling, the week appeared to be the best of the year for the higher priced cars.

Owing to the fact that retailers, many of them at least, put on unique sales, and quoted prices that were astonishing, there was a large number of used cars moved. The Dallas dealers were not alone in the pushing of such sales. Retailers throughout Texas appeared to adopt the week as "used car" week and advertised and sold them extensively. Several dealers report they had cleaned out their cars taken in on trade.

## S. A. E. SECTIONAL MEETING

MINNEAPOLIS, Nov. 9.—A dinner meeting of the Minneapolis section of the Society of Automotive Engineers was held here in the Manufacturers' Club. Speakers were Professor A. F. Moyer on Rotative Balance, A. H. Bates on Engine to Ground Power Absorption in Tractors, and F. E. Kenaston on The Relation of the Banker to Industry.

## Australia Lowers Duty on Tractors

### Tariff Reduced from 40 to 10 Per Cent—Caterpillar Type Favored

LOS ANGELES, Nov. 8.—The caterpillar tractor is to be greatly favored by the new Australian tariff and indications are that America's exports of tractors will hereafter be largely confined to this type. The Australian Parliament recently adopted an amendment to the tariff act, providing that tractors "which are not produced in Australia" shall pay a duty of 10 per cent instead of the 40 per cent duty hitherto charged. The intention of this amendment was to exempt caterpillars, but the decision as to which tractors shall be taxed at the reduced rate has been left to the new tariff board, which has not yet been constituted.

### Extremes of Weather

Conditions greatly favor the use of the caterpillar in Australia. The character of the soil differs so much that only a machine which can work in all kinds of land will prove economical. Then, too, Australia has extremes of wet and dry weather, with mud so deep and sticky in wet weather as to disarm a round wheel tractor, and the ruts so deep as to embarrass it when the ground begins to dry. In moderate weather, when the ground is soft, dry and flat, the round wheel works well, but even then is likely to strike patches of clay or other material which impede its operations.

## New Cole Series Shows Refinements in Design

INDIANAPOLIS, IND., Nov. 10.—A new Cole series has been announced embodying twenty-four different improvements, mostly in detail design, equipment and finish. Perhaps most important among these improvements is a re-designed aluminum piston of the constant clearance type. Thermostats are now incorporated in the cooling system, and the design of the oil pump has been improved. The clutch has also been re-designed and now is fitted with a clutch brake and is easier to operate, requiring less pedal pressure.

The spring shackles are now adjustable; the radiator is mounted on coil springs and the frame has been materially stiffened by the addition of tubular cross members. The strength of practically all structural parts has been materially increased and anti-rattle features have also been given considerable attention, heavier anti-squeak material being used wherever necessary. Improvements have also been made in the trim and in the finish of both chassis and body. The general specifications of the car remain the same and there has been no change in price.



## South Africa Will Make Truck Bodies

### Machinery Also Being Imported for Greater Manufacture of Spare Parts

JOHANNESBURG, Oct. 5 (*By Mail*).—The general aspect of the automobile trade is showing decided signs of improvement both in rural districts and elsewhere. Better sales records are being shown by most dealers and an optimistic spirit prevails. The tire companies are piling up sales records that bid fair to pass the 1919-20 mark.

Sales can be made every day but most tire companies and dealers find that the supply does not cope with the demand for popular sizes. This especially refers to cords. Such a condition applies to the Union only. There does not seem to be much change in Rhodesia but further north in Nyassaland there is a period of acute depression that is threatening the budding motor industry there.

Machinery is now being imported from the United States and Europe for the manufacture of steel bodies for trucks in Johannesburg and the necessary plant is also being imported by a number of firms for the manufacture of spare parts for all classes of automobiles.

In some cases the parts turned out by the different engineering works are produced in quantities and sold to dealers who stock them regularly, whereas in former days service stations had to rely on imported articles. Instances have occurred when orders have been placed with local firms for certain parts and the results were so satisfactory that orders were given immediately for large quantities.

This applies, of course, to comparatively simple jobs but as the industry expands the manufacture of spares and parts will expand accordingly so that in time the importation will come to an end except in cases where it will be cheaper to import the more complicated sections of engines, etc.

## Receiver Is Named for Lincoln Motors

(Continued from page 944)

The directors, it is understood, refused to sell the remaining authorized bonds or any unused company property. The Lelands held out for this alone, although they had surrendered control of their class B voting stock to assure previous financing. A glimmer of hope came last week with an offer of help from New York interests but this source of relief failed.

Universal regret is expressed in all quarters of the industry because of the financial difficulties which the Lelands have met in their new enterprise which had its inception in August, 1917, when the Lincoln Motor Co. was incorporated with a capital of \$1,500,000 to manufac-

ture Liberty Motors for use by the United States Government in the European war. This company was supplanted in January, 1920, by a Delaware corporation formed to manufacture a high quality car. The plant, which was erected in Detroit at a very large expense, is one of the finest in the country.

The Lincoln car was placed on the market at an exceedingly inopportune time, making its appearance almost simultaneously with the beginning of the period of deflation. Considerable difficulty was experienced in getting under way, but once the merits of the car, which was designed by the man who had most to do with the building up of the Cadillac, were recognized by the public, sales steadily increased and the business would have been on a solid foundation but for the fact that it had been necessary to incur heavy obligations to put it on the market.

There is no man in the industry who is more generally and genuinely admired and respected than Henry M. Leland. He has been a bulwark of honesty and good faith and has exerted a powerful influence for honest manufacture for 20 years.

As soon as it became generally known that the company had been forced into bankruptcy, the hope was expressed in all quarters that the Lelands would be able to work out a reorganization which would leave them in control.

In addition to 160,000 shares of class B stock of no par value, the company has outstanding \$8,000,000 in 10 per cent cumulative class A shares with a par value of \$50. This stock was first offered to the public in January, 1920, at par and is listed on the Detroit stock exchange. It has been weak for the past two or three weeks on rumors of reorganization of the company.

## Franquist Obtains Piston Injunction

NEW YORK, Nov. 9.—An order for preliminary injunction has been granted by Federal Judge Learned Hand in the Federal Court for the Southern District of New York to G. E. Franquist, owner of Patent No. 1,153,902, restraining Walker M. Levett Co. of New York from manufacturing and selling pistons alleged to infringe the patent in question. The restraining order was broadly effective that date, but suspended until Jan. 1, 1922, in the case of pistons undelivered on one particular contract.

Franquist's invention makes provision for a smoothly fitting piston skirt at all temperatures. The skirt is slit in such a manner as to fit when cold and to be compressible under uneven expansion of piston and cylinder.

## LEE COUNCILMAN INJURED

NEW YORK, Nov. 10.—Lee Councilman, former sales manager for the Chalmers Motor Car Co., was dangerously injured when his car was struck by a Long Island Railroad train at Beechhurst. His recovery is expected, but he may lose the sight of one eye.

## METAL MARKETS

On the surface the steel market presents an appearance of calmness which might be mistaken for placid serenity when, in fact, it is but the lack of incentive, resulting from utter apathy on the part of consumers, that tends to maintain prices at nominally unchanged levels.

The sheet market is once more headed toward the same state of affairs which prevailed a few months ago when producers eagerly vied with one another to corral every desirable order in sight, maintenance of reasonably satisfying production schedules being a more vital consideration than maintenance of price. Then the outstanding explanation was that many mills were willing to take losses temporarily so as to stimulate demand and bring consumption back to more normal proportions. In the case of a large number of producers prices that a few months ago would have entailed a positive loss may now be sufficient to make both ends meet. This is due not so much to the slight economies that have been effected but rather to the downward adjustment in inventory values.

If cold-rolled strip steel which is now generally quoted at \$5 a ton higher than it was a few weeks ago, forms an exception, it is due the belief of producers that just as much business will come out at the higher levels as would at the former prices. Passenger car builders who are using this kind of steel in the making of fenders are not likely to have recourse to full-finished sheets because of this advance, which, moreover, brings cold-rolled more into line with the price for hot-rolled.

Expressive of the entire situation is the fact that non-integrated sheet mills which depend for their supply of sheet bars on other producers, are able to place orders for these once more at prices practically unchanged from those that existed prior to the market's advance on Sept. 15, to \$32. Quite a few of these sheet mills still have tonnage of bars coming to them on account of \$29 @ \$30 contracts and are specifying against these. The market for cold-drawn steel bars is decidedly soft.

Pig Iron.—Modest tonnages of malleable are being bought by automotive foundries in the Middle West for shipment over the remainder of the year. The market is quiet, consumers being in a "hand to mouth" mood of buying.

Steel.—Sales of cold-finished steel bars are reported to have been made at as low as 2¢ base. There are said to be resale offerings of automotive screw stock at that level and mills have been meeting it in some instances, although the market is nominally quoted at 2.25¢, base. The leading builder of low-priced passenger cars is reported to be in the market for a tonnage of forging bars. Some automotive orders for cold-rolled strip for shipment over the next three months are reported to have been placed.

Aluminum.—All sorts of rumors are circulating. One has it that the domestic producer is meeting the low prices quoted on European ingots, though the official quotation has undergone no change. Another report had it that large tonnages of cheap metal and sheets passed into consumers' hands. None of these can be verified. The market continues to bear every outward evidence of being deserted by buyers.

Copper.—Producers are once more making an attempt to elevate prices but there is plenty of copper to be had at below 13¢.

## INDUSTRIAL NOTES

Hayes Wheel Co. has established a sales and service branch at 250 West 54th street, New York City, for the purpose of supplying the eastern territory and export division. Donald Ganiard will leave the general offices of the company at Jackson, to take charge and will be assisted by L. J. Curry, formerly with the Sales Service Co. at Philadelphia, as sales manager, and F. R. Symonds of the sales and service division of the Hayes Company at the home plant, to be in charge of stock, shipping and receiving.

Dewey-Collins Co., with offices in New York City, has been formed to act as manufacturers' sales agents. The company is composed of Martin A. Dewey, Jr., who formerly was with the Gemco Mfg. Co. and later sales manager for the Buckley Ralston Co. of this city and Thomas A. Collins who formerly was with the A. J. Picard Co., of New York. They already have taken on the products of several manufacturers.

Fuller & Sons Mfg. Co., Kalamazoo, will go into regular production of passenger car transmissions. During the dull period the company devoted the entire energies of its engineering and experimental departments in the development of two types of passenger car transmissions and is now prepared to produce the initial models. The styles will be suitable for both lighter and larger cars.

Quaker City Rubber Co. of Philadelphia has moved into its new modern five story building in Market street which will house the offices and sales rooms. Ample space has been provided to facilitate the movement of orders. The building which is of Indiana limestone and tapestry brick has been designed to promote the efficiency and comfort of employees.

Victor Rubber Co., Springfield, Ohio, is booking large orders for future delivery, according to President H. S. Berlin, due to recent price reductions. He states that an increase in production to a normal basis will be made within the next few weeks and that the expectations are that by December the output will reach normal.

Pierce-Arrow Co. reports that orders for parts necessary to complete 250 automobiles have just passed through its production department. This is an increase over the 200 cars produced last month and a large increase over production in the corresponding period a year ago.

Painesville Rubber Products Co. has acquired from the Middle States Rubber Co. of Cleveland the plant at Painesville, Ohio, formerly occupied by the Perfection Tube Co. The new company is incorporated for \$60,000 and will employ between 25 and 50 men.

Milwaukee Auto Engine & Supply Co., Milwaukee, has changed its name to Milwaukee Motor Products, Inc. There has been no change in the personnel or policies of the company.

Franklin shipments from the factory at Syracuse for the quarter ended Sept. 30 were 103 per cent of those for the corresponding period last year.

Advance Automobile Accessories Corp., Chicago, has absorbed the Rochester Woven Belting Corp., of East Rochester, N. Y.

## BUFFALO OPTIMISTIC

BUFFALO, Nov. 9—Regardless of the fact that fewer new cars were sold here during October than in September, and that the outlook is that November's busi-

ness will be slightly less than was October's, Buffalo's automobile dealers take into consideration the fact that October and November are the poorest business months in the year, anyway. They are sanguine that with the approach of the new year the pendulum will swing the other way and that long before the robins return from the southland the selling of automobiles here will be well on the way to normalcy.

## School of Industrial Journalism Is Opened

NEW YORK, Nov. 8—Fifty employees of the Class Journal Co., representing all departments and including a half dozen young women, attended their first lecture in the School of Industrial Journalism which has been established by the publishers of the leading business papers of the country.

The purpose of the course, which will cover 30 weeks, is to make the papers in the industrial field more valuable to their readers by means of a better rounded training for those who get them out. The first lesson was devoted to the fundamentals of business publishing and the lecturer was M. C. Robbins, editor of *The Gas Age*.

## Ford Says Country Is Coming Back to Normal

BUFFALO, Nov. 8—"Business conditions are improving everywhere." This was the statement made by Henry Ford during his stay in this city. Ford and his party arrived here from Green Island, where Ford had been inspecting his new plant. They left the following morning for Detroit in an imported English car. The entire trip was made in this car.

Ford discussed very informally problems of unemployment, unionism, prohibition, politics and the recent threatening railroad strike.

"Unemployment to-day is a problem created by the manufacturers," said Ford. "Many manufacturers who became rich during the war are now too lazy to open their factories."

It was suggested that the manufacturers claim that they have decreased production because the demand has diminished.

"No," replied Ford, "the trouble lies with the manufacturer who is neglecting to sense the public's wants."

"Business is picking up," he continued. "We are coming back to normal. It is difficult to say just what normal is, but the year 1915 might be called normal. In that year wheat was selling for one dollar a bushel. That is what wheat is selling for at this time. We might use this as one indication that we are approaching normal."

## WESTCOTT SHIPS TRAINLOAD

SPRINGFIELD, OHIO, Nov. 8—A trainload of seventy automobiles will leave the plant of the Westcott Motor Car Co. for the Chicago distributor this week. Orders received recently from Belgium are taken as showing the possibility of a revival in export trade.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

That the general trend of the money market is downward was hinted at in the interest rates for the recent offering of United States Treasury Certificates of Indebtedness, and was further confirmed during the past week when lower rediscount rates on all classes of paper were announced by all of the Federal Reserve Banks. The action of the New York bank marked the fifth successive reduction since last May.

Although the rates at the twelve institutions vary from  $4\frac{1}{2}$  to  $5\frac{1}{2}$  per cent at each individual bank a uniform rate is set for all classes of paper. Following the announcement of the reduction by the New York bank, the Bank of England on Thursday reduced its rediscount rate from  $5\frac{1}{2}$  per cent to 5 per cent. In spite of these general reductions, there was a tendency toward stiffening in the week's local money market. Call loans ranged from  $4\frac{1}{2}$  per cent to 6 per cent, as compared with 5 per cent to 6 per cent in the previous week, and renewals were negotiated at a ruling rate of  $5\frac{1}{2}$  per cent.

The effect of the lowering of the rediscount rates was perhaps noticeable in time money. Sixty-day maturities were quoted at 5 per cent, those from 90 days up to 5 months at  $5\frac{1}{4}$  per cent, and 6 months maturities at  $5\frac{1}{2}$  per cent to  $5\frac{3}{4}$  per cent, as against  $5\frac{1}{2}$  per cent for 60 and 90 day paper, and  $5\frac{1}{2}$  per cent to  $5\frac{3}{4}$  per cent for longer maturities up to 6 months in the previous week. Prime commercial paper was quoted at 5 per cent to  $5\frac{1}{4}$  per cent, as against  $5\frac{1}{2}$  per cent to  $5\frac{3}{4}$  per cent in the previous week. Although funds seemed to be readily available, the volume of transactions continued light.

The number of commercial failures reported for the month of October was 1713, with total liabilities of \$53,058,659. The number of October failures is the largest of any month this year, and is 790 more than in the month of October, 1920. Liabilities, however, were exceeded in amount in February and March. On Thursday of last week, wheat prices dropped to the lowest point of the year, when the Chicago wheat market reported sales at less than \$1 per bushel. Nearly all of the bonds on the list of high grade, long term securities touched new high levels during the past week, and one Government issue, the  $4\frac{1}{2}$  per cent Victory Loan, touched par for the first time in 1921.

## JAMES L. GEDDES IMPROVING

SPRINGFIELD, OHIO, Nov. 8—Announcement is made that the condition of James L. Geddes, chairman of the board of directors of the Kelly-Springfield Motor Truck Co., who has been in poor health for the past year and who a few days ago was stricken with paralysis, affecting his left side, is improving gradually.

## MEN OF THE INDUSTRY

**Myron E. Forbes**, who has been treasurer of the Pierce-Arrow Motor Car Company since August, 1919, has been made vice-president of the company. He will continue to act as treasurer. Forbes was one of the chief accountants of Haskins & Sells at the time the \$65,000,000 merger was effected by Deere & Co. Soon after he became auditor of Deere & Co., and later was appointed general manager of the Deere plant at Welland. In 1914, Forbes was made secretary and treasurer of the Syracuse Plow Co., a subsidiary of the Deere company.

**F. W. Fenn**, secretary of the motor truck committee of the National Automobile Chamber of Commerce, has been invited to deliver lectures on highway engineering and highway transport engineering in the following universities: He will speak at University of Michigan in February for the third successive year; at Syracuse University in December, at the Massachusetts Institute of Technology in March and at Toronto University on a date which has not been determined.

**C. G. Sinsabaugh**, who is widely known in the industry, has been appointed general manager of *Motor Life* by the new owner of that property. Prior to his becoming associated with *Motor Age* in 1905, an association that lasted ten years, he was connected with daily newspapers in Chicago. From 1915 to 1919 he served with *Motor* in New York and for the last two and one-half years has been with *Motor Life*.

**Frank M. Germane** has resigned as director and sales manager of the Marlin-Rockwell group, effective Dec. 31. He joined the old Standard Roller Bearing Co. in 1903 as western sales manager in Chicago. Two years later he went to the Philadelphia factory as sales manager and became successively general manager and vice-president until the company was absorbed by the Marlin-Rockwell interests.

**J. L. Irving** has been appointed general manager of the Rock Island Plow & Tractor Co., Rock Island, Ill. He became associated with the company twenty-three years ago, and since then served as branch manager, superintendent, assistant general manager and trade manager. He resigned in 1920 to engage with his son in the wholesale and retail tractor and implement business at Los Angeles.

**C. W. Price, W. R. Rasmussen** and **Frank W. Pardee**, long identified with the safety movement, have organized the Price-Rasmussen Corp. to extend consulting and personal service in public safety. Price, who was formerly general manager of the National Safety Council, is president of the corporation. Offices will be in the First National Bank Building, Chicago.

**Paul Kleiber**, president of the Kleiber Motor Truck Co. of San Francisco, was in New York this week looking into the prospect for export business. He is on his way to Atlanta, where his company proposes to erect a branch factory. Kleiber states that retail business on the coast has been satisfactory, although wholesale trade has fallen off heavily.

**John P. Franck**, for the past four years sales manager of the Guide Motor Lamp Mfg. Co., Cleveland, has resigned to become sales manager for the Thos. J. Corcoran Lamp Co. of Cincinnati. Franck is also sales manager for Dittwiler steering gears, Gallon, Ohio, and the Becker Varnish Co., Cincinnati. His offices are in Cleveland.

**A. B. Qualy**, assistant secretary of the Willys Corp. and private secretary to John N. Willys has been transferred to the Willys-Overland plant at Toledo where Willys will spend much of his time in future. The purpose of the move is to have some one stationed in Toledo who is thoroughly familiar with Willys' affairs.

**George A. Richards** has resigned as Detroit district manager for Firestone Tire & Rubber Co. to become manager of a department for Fisher Body Corp. He has been succeeded in the Firestone office by L. R. Jackson, formerly branch and district manager in California and Minneapolis.

**A. Z. Polhamus**, for the last year president of the Visible Pump Co., with offices at Fort Wayne and a plant at New Haven, Ind., has resigned. **S. B. Rohrer**, who for some time has been connected with the company as first vice-president and treasurer, has been elected president.

**H. S. Quick** has been appointed director of sales of the Auto Specialties Mfg. Co., St. Joseph, Mich., and will specialize in promoting sales in the shock absorber and jack division. He was formerly branch manager of the Chicago branch of the Hassler Shock Absorber Co.

**J. J. Wilson**, formerly in charge of the foundries of the General Motors Corp., has become manager of the foundry division of Hiram Walker & Sons Metal Products, Ltd., Walkerville, Ont., a new company which will make a general line of motor castings.

**Daniel G. Head**, formerly associated with the Federal miniature lamp division of the National Lamp Works of General Electric Co., has become sales manager of Culver-Stearns Mfg. Co., Worcester, Mass., manufacturer of automotive electric lighting accessories.

**R. E. Chamberlain** has been promoted to the position of general sales manager of Packard Motor Car Co. He has been connected with the company in other capacities since 1916, being assistant general sales manager for the last year.

**F. A. Morrison** has been appointed assistant secretary of the Maxwell Motor Corp. and assistant secretary of the Chalmers Motor Corp. Morrison has been connected with the Maxwell-Chalmers organization for several years.

**George C. McDonald**, for the past fifteen years identified with the steel castings industry in Detroit, has become associated with the Monroe Steel Castings Co. of Monroe, Mich., in charge of sales.

**William A. Henderson**, manager of the Dort Motor Car Co.'s body plant at Kalamazoo has resigned his position and returned to his former home in New York City.

**Allan A. Macool** has been appointed sales manager of the Flexo Co. of America, Philadelphia, manufacturer of an attachment for the Ford truck.

**W. H. Olmstead** has been appointed sales manager of Carlisle Tire Corp. and will be located at the factory at Stamford, Conn.

## TO SUE ROAD DEPARTMENT

LOUISVILLE, Nov. 7—Members of the Kentucky Motor Club, by a majority vote, have authorized the filing of a suit against the State road department to compel observance of a Court of Appeals decision given in 1917. The suit, if successful, will require that the fund derived from automobile license fees be applied to maintenance of completed highways in the State.

## FINANCIAL NOTES

**R. H. Collins** has made the initial payment of \$1,857,581 which is to be paid at the rate of \$23.33 a share to the stockholders of the Peerless Truck & Motor Corp. who have pledged their stock under an agreement whereby Collins will buy a maximum of 50,000 shares of the stock of the Peerless company at \$50 a share. Under the new purchase plan it is purposed to make payments in four installments over a period of from 18 to 36 months, a payment every six months, interest on the balance being at 6 per cent.

**Goodyear Tire & Rubber Co. of Canada, Ltd.**, reported for the quarter ended Sept. 30 net profits, after all expenses, interest charges, depreciation, etc., of \$200,129. This added to \$100,760, at credit of profit and loss account, brings the total to \$300,889. The balance sheet as of Sept. 30 last shows current assets of \$6,971,830, current liabilities \$1,701,836; inventories \$2,985,137; accounts receivable \$3,116,418; cash on hand \$870,275 and total assets \$14,139,804 against \$15,322,999 on June 30.

**Rickenbacker Motors Co. of Detroit** has been authorized by the Ohio Securities department to place 100,000 shares of common stock on sale in Ohio at a price netting the company 85. The company has an authorized capital of \$5,000,000 divided into 500,000 shares of common stock, par value \$10.

**Moline Plow Co.** reports that under the reorganization plan of Sept. 22, 1921, 92 per cent of the outstanding claims of creditors have been deposited. Time for depositing claims and all classes of stock has been extended to Nov. 21.

**International Motor Truck** showed net profits for the quarter ended Sept. 30 of \$12,634 after taxes and depreciation. For the nine months ended Sept. 30 net profits were \$540,668.

**Stewart-Warner Speedometer Corp.** reports sales and shipments during Oct. 1921 were 48 per cent in excess of October a year ago.

**White Motor Co.** has declared its regular quarterly dividend of \$1 a share, payable Dec. 31 to stock of record Dec. 10.

Kelly-Springfield  
Reduces Obligations

SPRINGFIELD, OHIO, Nov. 9—The Kelly-Springfield Motor Truck Co. reduced its obligations to trade creditors from August, 1920, to Oct. 22, 1921, by \$448,507.80. Its unpaid balance represented by open accounts and notes payable to trade creditors amounted on the latter date to \$211,454.12.

The quick assets of the company aggregate \$3,517,388.92 and the quick liabilities \$1,562,912.51; the excess quick assets are \$1,988,472.47. The liabilities include accounts payable of \$135,767.21 and notes payable of \$1,427,145.30. A large portion of the notes payable consist of notes to banks and bankers.

The company's plant is in operation at this time. Efforts are being directed by the company on the development of special equipment for additional fields in which it is a rapidly increasing demand for its product.

# Calendar

## SHOWS

- Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.
- Nov. 27-Dec. 2—New York, Automobile Salon, Hotel Commodore.
- Jan. 28-Feb. 4—Chicago, Automobile Salon, Hotel Drake.
- Jan. 7-13—New York, National Automobile Show, Madison Central Palace, Auspices of N.A.C.C.
- Jan. 28-Feb. 4—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.
- Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.
- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

- Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

- Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.
- Nov. 4-12—Car Show, Nov. 28-Dec. 3—Motorcycle Show.
- Nov. 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.
- Nov. 12-27—Buenos Aires, Annual Motor Show, La Pabellon de las Sosas, Automovil Club Argentino.
- Nov. 26—Dec. 3—Shanghai, China, Automobile Show.
- March, 1922—Santiago, Chili, Annual Automobile Show.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

- Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

- Nov. 14-19—Chicago, Annual Meeting and Business Exhibit of Automotive Equipment Association.
- Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.
- Nov. 21-23—Atlanta, Third Annual Convention of American Farm Bureau Federation.
- Dec. 6-8—Chicago, Second Annual Meeting of American Petroleum Institute.
- Dec. 10—New York, American Institute of Mining and Metallurgical Engineers.

- Dec. 20—Philadelphia, American Society of Mechanical Engineers.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.
- Jan. 17-20, 1922—Chicago, American Road Builders Association.
- Jan. 30-31—Chicago, Fifth Annual Convention, N. A. D. A., La Salle Hotel.
- June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.
- Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.
- S. A. E. MEETINGS**
- Detroit, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.
- New York, Jan. 11-14, 1922—Annual Meeting.
- Chicago, Feb. 1
- Minneapolis, Feb. 8—Tractor Meeting.

## Theft Is Hazardous Under Missouri Law

### Bestor Statute Places Motor Vehicles on Same Basis as Real Estate

ST. LOUIS, Nov. 7—Motor vehicles are placed on much the same basis as real estate and theft of them is made hazardous by the Bestor motor vehicle law, which became effective this month. The law revises all State statutes on motor vehicles and makes laws applied about the same in country as in city.

One of the provisions intended to stop automobile thefts is the requirement that each owner of a car obtain from the commissioner of motor vehicles a certificate of ownership which must be passed with each sale of a car just as a deed passes with a sale of real estate.

No license plates may be issued until such a certificate has been obtained, \$1 paid and all data by which the individual car may be identified, furnished. Every owner of a motor car in the State must obtain a certificate within four months after the law goes into effect.

The certificate is good until the car is sold. Then it must be indorsed with a warranty of title and transferred as a deed. The new owner must present the assigned certificate when he gets his license plates. In case the car is sold out of the State or dismantled, the certificate must be returned to the commissioner of motor vehicles. Sale of a car without transfer of the certificate is declared unlawful, fraudulent and void.

The police may require drivers of cars to establish ownership by production of the requisite certificate, and the commissioner of motor vehicles is required to help trace stolen cars taken into other States.

Dealers must make monthly reports to the commissioner of all cars sold. Gar-

age proprietors must keep a record of cars owners and identification marks on all cars they store. Obliterating or altering a motor number is declared *prima facie* evidence of larceny. Garage owners are required to notify the police of such cases and to hold cars 48 hours.

## Good Highways Bill Signed by Harding

WASHINGTON, Nov. 9—President Harding to-day signed the highway bill, bringing to an end the long fight over good roads. The Bureau of Public Roads will now select the States and roads where the funds will be distributed. In explaining the fundamentals of the law, Senator Townsend, who sponsored the bill, says:

"Before any state can participate in Federal aid it must lay out a system of roads approved by the Secretary of Agriculture, consisting of not more than seven per cent of the road mileage of the state. Three-sevenths of that percentage shall be interstate mileage, connecting with similar roads in adjacent states and four-sevenths inter-county roads, connecting with the inter-state highways.

"Fifty per cent of the state's share of the Federal money will be spent upon interstate roads until they are completed, and, with the consent of the state highway department, all of this money may be spent on these highways."

## NEW NASH SERIES

KENOSHA, Nov. 10—The Nash Motors Co. announce a new series of six-cylinder cars, including five and seven-passenger touring, roadster, coupé, sport model and sedan, to be known as series 691. The major specifications remain the same as for the current model, but several refinements in details have been incorporated. The bodies are characterized as being of the straight line type and are of lower appearance. The spring suspension has been slightly altered to give improved riding qualities. Delco electrical equipment is now employed.

## California Demand Brisk in New Cars

### Improvement Is Also Apparent in Movement of Used Stocks

OAKLAND, Nov. 7—Conditions in the automotive merchandising industry throughout California are improving, though business is slower in some sections than in others, according to Robert W. Martland, secretary-manager of the California Automobile Trade Association, who has just completed a trip of several thousand miles through California, in which he held meetings of bankers, business men and automobile dealers in more than 50 cities and towns. He said:

"Motor car dealers report the demand for new cars brisk, and that used cars are moving faster now than they were a few months ago. Many of the dealers are taking serious losses, however, in order to clean up their stocks of used cars and square away for winter and spring business. Eastern motorists, dealers and repairmen whom I have met in various parts of the state were surprised at the excellent conditions prevailing in the automotive industry in California.

"Comparatively speaking, California is prosperous and the automobile dealers are more than 'breaking even.' Here, in the San Francisco section, members of the association are reporting a gradually increasing demand for cars and all expect an improvement in business during the winter.

"With nearly half a million passenger automobiles in operation in California, it is small wonder that the members of our association, who do most of the repair work, are going ahead. I find that the men who are dealing fairly with the public, setting their prices low enough to stay above board, and still are doing good work, are getting the business. Price-cutters are having a hard time of it, because the cost of standard articles has been reduced to such an extent that the public would rather buy a good article at a low price than pay a little less for an inferior article."



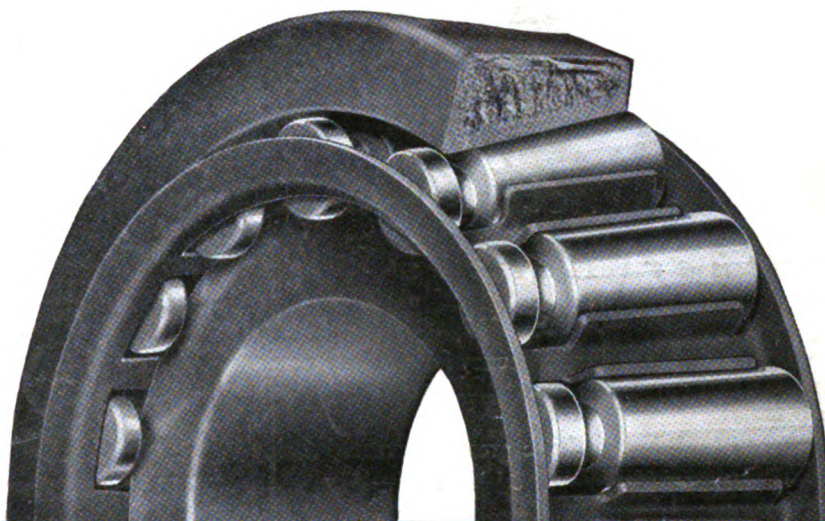
# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

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Thirty-five cents a copy  
Three dollars a year



Conservación de fuerza es uno de los rasgos característicos en cuanto a utilidad de las Chumaceras Cónicas de Rodillos Timken. Ellas evitan grande y frecuente lubricación y, debido a su propio diseño, las ensambladuras de chumaceras resultan más livianas y compactas.

Conservation of power is but one phase of the utility of Timken Tapered Roller Bearings. They eliminate the frequent lubrication bug-bear, and by their very design make possible lighter and more compact bearing assemblies.

The original Spanish, and the American translation, of a Timken Bearing advertisement printed in *Automovil y Sports* of Buenos Aires

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

Timken Tapered Roller Bearings for Passenger Cars, Trucks, Tractors, Trailers, Farm Implements, Machinery, and Industrial Appliances

# TIMKEN

## *Tapered*

# ROLLER BEARINGS





# Conservation of Capital

## *Another Reason for Concentration in Buying*

The expenditure of vast sums of money for surplus stocks is inevitable today in the successful manufacture of motor cars.

Many executives, however, have greatly decreased such expenditure through concentrating their purchases in one source of supply.

One item of expense that may be materially lessened through centered buying is the purchasing of automobile body hardware *exclusively* from Ternstedt.

Ternstedt Equipment is delivered to your door just as you require it. All units, being of standard design, you have waiting at the Ternstedt plant an immense reserve, instantly ready at your call. There is apparatus for every possible need.

As you pay for Ternstedt Hardware only as you receive it, capital, ordinarily invested in heavy surplus stocks, is released for other purposes. The saving is quickly apparent.

Those who have become familiar with this and the many other advantages of concentrating in Ternstedt are specifying Ternstedt Hardware *exclusively*. The list is large and rapidly growing.

Ternstedt Manufacturing Company  
D E T R O I T



Trade Mark Registered

**Concentrate on  
Ternstedt Products**

Window Regulators  
Curtain Rollers  
Sunshades  
Open and Closed Body Door  
Locks  
Door Panels  
Door Bumpers  
Anti-rattlers  
Windshield Wipers  
Windshields  
Window Sash  
Strap Hinges  
Concealed Hinges  
Piano Hinges  
Rear Deck Hinges  
Rear Deck Locks  
Rear Deck Lid Braces  
Channel and Shapes  
Screw Machine Products  
Die-Castings  
All kinds of Stampings  
Other Miscellaneous Auto-  
mobile Hardware

# TERNSTEDT

## *Automobile Body Hardware*

...BUILT BETTER FOR BETTER BODIES...

LARGEST MAKERS OF AUTOMOBILE BODY HARDWARE IN THE WORLD

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, NOVEMBER 17, 1921

No. 20

## Statistics for Use in Making Sales Plans

Here is statistical data never before available. More detailed material will follow. This article discusses the use of such information and general trends in the passenger car field. Industry shown to be on sound basis for future progress.

By Norman G. Shidle

**T**HE marketing problem of the automotive manufacturer divides itself in a general way into two parts and in working out that problem studies are likely to follow two general lines. The first of these consists of the principles of marketing which underlie all sound procedure. In this field might be included all those studies designed to lay out the various factors involved in automotive marketing, to determine the relation between these various factors, human, statistical and economic, the unit cost of marketing, and the other fundamentals upon which rests the development of effective practice and performance.

These form a basis, and current marketing discussions in AUTOMOTIVE INDUSTRIES are designed to contribute constructive thought along these lines. In addition to such fundamental studies, however, another phase of marketing must be considered which includes the assembling and proper interpretation of actual facts as regards the industry and its marketing possibilities. This includes the development of accurate statistical data, compiled to aid in the solution of definite selling problems.

Such accurate data is extremely difficult to obtain concerning the automotive industry, as has been

pointed out before, yet once compiled and properly utilized by individual firms within the industry it might materially reduce marketing costs and greatly aid the return to a strong economic position.

In connection with statistical data concerning the automotive industry then, there are two major requisites:

1. Statistical data must be accurate.
2. It must be sanely interpreted, due emphasis being given to factors affecting the situation which cannot be reduced to statistical form.

These requisites cannot be fulfilled except through very extensive and careful research and through an intelligent and analytical consideration of the results of such research.

Such data as regards certain phases of the automobile industry, AUTOMOTIVE INDUSTRIES is able to present for the first time.

For marketing purposes it is essential that all material be presented in segregated form, since the marketing of each kind of automotive vehicle constitutes a problem in itself. General data concerning a given type of vehicle will enable the manufacturer to visualize the present condition and future possibilities of the industry as a whole and to discuss intelligent-

ly what is likely to happen during the next few years.

With this general picture as a background he will want more detailed data concerning the developments within his particular price class, in given sections of the country, etc. Upon the basis of these more detailed statistics he will be able to analyze the market for his own particular product more accurately and to direct his sales effort more efficiently.

Within the scope of a single article only one of these phases can be adequately discussed. The charts presented here are designed to show what may reasonably be expected in passenger car sales, production and registration during the next two to five years. The information presented by the charts is valuable because of the accuracy of the figures used and because of the soundness of the basis upon which the moderate predictions are made.

It is important that the basis upon which the figures were compiled and the charts drawn be thoroughly understood before any attempt to interpret the results is made. This is true because no intelligent interpretation of any set of figures or charts can be expected unless the details of the statistical work are understood.

All interpretations of statistical work are not sufficiently concerned with this phase, and as a result statistical data of some relative value has been misinterpreted in the past. Considerable harm can accrue both to an industry and to an individual marketing plan through a hasty interpretation of statistical results which fails to consider the factors involved in the statistical work.

The charts presented here have to do specially with the passenger car part of the automotive industry. The first chart shows passenger car production figures, and the second chart passenger car registration figures. The first is merely a general progress curve designed to show the trend of any industry over the three periods of its development.

Mr. Prescott's explanation of the bases upon which these results were built up follows:

The growth of population of all countries as well as their economic activities, i.e. farming and industry, all extractive industry excepted, seem to follow a defined growth which passes through four stages in the course of its progress. These four stages are: period of experimentation, period of growth into social fabric, through point of "Diminishing Returns," into period of stability. Knowing the fundamental curve of growth that industry seems to follow with uncanny accuracy, it is not difficult to conceive that when one part of that growth is known the other can be forecast. To explain past performance and predict the future are not different operations. They are the same operation but working in opposite directions, one from effect to cause and the other from cause to effect.

During the period of experimentation, the permanent success of an industry is doubtful, because man is a creature of habit. It is difficult to change him from the

groove in which he is traveling. He accepts very slowly anything that tends to change his routine. The success of this industry depends upon how well the opposition habits of man are overcome.

If the industry successfully overcomes this opposition it enters the next period of growth into social fabric; if not, it fails. In this period the development of the industry is slow or rapid, depending upon how well the opposition is overcome. Sooner or later, if successful, the industry will pass through point of "Diminishing Returns," that is where its growth increases but at a diminishing rate.

It then enters the period of stability where it adjusts itself and becomes a part of the social and economic life of that country. To study and measure the growth of various economic activities, it is necessary to have a clear conception of what constitutes and influences this growth.

Every industry is comprised of many individuals that produce, distribute and use the product, varying from small industries having only a few to large industries with national distribution having several million.

All these individuals exert some influence on the growth of the industry. Some of these influences are favorable or plus, while some are unfavorable or minus. It is the summation of these individual plus and minus influences that determines the progress of the industry. The influences may be grouped as internal and external. The internal may be controlled to a large extent, but the favorable external factors have to be created by strong internal influences. Internal favorable influences are comprised of capable executives that build up strong organizations for

producing and marketing the product, which are reflected externally in policy, good will and competition. These influences are measured in the volume of business, whether it is units of production or value of product. This history or progress may be shown graphically by the curve in Fig. 3 that seems to be fundamental for all industries that are a direct or indirect function of population. As every industry has many different influences, so every industry will have a different rate of growth, but the trace of the curve will be the same.

As the record of past performances is the history of that industry, it is necessary to have these records accurate and as complete as possible, in order that accurate results can be obtained from the use of the equation designed to measure the past and predict the future of industries. This equation, used in constructing the accompanying charts, was tested on cotton, railroads and pig iron. It forecast in the case of cotton the probable production of cotton thirty years in advance with an error of 2 per cent; in the case of railroads twenty years in advance with an error of 3 per cent; and in the case of pig iron, ten years in advance with 3 per cent error. All of these activities can furnish accurate data for a long period. It is hardly to be expected that the data of the automobile industry, which is for a very short period and of a very uncertain nature, can be fore-

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**C**ONSIDERABLE space has been given here to an explanation of the basis and compilation of the statistics upon which the conclusions have been drawn. This explanation is important, since it forms a basis, not only for the material presented here, but also for future marketing statistics which will appear in coming issues. Conclusions drawn from statistical data are valuable only in so far as the basis of the data is understood, and the limitations as well as the value of the material considered.

Accurate statistics concerning certain phases of the automotive industry are not yet available. But accurate material concerning many phases has been developed by Raymond B. Prescott of AUTOMOTIVE INDUSTRIES Research Staff as a result of many years' careful study, analysis, and investigation and can now be given to the industry.

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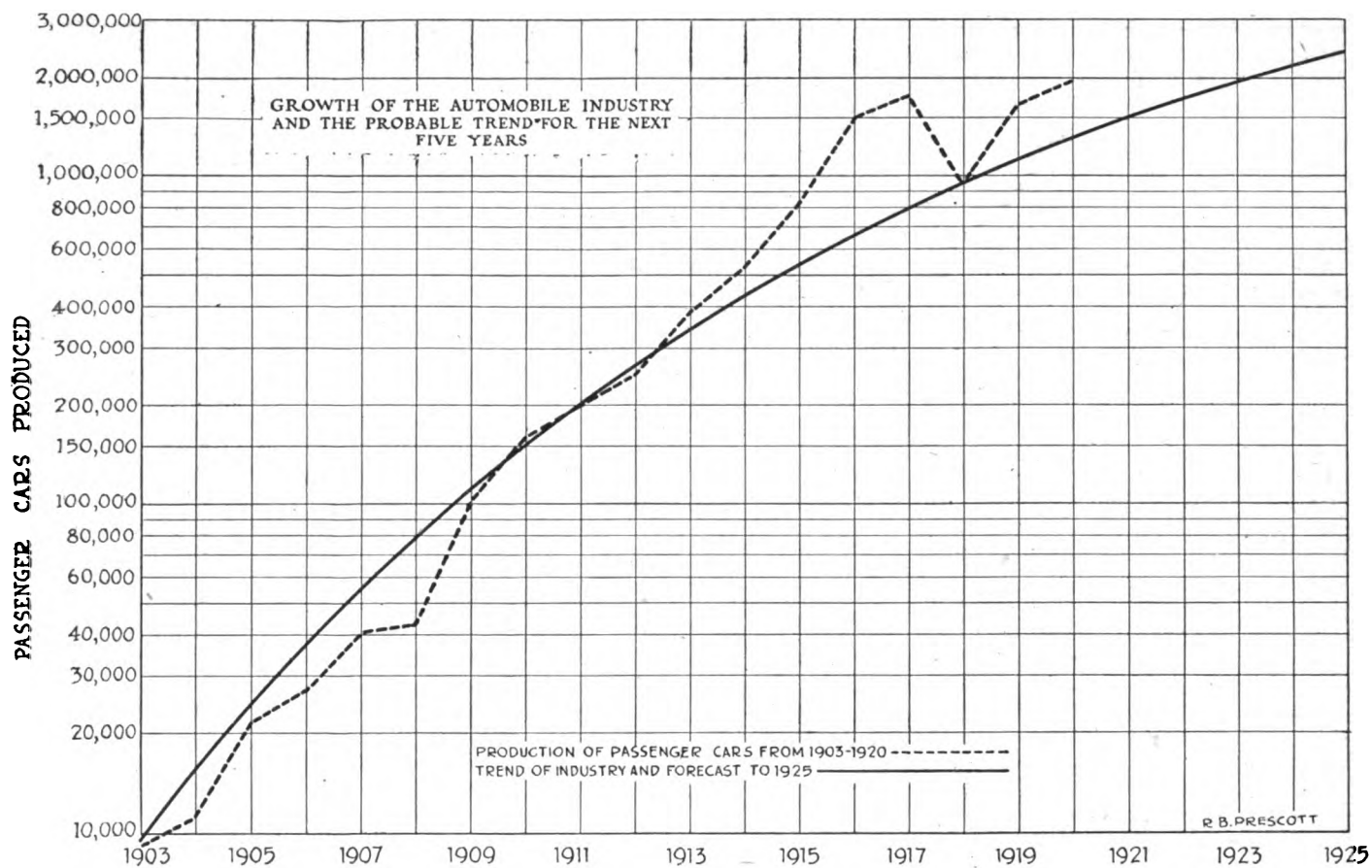


Fig. 1

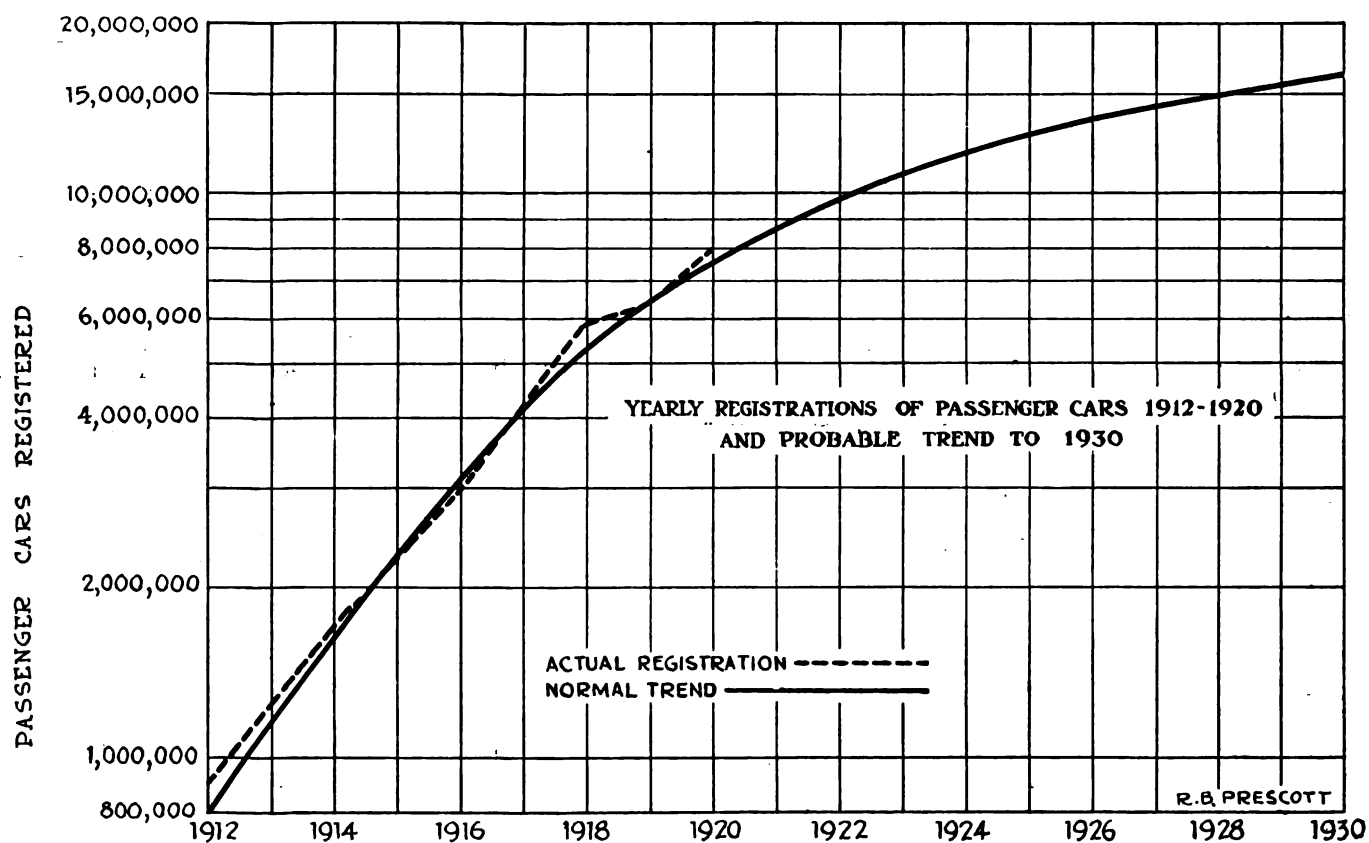


Fig. 2

cast as accurately as the above. But the absence of accurate data over a long period does not preclude the use of mathematical analysis as a tool in anticipating the future trend.

The equation that has been fitted to the data mentioned above, with the results given, is as follows:

$$(1) y = ab^{c^x}$$

$$(2) Y = A + c^x B$$

Let now  $x$  become successively  $x_1, x_1 + 1 + \dots + x_1 + n - 1$ . Then taking the sums we get

$$(3) \sum_{x=x_1}^{x_1+n-1} Y = nA (c^x + c^{x+1} + \dots + c^{x+n-1}) B$$

The series of  $c$  is in geometrical progression. Such a series is

$$\begin{aligned} S &= \alpha + \alpha\beta + \alpha\beta^2 + \dots + \alpha\beta^{n-1} \\ \therefore \beta S &= \alpha\beta + \alpha\beta^2 + \dots + \alpha\beta^{n-1} + \alpha\beta^n \\ \therefore S(1-\beta) &= \alpha(1-\beta^n) \text{ and} \\ S &= \alpha \frac{(1-\beta^n)}{(1-\beta)} \end{aligned}$$

Consequently the sum of the  $c$  series is

$$S = c^x \frac{(1-c^n)}{1-c} = c^x \frac{(c^n-1)}{(c-1)}$$

and we may write (3)

$$(4) \sum_{x=x_1}^{x_1+n-1} Y = A + c^x \frac{(c^n-1)}{(c-1)} B$$

This equation (4) will enable us to find the constants in the formula.

There are three constants in the equation, and we therefore need to have three simultaneous equations. If we divide up our observations into three equal parts we have, using equation

$$(4) \sum_{x=x_1}^{x_1+n-1} Y = nA + c^x \frac{(c^n-1)}{(c-1)} B$$

$$(5) \sum_{x=x_1+n}^{x_1+2n-1} Y = nA + c^{x+n} \frac{(c^n-1)}{(c-1)} B$$

$$\sum_{x=x_1+2n}^{x_1+3n-1} Y = nA + c^{x+2n} \frac{(c^n-1)}{(c-1)} B$$

Differencing both sides of these equations, we get

$$\sum_{x=x_1+2n}^{x_1+3n-1} Y - \sum_{x=x_1+n}^{x_1+2n-1} Y = c^{x+n} \frac{(c^n-1)^2}{(c-1)} B$$

$$\sum_{x=x_1+n}^{x_1+2n-1} Y - \sum_{x=x_1}^{x_1+n-1} Y = c^x \frac{(c^n-1)^2}{(c-1)} B$$

These two equations may be written

$$(6) \begin{aligned} \Delta \sum_{x=x_1+n}^{x_1+2n-1} Y &= c^{x+n} \frac{(c^n-1)^2}{(c-1)} B \\ \Delta \sum_{x=x_1}^{x_1+n-1} Y &= c^x \frac{(c^n-1)^2}{(c-1)} B \end{aligned}$$

Now dividing both sides of the first equations in (6) by the corresponding side of the second equations in (6) we get

$$\frac{\Delta \sum_{x=x_1+n}^{x_1+2n-1} Y}{\Delta \sum_{x=x_1}^{x_1+n-1} Y} = c^n$$

Take the logarithms of both sides

$$(7) \log \Delta \sum_{x=x_1+n}^{x_1+2n-1} Y - \log \Delta \sum_{x=x_1}^{x_1+n-1} Y = n \log c$$

Equation (7) enables us to compute at once the value of  $c$ . We may then find  $(b)$  from either of the equations in (6). Finally  $A$  may be obtained from (2).

Note.—As far as the writer has been able to learn this equation has never been fitted to economic data before.

The above equation is a method or tool of forecasting and it is not put forward as a "Cure All," but is simply an improved method over the present unscientific ones used to-day. The equation will not forecast abnormal economic or social eruptions any more than any business executive can predict fires, strikes or destructions of his plant by the elements, but it seems to predict with uncanny accuracy the Law of Growth of industries that are a direct or indirect function of population. Marshall ably said: "History tells of sequences and coincidence, but reason alone can interpret and draw lessons from them." This equation as fitted to data of the automotive industry should make it far less difficult for the executive having intimate knowledge of that particular activity to shape his policies several years in advance with a high degree of accuracy.

The data used to fit the equation has been carefully computed from confidential figures collected after years of close association with the industry. It is as nearly correct as it is humanly possible to obtain at the present time.

The registration figures for passenger cars have been obtained from an actual count of registration records of the various states. Even this method involves slight inaccuracies under present registration conditions, but the factor of error is less than 1 per cent so that the figures can properly be used for purposes such as this.

This is not true as regards truck figures, however, at the present time. This may be explained as follows: Those states which do not segregate in any way cars and trucks—and there are still about 15—list the name of the vehicle without designating its type. In the case of those firms which make both cars and trucks, it is impossible to determine, even from an actual count on the records, the exact division.

Consequently, the passenger car figures include those trucks in the states where there is no segregation which are made by concerns manufacturing both cars and trucks. But these trucks are so small a percentage of the total passenger car registration that they do not affect the resulting figures.

The only truck figures available, on the other hand, include merely those trucks made by companies which manufacture only trucks. These figures would not include those trucks made by companies which also manufacture passenger cars. In this case the trucks made by companies which also make cars form so large a percentage of the total truck registration as to affect the results very materially. Hence, truck studies similar to the passenger car studies presented, are not possible at the present time.

The figures are not available from any total registration figures that are now published, since they are subject to many errors owing to the many methods of classifying motor vehicles in the states.

This explanation indicates that these charts have been built up on a fundamentally sound basis, and that they can be relied upon as picturing accurately the probable development of the passenger car industry during the next three to five years. It is not claimed that the figures are exact to the last degree. The figures themselves, however, and the basis upon which they have been compiled are sufficiently accurate to reduce the possible error to one or two per cent for the period covered, provided no unusually abnormal factor, such as the war, enters.

With this thought in mind, it is possible to intelligently study the charts and the results which they give.

It is recognized everywhere, of course, that every industry in the country was given an abnormal impetus by the



demands of the war. Production capacities in all industries increased as much during the years of this abnormal condition as they normally would have done in twice or three times as long under normal conditions. Thus, to say that the automobile industry has piled up a production capacity in excess of its immediate needs, is merely to state an obvious fact that is true of every other industry.

A close analysis of the charts, however, indicates that the passenger car industry, despite the rapid increase during the war period, has not taken nearly so great a deviation from normal as have many other similar industries.

Assuming for the purposes of discussion that "normal" may be defined as a period in which the industry is producing at a rate equal to the highest production point it has yet reached. On this basis, it appears that it will take two years for the passenger car industry to return to "normal."

The highest production reached by the passenger car manufacturers was slightly under 2,000,000 in 1920. This is less than 500,000 over what the normal production would have been for 1921, had there been no artificial acceleration due to the war. It is about 200,000 more than the normal for 1922 would have been.

And it is just the same as the normal for 1923.

That is, if the industry is not interrupted by any abnormal disturbances during the next two years, it will be back to normal by 1923. This is a decidedly encouraging outlook, since the definition of normal used in this discussion means that practically every passenger car plant in the industry will be going full blast, provided the production capacity remains at its present level. This proves the automobile industry to be in a favorable, rather than an unfavorable, position as compared with many other industries which may properly be compared with it. It refutes the prophets who have seen catastrophe ahead for the automobile industry.

This optimism is particularly sane, when it is realized that it is not necessary for every plant in the industry to be producing at 1920 capacity rate in order that there be a good profit available. Producing at the rate shown to be possible by this curve, it appears that there is an excellent business available during 1921 and 1922, even though 100 per cent production is not warranted during that time.

It is evident that the measure of soundness and prosperity of the industry is in direct proportion to the distance between the normal trend line and the actual production or sales line. This distance was less in 1920 than it was in 1917. Fundamentally the passenger car industry is more sound and on a better basis than it was during the boom period of 1917, and is rapidly returning to normal.

The registration curve shown in Fig. 2 is of special interest since it shows how closely the actual registrations in the past have coincided with the predictions of this normal trend curve. This appears to be true in spite of the abnormal conditions caused by the war and the present business depression. The variation between the normal and the actual in this curve is less than in the production curve partly because the numbers involved in the calculation are considerably larger, thus reducing the percentage of error. For this same reason, the deductions of this curve may be accepted as accurate some years further in the future.

This chart shows that in 1923, the year in which the in-

dustry is scheduled to be back to normal, the registration will be in the neighborhood of 17,000,000 passenger cars. The registration predicted by this normal curve for 1921 is about 8,700,000 passenger cars. It will be interesting to observe how close to this predicted figure are the passenger car registrations for 1921.

It is obvious that the per cent of increase in registration must become less very soon, yet the curve shows that there will be a material increase in actual registration for some years to come, and that the much talked of saturation point is not yet visible. In making the interpretation, attention should again be directed to the basis upon which the normal curve has been constructed, since it is only the soundness of that basis that renders the information valuable.

It is interesting to compare the variation from normal which the war gave to the automobile industry with similar effects in similar industries. The best available figures, for instance, as regards the talking machine industry indicate that its abnormal expansion or variation from normal is very materially greater than that of the automobile industry. This is found to be the case in numerous other instances. A survey of comparable industries, in fact, indicates that the position of the automobile industry, as regards getting back to normal, is better than many others.

There may be some objection to the conclusions drawn here on the basis that the highest production capacity reached by the passenger car industry is not identical with the production capacity of the industry. This is a theoretical rather than a practical criticism, since the passenger car industry from a business point of view was considered throughout the country to be working at "capacity" during the year its peak production was reached.

Production capacity, in any case, is difficult to define in a theoretical sense. It cannot properly be said to include buildings owned by manufacturers which have never been equipped for actual production, but have simply been acquired for purposes of future expansion or development.

To refer again to the curve of passenger car registrations shown in Fig. 2, it is interesting to note how closely the normal trend curve coincides with the actual registration curve, in spite of the abnormal business conditions which have prevailed during recent years. While it becomes apparent that the rate of increase of registration during the next ten years will be considerably less than during the previous ten years, it is evident also that there will be a definite increase nevertheless.

Not only will production facilities be needed to take care of that development, but also service must be improved and developed, thus broadening the wide scope of business growth that may be expected in the automotive industry during the next decade. The industry is entering upon its period of stability. The automobile has become a fixed unit in the life of the people.

The automobile industry thus appears to be on a sound basis. It is rapidly returning to normal, gives evidence of an excellent market in the immediate as well as in the more remote future, and has an opportunity to do an excellent business, profitable to the vast majority of firms, during the two years which will be needed to return to normal.

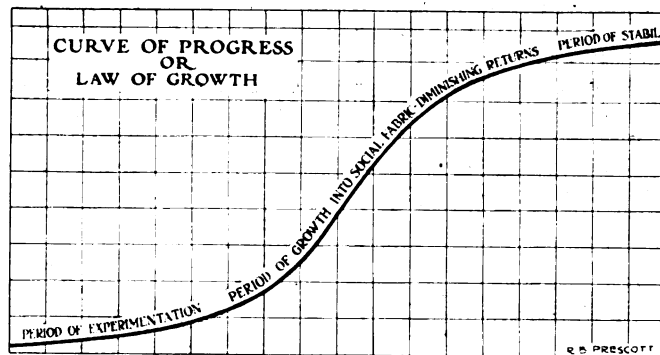


Fig. 3

# Closed Body Production Costs Minimized in Essex Coach

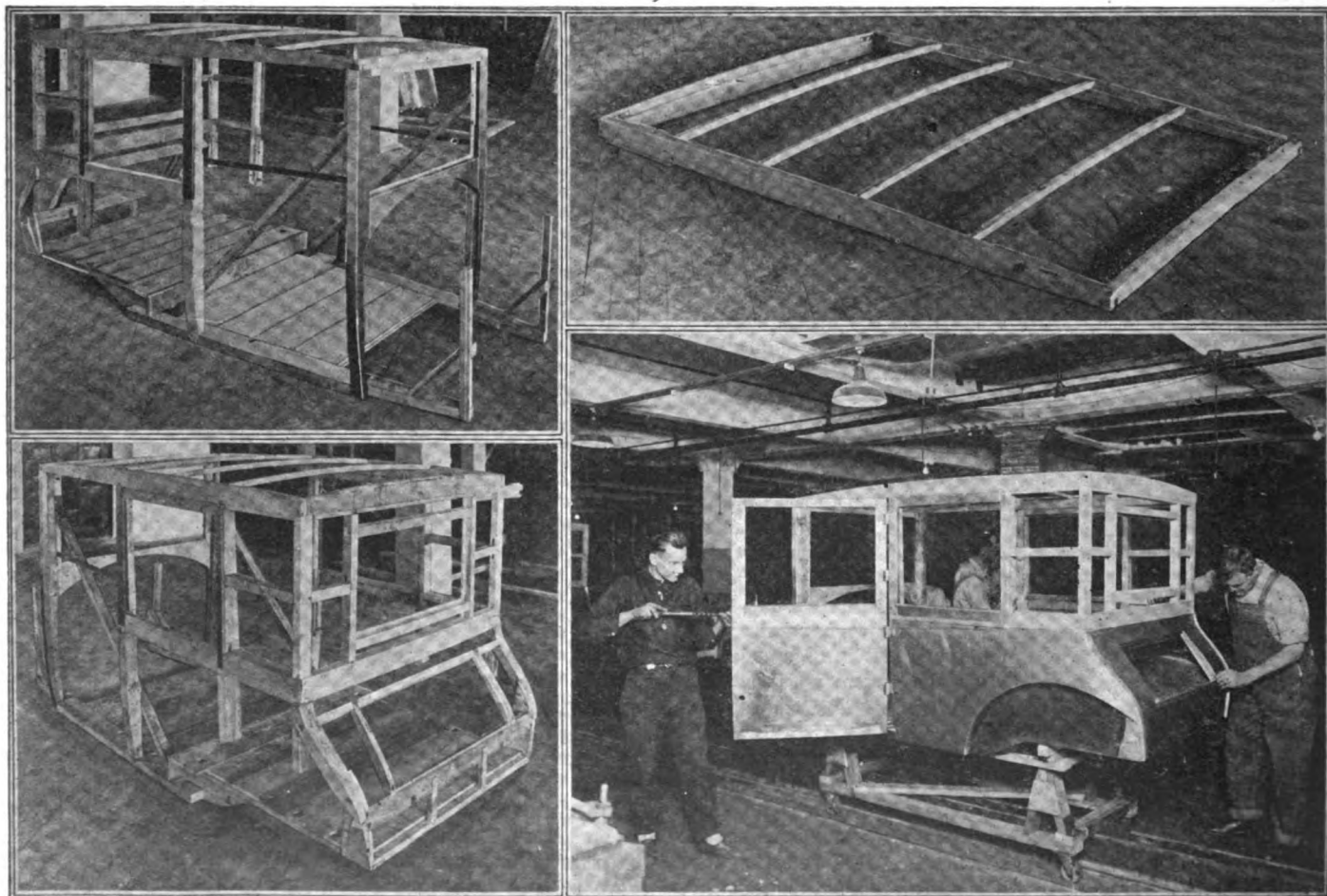
Use of straight-cut lumber, two doors and felt window runners assist in making it possible to produce a five-passenger closed car to sell at only \$300 more than open body on the same chassis.

By J. Edward Schipper

**T**HE new Essex Coach, which is to sell at the unusually low price of \$1,495, has just been put in production. It incorporates a number of economy features in closed body construction. The price, which is \$500 below that of the sedan and but \$300 more than the touring car, indicates that something has been done to cut the cost on this body, and a large part of the secret lies in the practical elimination of curved pieces of wood. Substantially all pieces of wood in the body framing are cut on straight lines. This not only materially reduces the cost in preparing the wood framing for assembly, but also, in a number of instances, has resulted in making the assembly work much easier and far more readily handled on an interchangeable basis. An additional saving has been made in the use of two in place

of four doors. This has been made possible by the adoption of individual Pullman-type seats in front in place of the usual fixed type. These seats fold out of the way to allow access to the rear seat. The car is a five-passenger design. The rear seat is continuous across the body in the usual way.

The usual window runners have been eliminated and in their place the felt liners which are old in coach work, have been employed. The glass operates between two fixed lining strips of felt. These not only assist in supporting the glass, but also serve to prevent rattling. The window regulators are of the Dura skew gear type with a worm for the actual lifting of the windows. The crank operates the worm through the medium of the skew gears.



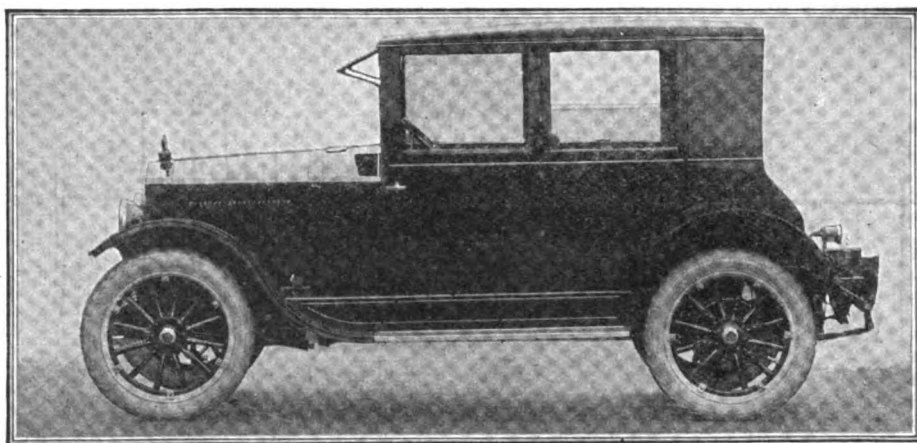
Some steps in the body assembly department at the Essex plant, showing framing for Essex Coach body, note practical elimination of all but straight pieces. The framing for roof is unusually simple. The lower body panels are covered with pressed steel on weather exposed surfaces

The type of body construction employed is such that it is possible to put it together in a number of sub-assemblies. The body may truly be said to be assembled instead of built up in the usual way. There is no great amount of tacking to be done from the inside of the body. This can practically be all done before the body is put together. The roof furnishes a good example of this method of construction. The entire roof is practically a sub-assembly. It is a soft type covered with artificial leather. The actual ceiling of the car, or, as it known, the roof lining, is stretched across the top of the body before the roof proper is put on. This permits of tight fitting and does away with a good part of the usual interior tacking and trimming work. The roof is then put on over the top of this lining as an independent assembly.

Additional economy has been secured by making as many parts on the body of the same dimensions as possible. For instance, all four window frames are of the same size. This also means that the four pieces of glass for the side windows are identical and, consequently, there is no fitting of left and right in putting the body together.

All of the plaited upholstery is detachable. The upholstery is a wool cloth with plaited back and seat cushions in the rear seat.

A sales executive of the Essex company states in exhibiting the coach:



New Essex coach seating five passengers which sells for \$1,495

"The idea behind this car has been to produce a good quality job without going to expense to carry out some of the details in coach work which are more the results of precedent than of necessity or even ornamentation. For instance, instead of going to considerable trouble and expense to cover the heads of the screws, all of the screw heads are exposed. While the manufacturer of an expensive custom body would not tolerate this type of construction, it can be stated that it is far from displeasing to the eye and certainly results in considerable saving in manufacture, which, of course, is what has been aimed at in this body, in which an attempt has been made to provide a closed body at open body figures. The finish has not been slighted as there are twenty-five paint operations, this being fully up to the normal number."

## Cooperation Between the Sales and Accounting Departments

**T**HE gradual return of good business is calling more and more for close cooperation between all the departments of an industrial or business organization. The present time is a splendid one to harmonize effort and every man in industry should be called upon to give his business associate the best he has, and ask from him in return, his best.

These facts, along with many others, were brought out in a paper presented by S. B. Taylor, General Sales Manager of the S.K.F. Industries, before the national conference of the Industrial Cost Association recently held in Pittsburgh. The title of Mr. Taylor's paper was, "What the Sales Manager Should Have from the Accounting Department."

Actual working contact between the accounting and sales departments starts with costs. Cost figures are of prime importance in merchandising and should always be made available. Current information should also be supplied on "In Process" material, including the quantities involved, as well as the stage of manufacturing process.

Certain data giving pictures of sales results should also be made available to the sales department, and Mr. Taylor outlined some of these as follows:

A daily memorandum showing the number and value of orders received, together with the number of units covered, and from what plants ordered; a similar memorandum detailed by customers, with quantities and type of purchase; a weekly report giving all sales, all returns and allowances for the period and to date, the status of unfilled orders and the value of new business accepted, and a monthly report showing the gross profits for the month

with comparisons for the same period of the preceding year.

The proper allocation, through coding, of sales by territory and by industry—assuming distribution to be varied—is an important responsibility of the comptroller's department. Correctly done, it forms a record from which the sales executive may learn much as to the ability of fields to absorb product and the desirability of such a field from the standpoint of profit, to note improvement or retardation as it occurs, also to judge more fairly if various territories, in which there is a common field for sales, are bearing their respective part of the burden.

There were other items which Mr. Taylor said he believed could be used advantageously by the sales department, but he pointed out that different conditions of business called for different plans of operation. The outstanding feature of such practice, however, is to establish a closer relationship between the two departments, and through cooperation develop more sales.

**A** SECOND edition of the *Aircraft Handbook* by Fred H. and Henry F. Colvin has recently been published. The new edition contains considerable new material, while much of the old text has been revised. The book is designed to aid mechanics in becoming familiar with the various phases of aircraft construction and repair. It begins with a general discussion of airplane theory and construction, and goes on to discuss in detail the best known motors. Space is also given to air laws, landing fields, S. A. E. airplane standards and nomenclature. The volume is published by the McGraw-Hill Book Company.

# Engineering Features of British Truck Models

New designs include both light and heavy trucks and a chassis built for omnibus work is a feature of the Dennis factory's products. In Maudslay 6-ton model, the driver's seat is alongside instead of over engine. This article includes descriptions of the new models of seven manufacturers.

By M. W. Bourdon

**M**ANY British manufacturers of trucks exhibited new models at the recent Olympia show, and while there were not many radical departures from custom in their design, various changes which the manufacturers believed will work for the better were noticed. At least one manufacturer of passenger cars has entered the truck field.

One of the new models shown was the new 6-ton\* Maudslay, which has a bigger area of load platform than any other British truck, and is of what has become known as the over-type, though it has the driver's seat alongside instead of over the engine. The steering wheels and controls are on the right, and there is a helper's seat on the left of the engine bonnet. Behind the driver's seat the load platform extends for 19 ft. 6 in.—this on a wheel-base of 14 ft. 6 in.

This new model has a straight channel section (6 x 2½ in.) rolled steel frame with the open side of the channel outward, the overhang beyond the rear axle being approximately 9 ft. In addition to rolled steel cross members at both ends, there are five tubular intermediate cross members, four being of 3-in. diameter and the other of 2½-in. The radiator is at the extreme front end of the frame, and close up behind it is the four-cylinder 4¾ x 6 in. engine which has overhead valve and camshaft, block-cast cylinders and a detachable head.

Maudslay's have always had an overhead camshaft, but in the means of operating it, in the arrangement of the valves, and in having a detachable head and block cylinders there are divergencies from past practice. The inlet valves are seated in cages, but the exhausts have their seats directly in the cylinder head, being removed if necessary through the inlet ports.

The overhead camshaft is driven from the rear end of the crankshaft by bevel gearing, the crankshaft pinion being secured by the same bolts and flange as the flywheel. Half way up the vertical shaft is bevel gearing driving a transverse shaft for the water pump on the left and the magneto on the right, the latter when the body is in position coming under the floorboards of the driver's seat. The pinion at the top of the vertical shaft is driven through a dog clutch, this arrangement allowing the camshaft with its bearing brackets to be lifted out after the holding down bolts have been removed. The camshaft operates the valves through tappets.

The aluminum induction manifold on the right of the cylinders has a very large water jacket. A Zenith carbureter is standard. Aluminum is also used for the two-part crankcase, in the upper half of which the crankshaft has three bearings. Four-bolt big ends are used,

as are hour-glass, cupped head pistons with three rings. Engine and gearset are separately mounted in a four-point suspended sub-frame. The main frame is only 36 in. wide and has the steering gear-box bolted to the extreme front end on the right, with the drag link running back to the swivel arm. The shaft of the clutch, brake and throttle pedals is carried by a single bracket projecting from the outside of the frame just in the rear of the steering box; slightly further to the rear, on the inside of the frame, are the gear lever gate and hand brake quadrant.

A cone clutch is used, whence a coupling shaft some 42 in. in length runs back to the gearset with an internal and external pinion type of semi-flexible joint at each end. Four speeds are provided with ball bearings for all shafts, and a plain bush for the pilot. The open propeller shaft has a star joint at the front and pot (sliding block) joint behind.

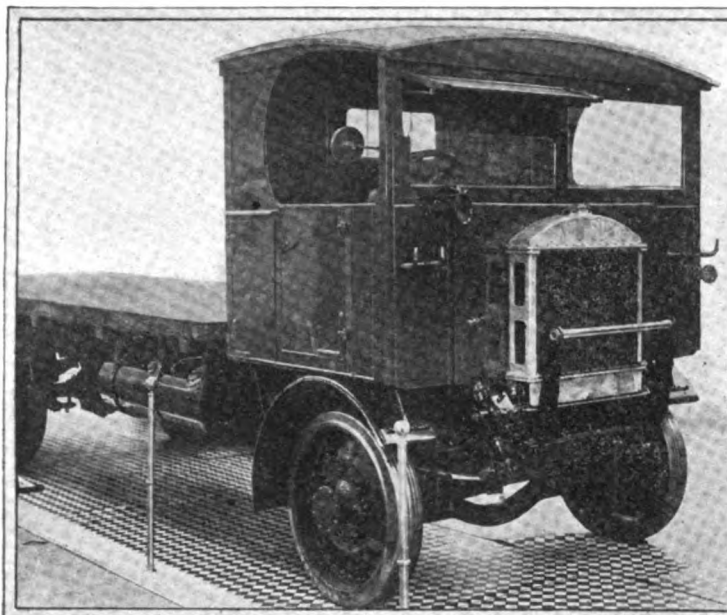
Double reduction gearing forms the final drive, the main axle unit being a horizontally arranged double banjo forging, with an aluminum sump and the whole of the gearing carried by an aluminum top section with a pilot extension the full length of the forging ring. The side extensions of the latter are of square section and have the spring and brake shoe brackets clipped on. Straight roller bearings with ball thrusts are used throughout the axles and wheels. Central vertical steering pivots are used, a point of design which was found in one Maudslay model before the war, but was dropped for a time. To secure this feature the hollow stub axle is belled out to 7½ in. diameter at the inner end, to accommodate the end of the beam axle and the swivel pin; this necessitates a very large hub and an inner roller bearing of 10 in. outer diameter—an expensive job, but resulting in easy steering. Brakes consist of a shoe type behind the gearset and expanding shoes in the rear wheel drums 24 in. in diameter and 4 in. wide on their friction surfaces, the shoes being cam-operated. The chassis is priced at £1,275.

The 3 (long) ton Maudslay is also a new model, but only so in respect of the driver's position, who is now also placed alongside the engine on the right. In its general lines the 3-tonner resembles the other, but the overhead camshaft drive is somewhat different. The vertical shaft is *in front* and is driven by helical gearing at top and bottom; the magneto is alongside the crankcase on the right and the pump is driven by belt from the front end of the crankcase. The pump has a distinctly unusual position, for it is bolted to the left-hand corner of the radiator, extending rearwardly. This engine has a bore and stroke of 4½ x 5 in. and the chassis sells at £1,000.

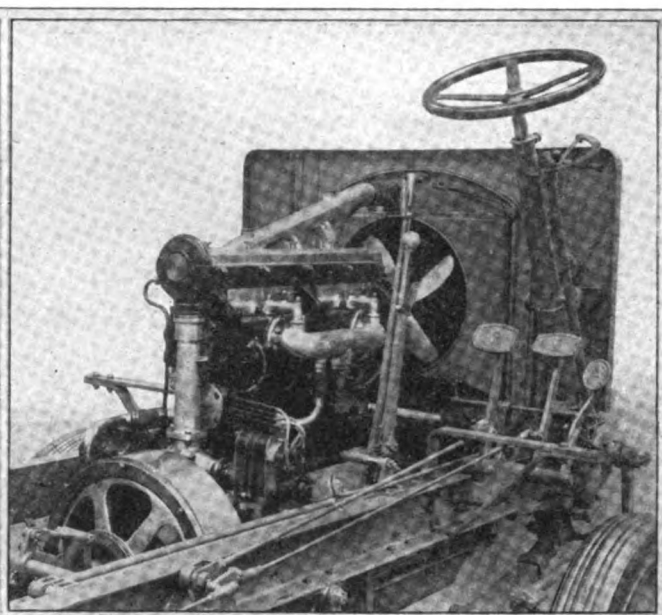
Hitherto the maker of the Guy truck has specialized on a 2½-3 ton chassis, but he has now introduced two

\*All tons referred to in this article are long tons of 2240 pounds, in accordance with prevailing English truck rating practice.





Front end of Maudslay 6 ton semi overttype truck.  
Note gasoline tank alongside frame



Engine and controls of new Maudslay truck. Engine has overhead camshaft, detachable head and block cast cylinders

new models, one of which is for 4500 lb. loads and has the same engine as the original type except that thermosyphon circulation is used. Gear-box, axles and other main parts are the same, but the frame and springs are shorter and lighter.

The other new model is an entirely fresh design and is a type which British makers have hitherto neglected, viz., a 1¼-ton chassis for fast delivery work. This chassis attracted an immense amount of interest among dealers and potential purchasers alike, not only by reason of its engineering features and general design, but also on account of its low price, viz., £395. This compares favorably with the prices of most American truck chassis of similar capacity sold in England. It is an exceedingly well finished job.

The 3¼ x 4½ in. four-cylinder block-cast engine is assembled as a unit with clutch pitch and gearset. The aluminum two-part crankcase is suspended from the main frame by two arms approximately midway of its length, while at the rear of the gearset the unit is slung in two trunnion bearings in a swinging bracket depending from a tubular cross member. The valve arrangement is on the lines of the larger engine described in detail in *AUTOMOTIVE INDUSTRIES* of Oct. 2, 1919.

The detachable cylinder head is inclined from the horizontal to afford a better shape of combustion chamber than would otherwise be feasible. Water is circulated by thermosyphon and a gilled vertical tube radiator with aluminum top and bottom tanks is used, secured rigidly by studs and nuts to the front cross member of the frame.

Trough lubrication is adopted, the gear type pump being at the front end of the camshaft, forward of the distribution casing, and is formed as a unit with a large and accessible strainer. Three plain journal bearings support the crankshaft, the distribution gearing at the front consisting of straight toothed pinions.

To the back of the crankcase is bolted the aluminum bell housing open at the top and enclosing flywheel and dry single plate clutch, the transmission casing being bolted up to it at the rear. Three speeds are provided, with a central lever working in a ball socket. An open propeller shaft is used with a star joint at the front enclosed within a rear extension of the transmission casing; at the rear is a sliding block joint.

Final drive is by top worm gearing, carried as a unit

in an aluminum top cover of the axle casing. The latter is a steel forging with integral sump and has the spring and brake brackets keyed and shrunk on to the integral extensions which carry the wheels on floating bushes.

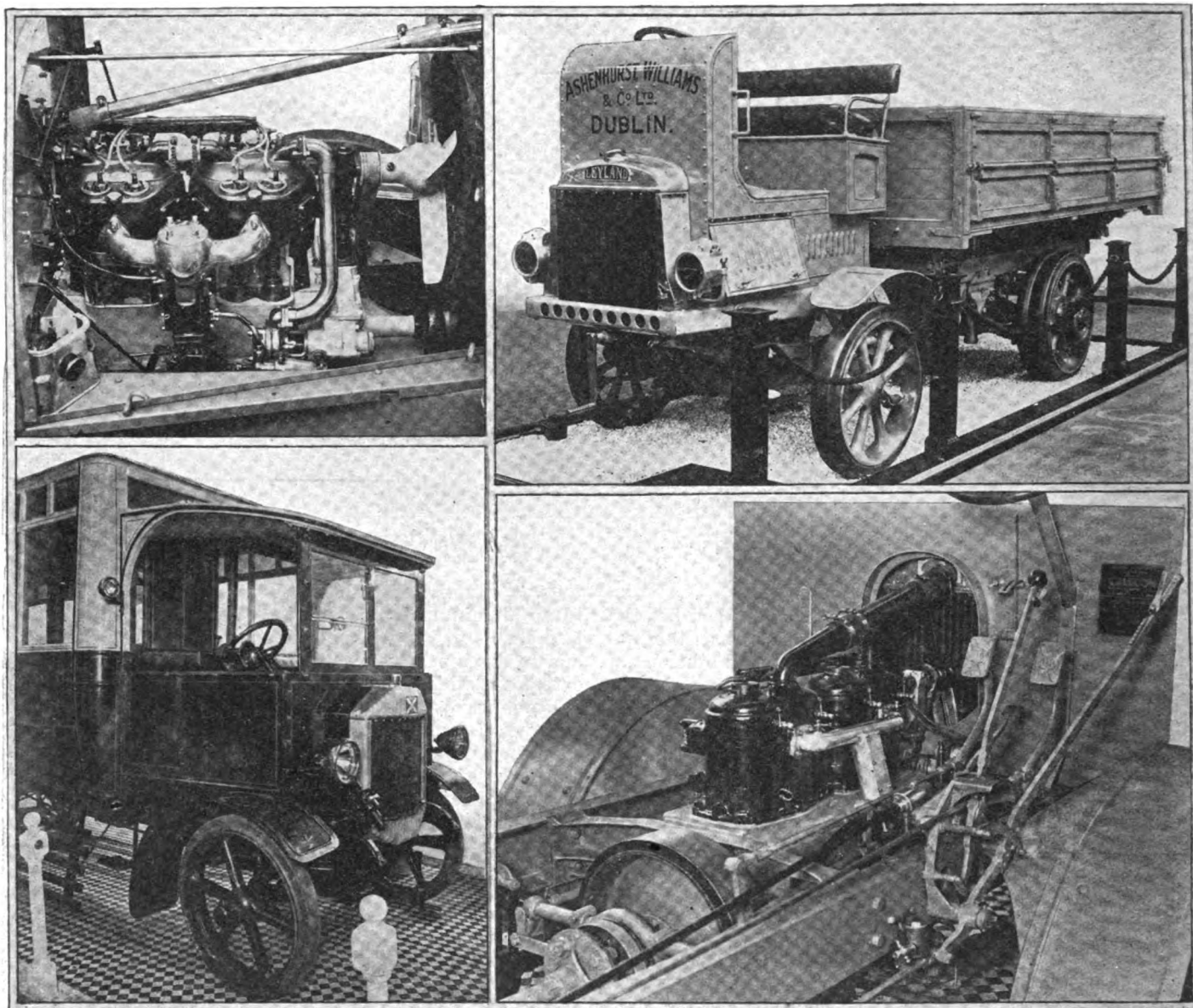
Both brake lever and pedal operate shoes within the rear wheel drums, the latter measuring 18 x 2½ in. Each shoe forms a segment of approximately 90 deg. and pedal and lever apply alternate shoes.

Either pneumatic or solid tires are furnished, the former at an extra charge of £20; with pneumatics, disk wheels are used; with solids, the hollow cast spoked variety. Steering is by worm and wheel, with magneto ignition control over the hand wheel; the throttle is controlled by pedal only.

The frame is of pressed channel steel, both side members being straight throughout. Springs are half-elliptic and an oil cup system of lubrication is used for the spring pins and other chassis details. Following are some leading particulars: Weight of chassis, 3800 lb.; overall length, 14 ft.; wheelbase, 112 in.; track, 56 in.; dashboard to end of frame, 141 in.; height of top of frame from ground, 28½ in.; gross load capacity, 4000 lb.; direct gear ratio, 6 to 1.

In general this is a good production job, though exception must be made in regard to the valve operation and cylinder head arrangement. These provide selling points no doubt—viz., greater efficiency and accessibility—but whether the additional cost as compared with the normal L head is justified is doubtful. So far as the substitution of rockers for vertical tappets is concerned, there is not much amiss with this from a production standpoint; where the design falls short in the latter respect is in departing from the horizontal and vertical in regard to various machining operations. The top facing of the cylinder block, for example, is set at one angle, the valve guides and seats are at another, while there are, of course, also the vertical cylinder bores and the base flange at right angles to them. These variations from normal can hardly make for a minimum of cost, though taken by themselves they need not, admittedly, account for very much difference; and apparently the makers consider they justify themselves when they are handed on to the sales department. The detachable head cylinders separate from the top half of the crankcase may also fail to secure approval from the production expert.





(Upper left)—T head engine of new Dennis chassis. Note peculiar circuit of water from pump. (Upper right)—Leyland 3 ton full overtype truck with 102 in. wheelbase. Has 64 in. track at front and 52 in. at rear. (Lower left)—Front end of Caledon semi overtype truck chassis with singledeck bus body. (Lower right)—Single sleeve engine of Caledon truck for 15,000 lb. loads. Driver's position is alongside engine

The Dennis truck is one of the oldest among British commercial cars and was the first to adopt worm drive, some eighteen years ago. A 2-ton model was introduced at the 1920 Olympia Truck Show, and this year a new 4-tonner (9000 lb. load) has appeared. While it is suitable for goods carrying bodies, it is primarily intended for omnibus and motor coach work, for with a length of 20 ft. 3 in. from dash to rear end of frame and 15 ft. 4 in. wheelbase, it will take a 56-seated double-deck bus body, or a 36-passenger single-decker. This, however, necessitates an overhang behind the rear axle of 90 in., for no attempt has been made to adopt the forward position for the driver. It is also offered for the carrying of bulky goods.

The pressed steel frame has channels 8 in. deep between the springs and 6 in. at the ends. There are five pressed steel cross members. A long sub-frame for engine and separate gearset is suspended at three points, from a central longitudinal trunnion at the front and by two brackets depending from a main frame and cross-member behind the gearset. The engine rests at four points on this sub-frame, while the gearset is hung below it by two bolts at each of its four corners.

In this new model Dennis retains the pair-cast T head engine design, with integral head  $4\frac{7}{8} \times 5\frac{7}{8}$  in. cylinder on a two-part aluminum crankcase. The crankshaft has three bearings and the connecting rod big-ends have four bolts each. Lubrication is on the trough and pressure system and ignition is by magneto. The pump water circulation is unusually arranged; from the pump on the right of the crankcase the water is delivered to near the top of the front pair of cylinders; passing through the latter it runs back through a coupling pipe to the rear pair, then out at the back and by a single rising pipe to the top of the radiator. This arrangement can hardly be conducive to equal cooling of all the cylinders.

A cone clutch and coupling shaft with two flexible disk joints carry the drive to the four-speed gearset. The latter has a one-piece aluminum box-like casing with an over-all cover plate. All shafts have ball bearings, the main shaft being splined. A shoe type transmission brake is located behind the gearset and a solid coupling shaft 42 in. long  $\times 1\frac{1}{4}$  in. diameter leads to the star universal at the head of the propeller shaft. The latter is enclosed in a torque tube of 5 in. diameter with flanged ends, the

whole machined from the solid bar; the front flange is bolted to a hollow spherical end which encloses the star universal joint and is supported by a cast steel cross-member, itself carried in rubber bushed trunnion brackets on the main frame—the rubber bushes or rings being obviously intended to take up the peak of transmission shocks. Dennis, by the way, has always made a feature of some flexible element in the transmission system and at one time used a spring coupling behind the gearset.

The top worm with worm wheel and differential is carried as a unit in the top cover of the cast axle casing; the latter has the sump integral, but has flanged and bolted-on extensions carrying the spring and brake brackets and the floating bushes of the wheel bearings. The wheel brakes are of the internal shoe type, with drums of 22 in. diameter and 3 in. wide.

This new Dennis chassis is unquestionably a sturdy job; it weighs slightly over 7000 lb. with solid tired, cast, hollow-spoked wheels, and is typical of the now medium but formerly heavy type of British truck. Its selling price is now £950, which represents a drop of £330 since its introduction.

One of the biggest of British truck makers and with a range of models already approaching a dozen—counting variations made available in five main types—Leyland has now put forward another model, a 3-tonner. This has a wheelbase of only 102 in. and an overall length of 192 in. It is of the full over-type, i.e., has the driver's seat and platform on top of the engine space, with a weather board in front. There has been a limited demand in England for a truck with a small turning circle and capable of being weighed both axles at once on any public weigh-bridge; and this new Leyland is put out to meet that demand. As with all over-type trucks, accessibility is sacrificed to a certain extent to obtain the advantages of the general arrangement.

The driver's platform is supported by an angle steel frame, forming the engine hood with detachable floorboards above and sheet steel sides, hinged as to approximately half their length. This frame carries the pedal shaft and, on the right, the gear shift and brake levers, but the steering column is continued through to the front right-hand corner of the main frame.

The four-cylinder  $4\frac{1}{2} \times 5$  in. engine is supported back and front by lateral tubes, passing through the upper half of the aluminum crankcase. The separate gearset is also supported by two tubular cross members at four points. Behind the gearset it is clear that this is not a model specially designed throughout, for one finds an open coupling shaft leading to a very short propeller shaft, the latter enclosed in a spherical headed torque tube supported by a bracket housing projecting rearwardly from a 3-in. diameter tubular cross-member of the frame. If the transmission had been specially designed, it is unlikely that a two-part propeller shaft would have been adopted, in view of the short wheelbase.

Final drive is by top worm, with a differential carrier forming the top section of the cast steel center of the axle casing. A departure from normal is seen in the semi-

elliptic rear spring mountings; each eye of the spring is secured to a slide block free to move fore and aft on frame brackets with horizontal surfaces which are shaped to a V at each side to dovetail into the slide blocks. The sliding surfaces are exposed, grease cup lubrication being provided. This chassis has different wheel tracks fore and aft; at the front the tire centers are 64 in. apart and at the back only 52 in. The chassis price is £1,000.

Commer has a new 6-ton model, but in the main it is merely an enlarged and strengthened edition of the 4-ton type, with a larger engine. The latter has a bore and stroke of 120 x 140 mm. ( $4\frac{3}{4} \times 5\frac{1}{2}$ ), pair cast L head cylinders, ball bearing crankshaft, thermo-syphon water circulation; all three items being standard Commer practice. The engine is three-point suspended on the main frame; there is a single longitudinal trunnion support in the cast front cross member, while the back end of the crankcase has a cast channel section two-armed bracket bolted to it and extending to the side frame members.

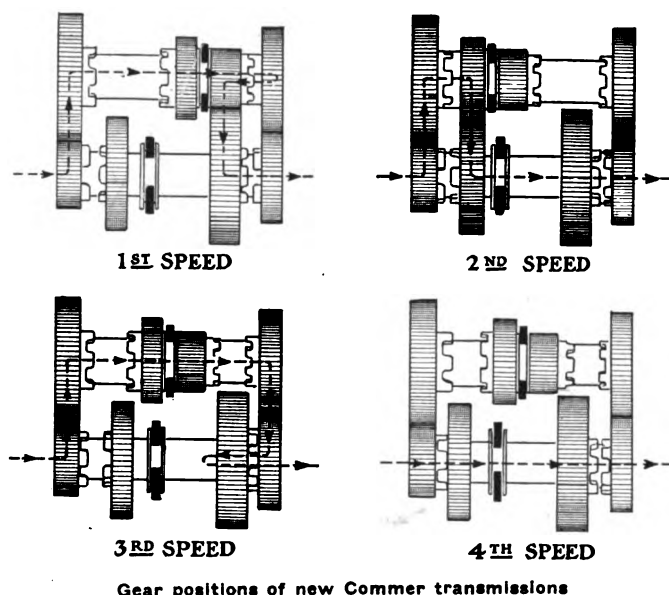
The induction tract is also unusual, for from the carburetor on the right to the valves on the left the mixture passes through a branched manifold to passages across the cylinder blocks below the water jackets and up to the valve ports.

Channel steel pressings form the frame side members, these being  $6\frac{1}{2}$  in. deep by  $2\frac{1}{4}$  in. wide between the spring hangers and tapering to  $4\frac{3}{8}$  in. deep at the ends; but a  $15/16$  in. adjustable truss rod is used under each side, anchored at the front to the rear spring bracket and at the rear to a special frame bracket some 12 in. behind the rear axle; there are two

struts, that at the rear being in line with the front hanger of the back spring. Transmission is by cone clutch, four-speed separately mounted gearset, and side chains. Commer's are made in six models, three having worm drive and three side chains.

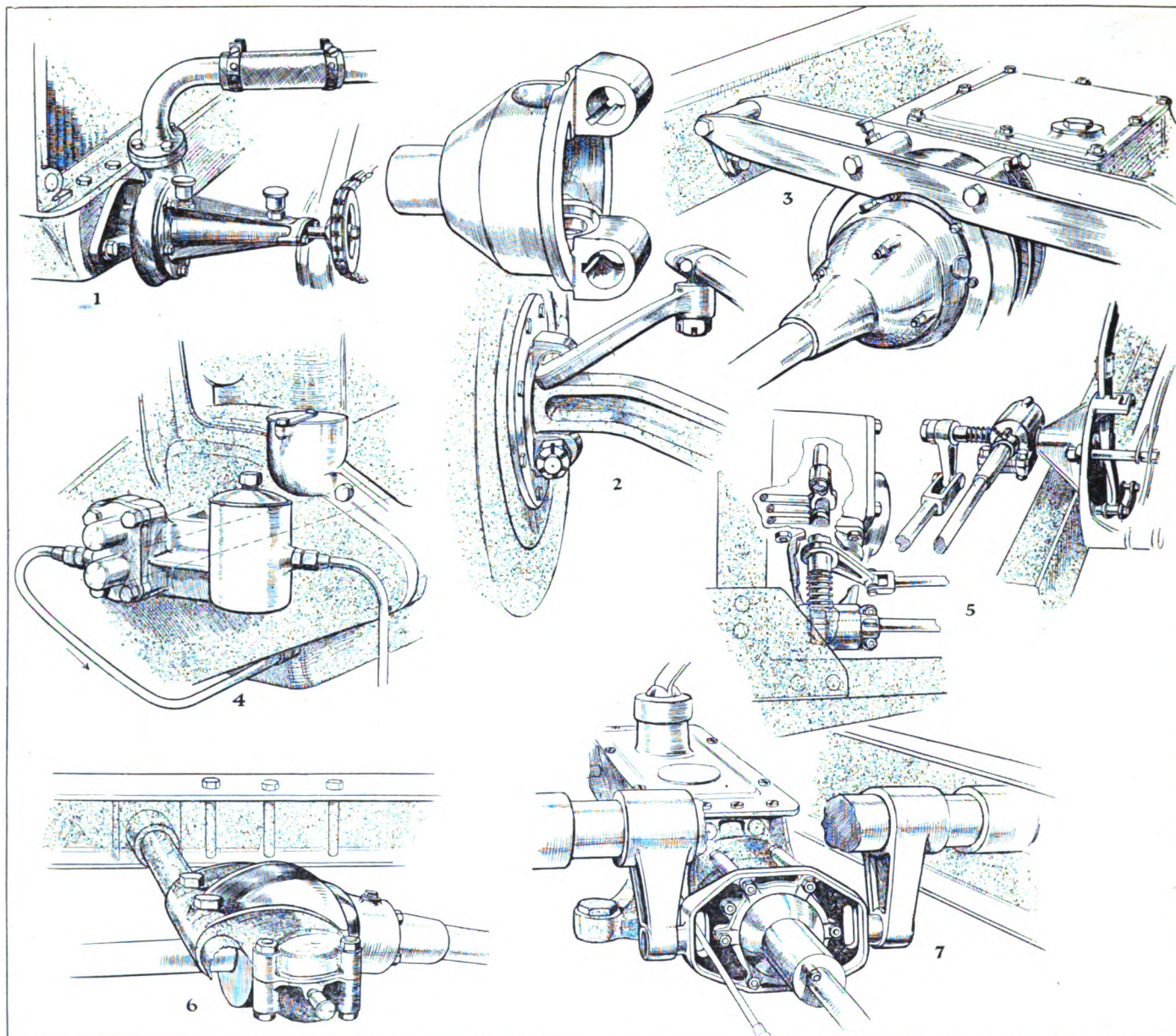
An outstanding feature of Commer trucks has always been a type of gearset different from the normal sliding and selective system. Until lately the Lindley gearset has been used, in which the gears are constantly in mesh and brought into use by a rotating grooved cam which allowed spring-backed dog clutches to be engaged. But the Lindley set has been dropped and another special pattern is now standardized. This is of the selective type, giving four speeds. There are constant mesh wheels at each end of the box, and two sliding sleeves, each with two pinions and dog teeth at their ends; one sliding member is on the layshaft and is free to rotate thereon, the other moving endwise only on the splined main shaft. The various combinations are shown by the diagrammatic views herewith.

When the ratio is varied, the gear teeth are engaged when the gear on the layshaft is rotating idly and only its own inertia has to be overcome to vary its peripheral speed; not until its teeth had become two-thirds engaged are the dogs brought together. The dog teeth are stepped, beveled off and slightly undercut, and the arrangement is claimed to effect a great improvement in ease of gear shifting, both up and down; the gear teeth are not dam-



Gear positions of new Commer transmissions





1—Belt driven water pump of 6,500 lb. Maudslay secured to bottom tank of radiator. 2—Central pivot steering of Maudslay 13,000 lb. truck. Upper view shows swivel axle design. 3—Method of supporting transmission brake shoes on Maudslay truck direct from side frame members. 4—Combined gear type oil pump and strainer at front end of camshaft of new Guy engine. 5—Caledon gear shift couplings. Circular racks operated by pinions on transverse shafts provide lateral movement for striking rod. 6—The tracket overhung from a tubular cross member to support the forward end of the Leyland torque tube. 7—Method of suspending rear end of engine and gearset unit on new 2,750 lb. Guy

aged if the driver is careless or incompetent and the dogs will stand up to rough treatment. To shorten the shafts, by having the gear wheels closer together, both sliding sleeves are moved when the third and top ratios are being engaged; this is simply arranged by having two striking arms on the lever shaft, one only engaging a selector rod for first and second speeds, but both being in use for either of the two higher ratios. This gearset is obviously somewhat more costly to make than the usual pattern, but for heavy trucks the slight extra cost may be justified.

Both the new 7-ton and the 4-ton Caledon models, the latter used mainly for bus work, are of the semi-over type, and are designed on the same general lines except that the lighter chassis has top worm drive as against the other's double chains. The engine on the big chassis is three-point suspended in the main frame by means of a trunnion bearing at the front and a cast steel cross member bolted to the crankcase at the rear.

As on the over-type Maudslay, the steering box is bolted to the front right-hand corner of the rolled steel

frame, the latter being 7 in. deep and 3 in. wide, straight from end to end. Engine accessibility is partially sacrificed to obtain the lengthy load space, the magneto, for example, being under the driver's footboard and needing a contortionist to inspect the contact breaker without removing the whole machine.

The four-speed gearset is amidships, three-point suspended from pressed steel cross members. The gear shift coupling between lever shaft and selector rods is novel; it should prevent jamming and binding, but is an expensive design, and hardly worth while when the same ends can be secured in a less costly manner. The lever shaft, which is 60 in. or so in front of the gearset, has a series of grooves or circular teeth near its inner end, which, when the lever is pushed across the "gate," rotate a pinion on a longitudinal jointed shaft having a similar pinion at its rear end, this second pinion serving to move another rack or grooved shaft which carries the selector finger or lever. Thus lateral movement of the gear shift lever is conveyed to the selector finger; the extreme inner end of

the shaft of the former carries a short drop lever, with a coupling rod to a corresponding lever on the selector shaft; this means enabling the gear sleeves to be moved as usual.

This chassis provides an 18 ft. (216 in.) loading platform with 6 ft. (72 in.) overhang at the rear.

The manufacturer of the Star has hitherto made three types of chassis all identical as to engine and gearset but varying in respect of weight and strength of frame, springs and axles. But the heaviest of these (3 ton) has been dropped and its place taken by a 4-tonner. The new type has a four-cylinder pair-cast detachable L head engine. Besides being peculiar in having detachable heads on pair-cast cylinders, it is notable in having the cylinder holding-down studs extended so that they serve also to secure the cylinder head along the right-hand side and center; on the left is the usual row of short studs and nuts. Threaded valve caps are provided in the head. With a bore and stroke of 127 x 140 mm. (5 x 5½ in.), this engine has a separate two-part aluminum crankcase with handholes on the right large enough to enable the piston and connecting rods to be withdrawn or fitted without displacing the sump. Helical gear distribution is

used with a transverse shaft driving magneto and water pump. Hollow shaft lubrication, cone clutch, four-speed gearset amidships (three-point suspended on a subframe), double reduction final drive, transmission brake on bevel pinion shaft, and internal brakes on rear wheels are other details of the design.

A two-part propeller shaft is used. Drive and torque are taken by triangulated pressed steel members leading from each side of the central casing of the axle to a spherical mounting below a pressed steel cross member of the frame. The price of this chassis is £960.

The name Sheffield Simplex has long been associated with private passenger cars, and at the October Show it was attached for the first time to a truck chassis. The latter is to be called the Shefflex and is intended for 1½-ton loads. It follows quite normal lines throughout, with pair-cast L head cylinders, 4 x 4¼ in. bore and stroke, thermo-syphon circulation, trough lubrication, magneto ignition, cone clutch, amidships three-speed gearset and Hotchkiss drive; but for the reputation of its makers for high-class work it would be hardly worthy of mention, so ordinary is it in general design and layout. The chassis is offered at £680.

## The Common Sense Cost Accounting System

**T**HE fact that many cost accounting systems have been worked out on a highly theoretical, but impractical basis was brought out in a paper read before the conference of the Industrial Cost Association, held in Pittsburgh recently, by J. M. Howell of the General Electric Company, Schenectady, N. Y. Many of these systems, Mr. Howell said, have broken down when confronted with the cold facts of business.

The paper went on to point out that industry has reached a point where it is no longer sufficient that a satisfactory cost system merely record expenditures already incurred, but it must also provide a medium for a positive control of these expenditures. Many cost investigations at present are but post-mortems over some important contract which, after completion, has shown an unexpected loss instead of the expected profit.

Cost reports, to be of real value to executives, must be rendered promptly. This is especially true at the present time with those which cover indirect or overhead charges. In general these reports in the past have gone into too much unnecessary detail and in most instances the essential facts could be shown in simpler and better form. In many cases the use of graphic charts would present the information in a more striking and convincing manner than the old methods.

The executive will find the report of little value, no matter how accurate and complete it may be, unless the records are maintained in such a way as to be readily available for compiling prompt estimates for quoting on new business. Nothing can more quickly demoralize a business organization than failure to accurately forecast the cost of production. Furthermore, the system cannot be considered as ideal unless provision is made for furnishing designers, superintendents or foremen with correct detailed information concerning relative costs of various materials, operations and processes.

The effective cost system will also provide for the immediate detection and segregation of any unusual expenditures, either in direct costs or overhead, in order that these may be considered separately in establishing selling prices. This is especially important in the manufacture of a standardized product. A ready-made cost system is seldom a good fit. The now somewhat obso-

lete method of applying a flat percentage rate to cover overhead, undoubtedly has its serious faults, but the other extreme of trying to determine the exact rate of overhead for each machine or tool in a factory also has its disadvantages and may be carried to a point where it is neither desirable nor practical. Most items of overhead cannot be definitely allocated, and must, therefore, be pro-rated on a common sense basis.

There are some cost systems, too, which require so much of the workman's time in keeping his accounts, that his productive capacity is decreased. No cost system should require much clerical work on the part of workmen, such as making out time cards, etc., but better results can usually be obtained by having regularly appointed clerks handle, as far as possible, all such work.

The properly balanced cost system must fit into other departments of the business organization. It must co-operate with the selling system in order to promptly and accurately forecast the cost of future production. The purchasing division must keep a steady stream of information flowing into the cost department concerning prices of commodities. The production, or shop routine, division, the designing engineers and the shop superintendents and foremen must all work with the cost accounting division. Failing in this functioning to the fullest extent in its relation to other departments the cost system is pretty apt to have a demoralizing effect.

In brief, the efficient cost system, to achieve the maximum of success, must be based on the fundamental principles of sound accounting procedure and good business practice. In respect to details it should be constructed along the lines of common sense and straight thinking as they apply to the particular business under consideration. This method will prove far more useful to the manufacturer than one in the use of which he allows himself to be guided by ready-made rules and forms.

**A** BOOK in which an effort has been made to list the number and size of piston rings used in every make and model of passenger car, truck, tractor, marine engine and stationary gas engine manufactured in this country has recently been published by the Gill Manufacturing Co.

# Automatic Brake Regulation to Prevent Wheel Locking

In one brake here described the braking action is dependent upon centrifugal force, which increases as the car speed increases and vice versa. French designers have recently been giving much attention to the servo brake which is applied by other than direct muscular pressure.

**I**N a previous issue of AUTOMOTIVE INDUSTRIES the statement was made that one of the features of this year's Paris show was the attention which had been paid by French and other Continental designers to the problem of effective braking. This was emphasized, for one thing, by the large number of firms which had adopted front wheel brakes or used four-wheel braking. There was, however, also another development in this line, namely, the adoption of brakes which automatically prevent the locking of the wheels, thus enabling the maximum retarding effect to be obtained and at the same time preventing injury to the tires.

A brake of this type, known as the Hallot brake, was exhibited on the Chenard-Walcker car at the Paris show, and has also been fitted to many other makes. They have been described by *La Vie Automobile*. The principle underlying the design of this brake is as follows: The brake consists of the usual drum and expanding or contracting member, but the drum, instead of being rigidly keyed to the wheel hub, is free to turn thereon. In addition to the above-mentioned parts the brake comprises a disk or spider which is fast upon the shaft to be retarded and takes the place of the web or spider of the ordinary brake drum. The rim of this disk is formed with recesses in which there are located centrifugal weights. These weights are lightly pressed against the inside of the brake drum by coiled springs

within them, and when the wheel is rotating they are pressed against the drum by the additional force of centrifugal action. The radial pressure due to the centrifugal force varies as the square of the speed of the car and is therefore very great at high speeds and very small at low speeds.

Now suppose that the car is proceeding at high speed and that the brake is applied. At first the brake band or sectors will slip on the drum, because the centrifugal weights now rotating at very high speed are applied with great force to the drum and hold it fast on the wheel hub. But as the speed of the vehicle decreases a point is reached where the friction between the brake band and the drum exceeds that between the centrifugal weights and the drum, and slippage will then occur between the latter parts.

## Wheel Locking Impossible

It will be readily seen that with this construction it is entirely impossible to lock the wheels, because as the wheels approach a standstill the centrifugal force on the weights becomes almost zero and the retarding effort practically vanishes. By properly proportioning the parts of the brake it is possible to limit the force of application to just a little less than required to cause locking and thus obtain the maximum retarding effect.

It is, of course, also necessary to be able to apply a

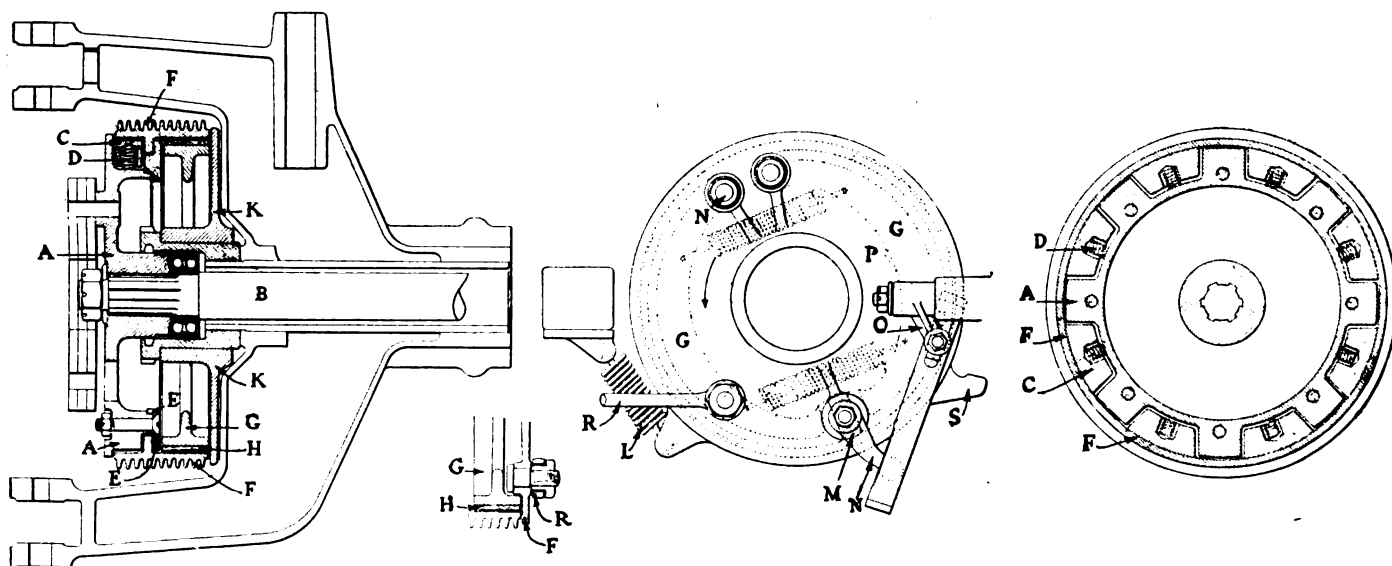


Fig. 1—Hallot automatic regulating servo brake as fitted to Bignan-Sport car. A, driving disk with recesses for the centrifugal weights; B, propeller shaft; C, centrifugal weights; D, spring applying centrifugal weight to floating drum with constant force; E, centering flange; F, floating drum; G, brake sectors; H, asbestos-fabric lining; K, disk supporting brake-operating mechanism; L, return spring; M, brake cam; N, brake arm; O, ball stud lever connected to brake pedal; P, hub of operating device for front wheel brakes; R, pull rod for front wheel brake; S, stop limiting motion of hub



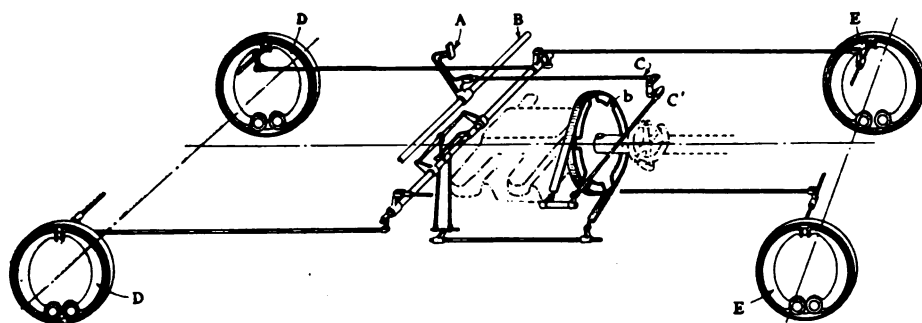


Fig. 2—Diagram of servo-regulating operating mechanism for four-wheel brakes. A, pedal; B, pedal shaft; C, C', operating links of the servo brake band b; D, front wheel brakes; E, rear wheel brakes

retarding effect while the car is proceeding at low speed, as well as to be able to hold the car in position on a grade, and this is accomplished in the Hallot by providing a supplementary brake designed on the lines of the ordinary brake, but far from being sufficiently powerful to lock the wheels. At high speeds the braking power of the automatically regulated brake predominates, while at low speeds the auxiliary brake is the most powerful, and at all speeds the effects of the two brakes are cumulative.

### The Servo Brake

French designers during the past two years have also given some attention to what is known as the servo brake, by which is meant a brake which is applied by other than direct muscular power. Such a brake may be laid out in the following way: Consider a brake drum mounted on the propeller shaft; say, directly behind the transmission. A brake band may surround this drum, one end being connected to the operating member of the brake (lever or pedal), and the other to the rod which connects to the rear wheel brakes. If a pressure is exerted through the operating member of one end of the band, owing to the friction between the band and the drum, a much greater tension is exerted by the other end of the band on the brake rod, and this device therefore serves as a multiplying mechanism. The multiplying ratio can be made anything desired by varying the arc of contact between the band and drum. It is an easy matter to convert an ordinary servo brake into an automatically regulating servo brake. All that is necessary is to replace the keyed brake drum by a free-running pulley containing centrifugal weights on the inside, like the Hallot brake described above. In that case the multiplication of the force of brake application is automatically limited by the friction of the centrifugal weights against the drum and this friction automatically decreases with the speed of the vehicle.

Of course, the automatically regulated servo brake is supplemented by an ordinary brake. On the other hand, it may be so arranged as to act as a brake itself. That is, instead of serving merely as a multiplying agent for the force with which the brake is applied, it, in itself, may be used to exert a retarding action on the vehicle. This arrangement is made use of on the Bignan car, the brake lay-out of which is illustrated herewith.

One of the first manufacturers to use the Hallot brake in regular production was Chenard-Walcker, and the engineers of this firm are said to have achieved almost unbelievable results, stopping the car from a speed of 100 km. (62 m.p.h.) in a distance of 93.5 ft. without slipping of any of the wheels and without the least skid, the road conditions being specially favorable.

The advantages of the Hallot brake are illustrated by the curves shown herewith. At a speed of 50 m.p.h.

a vehicle fitted with ordinary brakes comes to a stop in 334 ft. Under the same conditions a car fitted with Hallot brakes stops in 195 ft. If the two full line curves are compared, it will be seen that the vehicle equipped with Hallot brakes lose speed much more rapidly. At the point where this vehicle comes to a stop, the other, with ordinary brakes, still has a speed of over 30 m.p.h.

All those familiar with the operation of high speed vehicles know that during the first few moments of brake application the reduction in

speed is hardly noticeable. Referring to the two curves (Fig. 3) of braking effort, for the ordinary brake it has a very low value to begin with, but increases little by little, becoming very large as the vehicle comes to a stop, when it is of no use. With the Hallot brake, on the other hand, there is a very considerable braking force right from the beginning, and it increases rapidly, tending to equal the adherence of the wheels to the ground. When this point is approached, and locking of the wheels

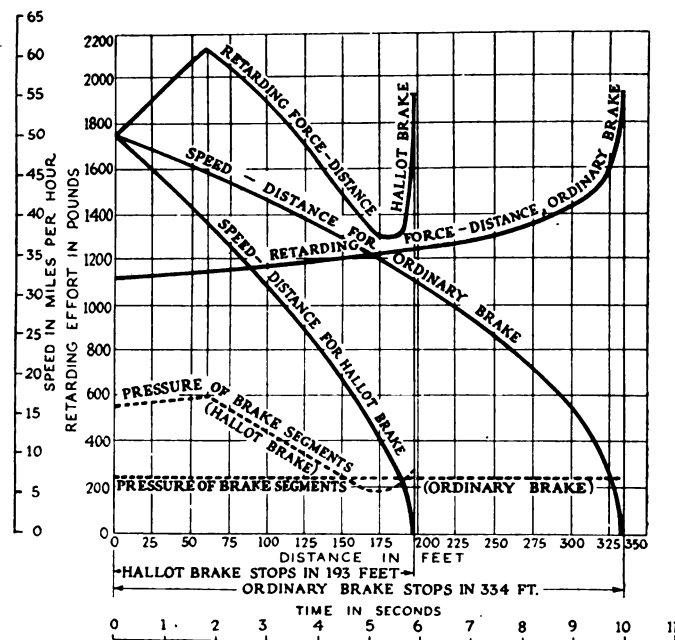


Fig. 3—Curves of braking effect with ordinary and Hallot servo brakes applied to the rear wheels only

is about to occur, the braking effort is automatically reduced. This strong initial braking effort obtained with the Hallot brake results in reducing the speed of the car from 50 to 22.5 m.p.h. in a distance of 131 ft., while the other car is still running at 37.5 m.p.h.

### Judges Appointed for Essay Contest

THE following men have been appointed judges to award the four-year university scholarship offered by Harvey Firestone for the best essay written on the subject "Good Roads and Highway Transport": Dean A. N. Johnson, Department of Engineering, University of Maryland; Harford Powel, Jr., editor of "Collier's Weekly," and C. H. Huston, Assistant Secretary of the Department of Commerce and president of the Lee Highway Association. The contest is open to all high school pupils in the country and is being conducted under the auspices of the Highway and Highway Transport Education Committee.

# Design Problems of the Isolated Electric Plant

Present difficulty is low efficiency energy transformations before usable power is obtained. Battery cost represents about 50 per cent of the initial output in 32 volt plant and also figures high in operating cost. Ultimate type of electric plant will be the full automatic, the author believes.

By Gustave Wiedeman

**T**HE difficulty which hinders the more extensive use of isolated electric plants, particularly for power purposes, is the larger number of low-efficiency energy transformations necessitated before usable power is obtained. For instance, the energy in gasoline or kerosene is transferred from a chemical to a mechanical form at approximately 15 per cent efficiency. This step is fundamentally necessary and cannot be practically eliminated or improved at present. Next, the mechanical energy of the engine shaft must be changed into electrical form by means of the generator, which is done at about 60 per cent efficiency. The transference of the electric current into storage battery energy requires a loss of 25 per cent. If now the current is used in an electric motor, 60 per cent to 70 per cent is the ordinary efficiency of the transformation. Thus it is evident that the over-all efficiency of the electric battery plant is very low and therefore extensive electric motor power use raises the cost of plant maintenance to a prohibitive figure. If power from a pulley of the electric plant can be utilized, the saving over the use of the same power from an individual electric motor drive amounts to approximately 73 per cent by reason of a 40 per cent generator loss, 25 per cent battery loss and further 40 per cent electric motor loss. In other words, it requires practically a 4 hp. plant engine to produce the power consumed by a 1 hp. electric motor, if run by the battery. Only 25 per cent of the plants made at present have engines as large as a 4 hp.

## Power Pulley for Power Purposes

The question naturally arises in this connection, "Why not use the power pulley exclusively for power purposes and dispense with all power-wasting individual electric motors?" In addition to the stock arguments advanced against it, such as immobility, belt troubles, etc., it is interesting to note that the actual power delivered at the pulley bears a widely varying ratio in the different models to the maximum power attainable through electric motor drives. The average excess engine power over generator output averages 60 per cent for plants designed for belt work and 35 per cent for plants not provided with power pulleys. In some cases the engine rated output exceeds the generator output by only 10 per cent, whereas the maximum excess is as high as 160 per cent, allowing in this estimate a 40 per cent generator loss. The engine output generally decreases materially as the engine becomes carbonized, the valves need adjustment, etc., and under such circumstances an engine will fail to rotate the generator under full load if the excess power ratio is as low as the figure stated above. We may be justified in concluding, therefore, that the power possibilities of a

plant can be most advantageously developed by using belt power in plants of high excess power ratio and confining light power work through electric motors to plants of low excess power ratio, where little is gained by having a power pulley. This latter condition holds particularly for full-automatic systems which are provided with an automatic generator cut-in, thus obtaining through electric motor drives for limited periods a discharge rate in excess of the normal generator output.

In designing an electric plant primarily for power use, it is evident that we face a problem essentially different from that met with in lighting plants. The power work with present plants is clearly limited by the great losses involved in the energy transformations necessary and very obviously the development of real power plants is interconnected with the evolution of some form of system which can eliminate the greater part of these losses.

## Battery Cost High

Finally, the power aspect of isolated electric plants presents a rather discouraging outlook from the battery standpoint. The battery cost of the average 32 volt plant now amounts to about 50 per cent of the total initial plant cost. Not only is the battery the element of the plant which requires the most frequent renewals but it also represents a large share of the plant cost. At present the average capacity of the battery at the generator rated capacity is about 5 hours, as stated above. If 5 hours of lighting and 5 hours of power work are averaged at normal generator capacity per week, it means 104 chargings per year, and, based on a battery life of 400 cycles, evidently such an installation would require a battery renewal in less than 4 years. At \$200 to \$300 per set of batteries, the cost per year for the battery alone aggregates \$50 to \$60, which just about equals the normal annual fuel costs. Thus it is evident that the power capacity of electric plants is limited by the capacity of its battery and since this is the big maintenance item, it is natural that electric plant engineers of the future should study this weakness of current design.

The electric plant industry is still in its infancy, a statement verified by the fact that about one-half of all plants produced have been made and sold within the last two years. This being the case, we cannot reasonably expect stability of plant design for some time to come. Even ten years of automobile development failed to settle such controversial questions as number of cylinders, two or four cycle, air or water cooled, chain or gear drive, etc. Similar issues are confronting the isolated electric plant industry, and a few of these are worthy of discussion from a commercially unprejudiced standpoint.

The most important of these is the matter of system voltage. On account of the ease and economy in securing lamps and other equipment, the 110 volt system would naturally be preferred for the ordinary installation. If the generating plant used is semi-automatic in operation, 56 cells are required for its battery complement and usually this item alone accounts for 50 per cent of the initial plant cost. Actually about 15 per cent of domestic plants are of this class. There are a few plants obtainable employing 60 volts, and the remainder of those using batteries, operate on 32 volts. The latter constitute the majority in current production which may be accounted for principally by the fact that such a system is the easiest to build and the cheapest to put on the market. Where a considerable area is to be covered with the lighting and power system, the cost of wire is an important item and for the same power varies inversely as the voltage. The copper cost of a 110 volt system is therefore only slightly more than one-quarter that for a 32 volt unit and the advantage in point of line loss is in the same ratio. Notwithstanding this fact about 80 per cent of present plants include 32 volt battery equipment.

### Choice of the System

Another of the important issues facing plant designers is the choice of system, whether manual, semi-automatic or full-automatic in character. Several full-automatic plant manufacturers have failed in the past, and their failure may have been influenced by imperfections in their automatic control mechanisms. At present there are four manufacturers producing full automatic plants, which employ only a low-voltage starting battery and deliver 110 volts D.C. to the circuit. About 10 per cent of all the units now on the market are full automatic but equipped with a 32, 60 or 110 volt battery. The remainder are about evenly divided between manual and semi-automatic control. The development of full-automatic systems have

made considerable headway in recent years and further exploitation in this field seems restricted only by the evolution of a simple, fool-proof full-automatic control, its desirability being self-evident.

Viewed from an impartial standpoint, it looks as though the full-automatic electric plant would be the ultimate type, irrespective of whether the voltage be 32, 60 or 110, and whether batteries are used or not.

### Increased Efficiency by Batteryless System

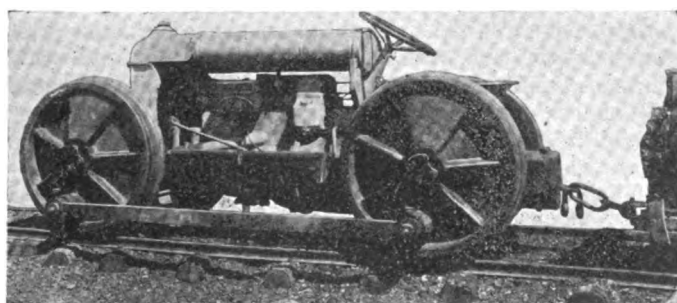
Judged apart from other considerations, the modern electric plant offers an inviting opportunity for improvement in the way of over-all efficiency. Consider the efficiency of the average 32 volt battery system from fuel tank to lamp socket. The best net over-all efficiency of the average four cycle low-compression kerosene engine is about 15 per cent; that of the generator 90 per cent; the battery, 75 per cent; and the line about 90 per cent. Multiplying these together we obtain approximately 9 per cent as the efficiency of the whole system. With the engine in the operating condition we ordinarily find it, as well as the battery and generator, 5 per cent would probably be nearer the true average plant operating efficiency. It is therefore rational that future design should develop the full-automatic batteryless plant which offers an immediate opportunity for improvement in at least two vital respects contributing to better plant efficiency, namely, (1) no battery loss and (2) less line loss due to the ability to use 110 volts (or 220 volts, for that matter). If in such a system we assume again an engine efficiency of 15 per cent, generator 90 per cent, and line 95 per cent, we obtain almost 13 per cent as the over-all efficiency or almost 50 per cent improvement over the low-voltage battery unit. It is encouraging to note that a few far-sighted manufacturers have already undertaken the perfection of the batteryless electric plant which carries with it the possibility of halving future operating costs.

## Tractor Used in Place of Locomotive

**A** LIGHT locomotive for use by lumber mills, coal and ore mines and other manufacturing plants is to be manufactured here by the E. T. Beatty Machine Co. The locomotive consists of a Ford tractor with special attachments. Three of the locomotives are now in use and are declared to be giving satisfaction, furnishing ample power and being very economical as compared with other types of locomotives.

The attachments consist principally of a steel frame and a set of four driving wheels. Power from the rear wheels is transmitted to those at the front by two connecting rods.

The frame of the locomotive is constructed of 1 x 6-in.



Fordson tractor converted for use as a locomotive

solid steel and will be standardized, while wheels will be available in a number of different sizes to suit the needs of the buyers. The locomotives can be reconverted into tractors at any time by removal of the attachment and replacing the tractor wheels.

**T**HE new German Patent Office law regulating fees, which has recently come into force, provides for considerable increases of fees, but consideration has been shown to poor inventors. The fee for the notice of a patent is now 100 marks, for the registration of a trade design 60 marks, as hitherto; for the extension of the validity of registered trade designs 300 marks and for registered trade marks 200 marks.

The annual fee for a patent for the first two years is 100 marks each, and increases by 50 marks per annum until the sixth year; by 100 marks per annum from the seventh year to the eleventh year, and by 150 marks per annum from the twelfth to the fifteenth year, so that in the last year of a patent the charges will be 1,400 marks. The fee for lodging a complaint will henceforth be 100 marks and for the renewal of a trade mark 50 marks.

It is hinted that a revision one way or the other may be called for when the financial results of the new rates have had time to show the effect.

# An Analysis of Air Bleed in Carbureter Compensation

The bow-shaped economy curve which usually results from the conventional dynamometer test is believed to be ideal. A flatter curve may indicate loss of power resulting from too lean a mixture. Various arrangements of the air-bleeding orifice are discussed and their effect is noted.

By W. H. Weber\*

**I**N carbureter literature a good deal may be read about "compensation," and the question naturally arises, "What is compensation and why do we need it?" The latter part of the question is very easily explained. It is only necessary to drive a car equipped with a simple suction-controlled, single jet carbureter to find that the mixture becomes richer as the engine speed increases. We may adjust the mixture in any way we like, but we cannot overcome this tendency for the fuel to flow faster in proportion to the air as the suction increases. The former question is not so easily explained.

Fig. 1 illustrates the first question, the horsepower and economy curves being records of dynamometer tests under wide open throttle made with a simple suction-controlled fuel jet and fixed air carbureter. If we bleed air into the fuel nozzle above the normal level of the fuel and duplicate the test in Fig. 1 we will get an exactly similar economy curve, showing that we have in no way altered the characteristic flow of the simple suction-controlled jet. It is a fact that such an air bled jet can never be compensating. The effect is merely that of an air spray over the fuel helping atomization as the fuel is lifted out of the nozzle.

The dictionary tells us compensation is reparation, intimating that there is a condition requiring correction

\*Engineer, Claudel Carburetor Company.

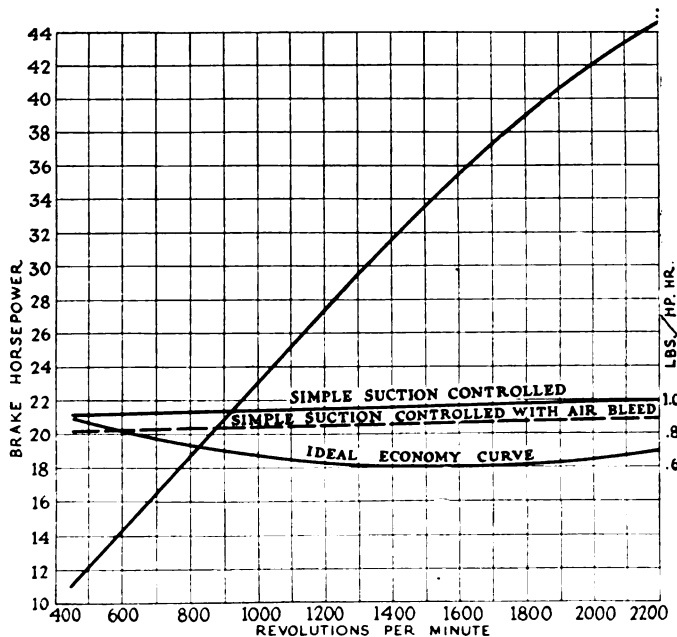


Fig. 1

which is the case in the plain tube carbureter. The distinction between air bleed and compensation is not generally understood, nor is the allowable percentage of air bleed generally known. The terms "air bleed" and

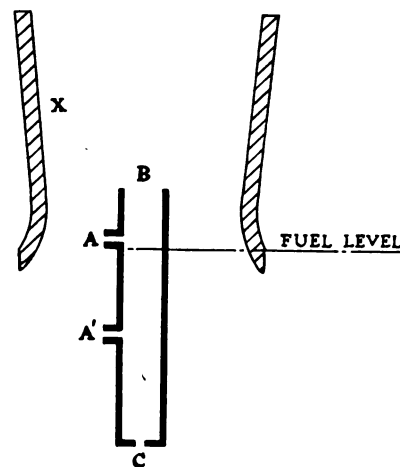


Fig. 2

compensation are synonymous only when the effect of air bleed is to alter the characteristics of the simple suction-controlled fuel jet.

It will be noted that the economy curves obtained with the simple suction-controlled fuel jet and air bled jet are of the straight line ascending type, but that the ideal economy curve is bow shaped, a little richer on both ends than in the middle. Only wide open throttle conditions are considered, because, as I indicated in my article, "Some Factors Entering Into Carburetor Construction," it is a simple matter to combine two suction controlled jets such that the suction increases on the one as it decreases on the other as the throttle is opened. This carburetor will satisfy level road, variable throttle driving, but it will fall down on hill climbing or where maximum power is desired at low engine speeds. We must accept the bow-shaped curve as ideal, for the simple reason that practical dynamometer experiments always establish such a curve. When we try to make the curve more nearly horizontal we lose power and the mixture becomes too lean to run.

This bow-shaped economy curve is obtained in plain tube carburetors by means of a compensating air bleed. To illustrate, Fig. 2 may roughly represent a discharge nozzle. The nozzle outlet B terminates at the throat of the venturi X. The calibrated fuel orifice C is submerged and the air bleed hole A above the level communicates

directly with the atmosphere. When A is closed we get the economy curve illustrated in Fig. 1 and when it is opened we get economy curves similar in shape (ascending) regardless of the size of opening A. This is a case of pure air bleed, no compensation. Now if we move A so that the orifice pierces the nozzle below the normal fuel level we get immediately a bow-shaped economy curve, the inclination of the bow depending directly upon the distance between the fuel level and A' and the size of calibration C. We have an air bleed just as before, but we have changed the characteristic simple suction-controlled fuel jet curve. The reason is that we have introduced a second flow not dependent upon suction but constant per unit of time. This flow is due to head, since the fuel level drops in the nozzle to the position of A', and where before we had only the effect of an air bleed causing partial suction destruction, we have now the same suction on the fuel plus an additional flow by virtue of the fact that a difference in head exists between the fuel supply or float chamber and the fuel discharge or nozzle.

Fig. 3 illustrates the effect of lowering the position of A without changing its size. It will be noted that the resultant mixture is richer the lower we place A. It might be added that a much more effective method of increasing flow due to head is to increase the size of the fuel calibration C, since flow due to head varies directly only as the square root of the head, but as the square of the diameter of the orifice. It might be argued that such a change would affect the mixture throughout the range, and more especially at high speeds, when the amount of flow due to suction is so much greater than that due to head, but we have a very good method of

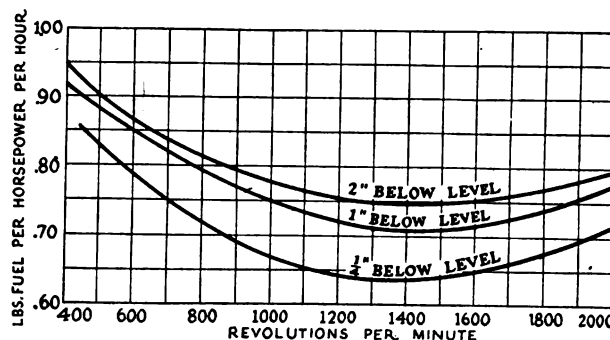


Fig. 3

offsetting the former flow by simply reducing the size of nozzle outlet B.

The plain tube carbureter is a very flexible instrument in that we may get any number of different results by juggling openings A, B and C.

A very definite and important ratio exists between outlet B and air bleed or compensating air area A, which is not generally known. In a large number of tests I varied the ratio of B/A from 0 to 1, or made the change from simple suction-controlled jet to 100 per cent air bleed, and discovered the surprising fact that when B/A is 20 per cent or less we may expect maximum power, but when we go beyond 20 per cent—that is, when the air bleed area is greater than 1/5 the nozzle outlet area—the power falls off and it is not possible to regain the power lost by increasing the size of fuel jet C. This is equally true of air bleed or compensation. In road work we may go as high as 50 per cent when extreme economy is desired, but only at a sacrifice in power.

## Municipal Transportation Improvements

THREE recommendations of importance were submitted to the American Society for Municipal Improvements by the Committee on Traffic and Transportation. The first called for the installation of motor bus routes in municipalities when an extension of the public passenger transportation system is required, the second condemned the so-called "jitney service," and the third recommended the formation of a Highway Transport Division in municipalities with a population of 100,000 or more.

Installation of motor bus routes has resulted in advantage to many cities. Such a service not only maintains the maximum practicable traffic capacity of streets, but it also avoids the use of car tracks in the highways.

From the standpoint of economic public service transportation, the installation of "jitney" service is undesirable. The systems not only overcrowd the streets, the report said, with five-passenger public transportation vehicles, but "it is obviously unfair to public service corporations, operating under franchises, to be forced to compete with a 'jitney' service which almost universally is operating on an uneconomic basis." Detroit was cited as an example of crowded streets as a result of this service.

The duties of the Highway Transport Division, as recommended by the committee, would be to deal with all matters pertaining to traffic and transportation which affect the economic design and maintenance of streets and their efficient use by pedestrians and all classes of vehicles. An important function would also be to make highway transport surveys preliminary to the design or

redesign of streets. This survey would also determine efficient methods of maintenance and the formulation of recommendations pertaining to efficient traffic regulations. Many things would have to be taken into consideration in such a survey, such as possible future developments of the community with a view to determining the sort of traffic the road would be called upon to bear. Men assigned to this work should be experienced highway engineers who have a knowledge of practically all subjects related to highway work.

## Sulphide Liquor as Dust Preventive

IN Switzerland very good results are claimed to have been obtained from the use of sulphide liquor as a dust preventive on roads. The liquor is usually distributed by means of motor-propelled sprinkling carts. After the water of the solution has evaporated there remains a brown, shiny, asphalt-like residue, consisting mainly of lignin or ligno-sulphite, which covers the road material with a hard, adhesive liquor, and in case of sufficient thickness prevents the formation of dust for weeks. The effect is the more lasting the heavier the application, and the application is the surest of results if made before any dust has formed. About 400 cu. ft. of the liquor are required per mile of road 14 ft. wide. In order to reduce the freight charges the sulphite liquor is sometimes obtained in a concentrated form and diluted at the point of use. In contrast to tar, the lignin mass is soluble in water, so that continued heavy rains may wash the coating off.



# Some Road Tests with a New Type of Accelerometer

Measurements of tractive effort, tractive resistance, braking effort and brake hp. of two trucks and two passenger cars indicate some reasons why there is a marked difference in performance of various vehicles.

By Samuel H. Woods\*

IT is generally agreed that experimental data relative to automotive equipment should be taken under conditions of road operation, so far as possible. In laboratory work so many of these conditions can be only approximated or not realized at all, that results so obtained are frequently subject to criticism on this account. Any means, therefore, of obtaining reliable data while actually operating on the road is to be welcomed as a valuable contribution to the art of automotive engineering.

An instrument by the use of which it is possible to obtain not only data on engine performance in actual road operation, but also data on tractive resistance, has been tried out by the International Motor Co. in a preliminary way and so far appears to function well. It is known as the Drewry Testometer and consists of a U-tube of uniform bore, set with its plane level when the vehicle on which it is mounted is on a level surface. One branch of the tube connects with top and one with the bottom of a closed reservoir containing a colored liquid. In manufacture, the tube is carefully set level and the reservoir filled until the liquid just reaches the center of the bend in the tube, after which the top of the reservoir is sealed, forming a closed system.

It is obvious that if the tube is now inclined endwise, the liquid will come to rest in one branch or the other of the U-tube at a distance from the end depending upon the angle of inclination. If the tube and reservoir complete, mounted in its case, be set successively at different angles, and the positions of the end of the liquid column be marked, a scale will be obtained, enabling the device to be used as an inclinometer. This, however, is distinctly a secondary use.

If we consider the instrument mounted on a vehicle weighing 10,000 lb. standing on a grade of 1 in 10 (British nomenclature), neglecting friction, the brakes hold with a retarding force of  $\frac{1}{10} \times 10,000 \text{ lb.} = 1000 \text{ lb.}$ , or 224 lb. per ton (2240 lb.). It is on this basis that the instrument is calibrated, and if one analyzes the forces acting, it is not difficult to understand that this instrument will indicate at any instant the resultant accelerating or decelerating force acting on the vehicle in the direction of motion in terms of pounds per ton of its weight.

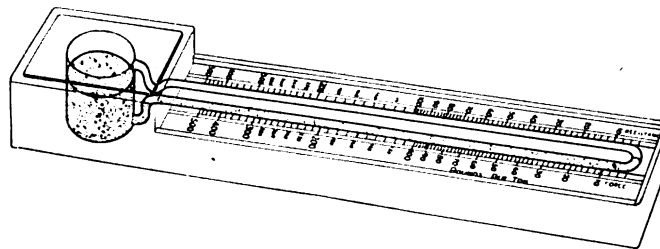
In order to understand that the instrument indicates true value of tractive resistance and tractive effort, regardless of the gradient, it is necessary only to conceive of the vehicle mentioned moving at uniform speed on the level and also on a grade. On the level the instrument will indicate zero because the engine is just overcoming tractive resistance. On the grade the indication will be the same as if standing at rest on the grade, and the engine will be overcoming tractive resistance and also raising the vehicle up the grade. When coasting down a grade the vehicle may accelerate, but we still get a true indication of tractive resistance, for the vehicle is free to move except for the retarding effect of this resistance.

The experiments were made with vehicles of widely varying weights and characteristics as shown on the charts. They consisted of—

1. Observation of tractive resistance on
  - (a) Fair granite block pavement,
  - (b) Smooth asphalt, at various speeds;
2. Observation of
  - (a) Tractive effort with full throttle opening,
  - (b) Tractive resistance,
  - (c) Tractive resistance plus engine friction, at various speeds;
3. Observation of maximum tractive effort in first, second and third speed.
4. Observation of maximum braking effort with each set of brakes.

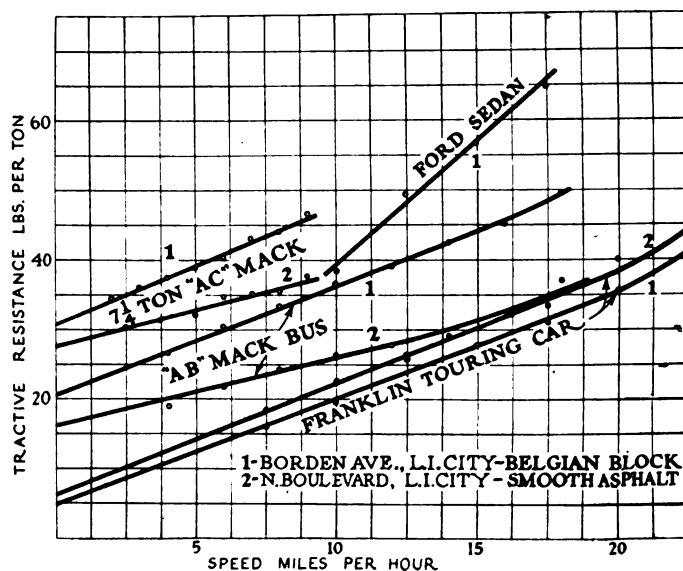
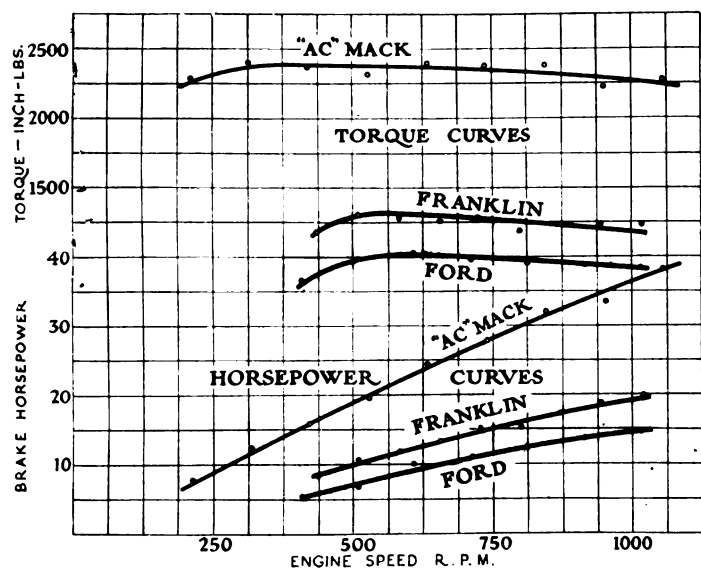
In making these observations, the procedure was, first, to level the instrument relative to the surface on which the vehicle stands. To observe tractive resistance it is necessary to select a stretch of level road of uniform character as free as possible from undulations. The vehicle is brought up to a speed 3 to 4 miles per hr. in excess of the highest speed at which it is desired to take observations. The transmission gears are then placed in neutral position and the vehicle allowed to coast. As the vehicle slows down, the testometer reading at any speed is the value of tractive resistance in pounds per ton of vehicle weight. This, of course, includes rolling friction of the tires on the road and chassis friction.

The best method of observing brake horse-power is to select an up-grade which the vehicle will not quite climb in high gear. Starting at the bottom at the maximum speed desired, observations of tractive effort which is now indicated on the instrument are taken at various speeds as the vehicle slows down. To these must be added tractive



Diagrammatic view of the Drewry "Testometer," the form of accelerometer with which the tests here reported were made

\*The author is connected with the Engineering Department of the International Motor Co., on whose behalf the tests here described were made.



Horsepower, torque and tractive resistance curves plotted from results of tests made with the Drewry "Testometer" on four different vehicles

#### PARTICULARS REGARDING VEHICLES TESTED

Vehicle	Weight as Tested, Lb.	Gear Ratio	TIRES			
			Front	Inflation Pressure, Lb. Sq. In.	Rear	Inflation Pressure, Lb. Sq. In.
7 1/2-ton Mack AC truck..	20,840	12.62	Firestone solid, 36 x 7	—	Firestone solid, 40 x 7, dual	—
Mack AB bus.....	10,260	5.88	Kelly-Springfield caterpillar (cushion), 34 x 4	—	Kelly-Springfield caterpillar (cushion), 34 x 5, dual	—
Franklin passenger car..	3,440	3.69	R-Howe cord, L.-Goodrich Silvertown cord, 34 x 4 1/2	40	Kelly-Springfield cord, 34 x 4 1/2	50
Ford sedan .....	2,770	3.67	Goodyear All Weather, (fabric), 30 x 3 1/2	60	Goodyear All Weather (fabric), 30 x 3 1/2	60

resistance values obtained by allowing the car to coast down the hill and observing instrument readings at various speeds as the car accelerates. If instead of coasting with transmission in neutral, the ignition is cut off and transmission left in high gear, we obtain values which include friction, and by adding these to those of tractive effort, we obtain approximate indicated horse-power.

The values of horse-power may be obtained as follows: Let  $P_t$  = maximum tractive effort plus tractive resistance in pounds per ton at a speed in miles per hour =  $V$ , while  $W$  = vehicle weight in tons of 2240 lb. Then,

$$\text{B.hp.} = P_t WV \times \frac{5280}{60 \times 33,000} = \frac{P_t WV}{375}$$

and, if  $P_i$  = maximum tractive effort plus tractive resistance plus engine friction, I.hp. =  $\frac{P_i WV}{375}$

Engine torque is obviously total engine effort =  $(P_i WR) \div K$ , where driving wheel radius =  $R$ , and the gear ratio =  $K$ .

In all cases in which this instrument is applicable, care must be taken to use it in such a way that its indications do not change rapidly. This means that in observing values of tractive effort, the grade should be such as to permit the car to accelerate or decelerate slowly with wide open throttle. When tractive resistance is being observed, variable winds seriously affect readings on light vehicles. Unevenness in the road surface causes rapid fluctuations in the indication. If the air is still, a slight down-gradient is an advantage, but if windy so that runs must be made in both directions, a level road is preferable.

The curves attached show results obtained in the first experiments made with this instrument by the International Motor Co. To a great extent these are self-explanatory, but a few comments will aid in their interpretation. Tractive resistance will be seen to include chassis friction and rolling friction. In routine factory testing, therefore, the instrument should be of great service in

keeping the former within limits which can be established after sets of readings have been taken on a number of chassis over the same road surface. Various types of road surfaces, again, can be compared from tractive resistance indications taken upon them, using the same vehicle in each case.

It is to be noted that only one set of observations was made in obtaining the horse-power curves. By taking several sets of readings and averaging, a smoother result would be obtained and the effects of road irregularities minimized. This principle applies to all readings taken with the instrument; in order to obtain satisfactory results the average of several runs must be obtained. Great accuracy of speedometer readings is also essential.

Measurement of braking effort is a very useful function of the instrument. Taken in conjunction with tractive resistance, readings on braking effort indicate whether or not brakes drag when released, and their effectiveness when applied. Net braking effort is, of course, that indicated less the tractive resistance value at the speed at which the car is traveling. In order to be fully comprehensive, a fairly steep grade should be selected for the observation of braking effort. This in order to arrive at the values at different speeds as the car slows down, more gradually than it would on the level.

Values of maximum tractive effort, also, in order to be of greatest usefulness, must be observed under conditions which reduce the acceleration so that simultaneous readings of speed and tractive effort can be made with reasonable accuracy.

Braking effort and maximum tractive effort were observed so far as possible without undue expenditure of time, on the 7 1/2-ton truck and the Franklin touring car, with the results given below:

	Maximum Tractive Effort Lbs.-Ton			Maximum Braking Lbs.-Ton	
	1	2	3	Foot	Hand
7 1/2-ton Mack .....	380	200	140	340	215
Franklin .....	312	260	140	260	260

These values are undoubtedly low, since all except those of tractive effort with the truck were taken on a level road and the changes of indication in the instrument were too rapid to permit of great accuracy. Where an engine is governed as in the truck, the observation of low gear performance is almost impossible except on a very steep grade because of governor action.

The values of tractive resistance as shown in the curves indicate a wide difference for the various vehicles experimented with. This difference is obviously due to a com-

bination of chassis and tire friction. The exact relation of these does not yet appear. It is obvious, however, that the difference between pavements 1 and 2 is due to a difference in tire friction. It will be noted also that in the cases of the lighter vehicles a slightly more rapid rise of the curves above 15 m.p.h. is shown, indicating the effect of wind resistance. Such curves will undoubtedly be of great service in studying the effects of different types of tires and varying the elements of chassis friction through gear and bearing adjustments and lubrication.

## This Year Progressive in Federal Aid Highway Work

THE amount of money expended by the various states for highway improvement during the fiscal year ending last May 30 was nearly double the amount spent in the four previous years.

This fact is shown in figures giving the amount of the \$226,000,000 appropriated by the Federal Government for road work the states have used since the money was made available. During the four years previous to May 30, 1920, but \$40,097,881 had been taken over by the states and between that date and May 30, 1921, a total of \$38,719,134 was dealt out to the various state governments, making a total of \$78,817,015. By last midsummer the Bureau of Roads estimated that there was but about \$18,000,000 left of the original appropriation, for a vast number of projects were taken over during the summer months. Work on many hundreds of these new highways has already begun and is now being rushed. It was shown that by June 30 twelve states had completely exhausted their quotas of the money and many others had but enough remaining to permit building but a mile or two of road. Here and there were delinquents, but as a whole the states surmounted the tremendous obstacles they found in road building and co-operated with the Government in its endeavor to get improved roads built by sharing half the expense.

June of 1921 saw 1200 miles of highways (Federal aid system) completed—about twice as much as the record for May showed. The accomplishments for these two

months together nearly equaled the total completed mileage for the previous four years. The old record of 1677 miles of the 1920 May Bureau of Roads reports for finished miles had grown to 7469.

Especially rapid progress has been made in some of the Middle Western States, Indiana being an exception. By midsummer Illinois had completed 411 miles of its Federal aid roads and was spending \$12,265,218 (estimated) on 334 miles of additional roads—hard surface ones largely. Ohio, with 182 miles finished, was spending \$15,319,521 to complete 404 miles; Wisconsin had 255 miles done and had \$9,844,248 of contracts calling for 644 additional miles—a considerable quantity of this mileage of gravel, and other types. Michigan, with 105 miles of completed work, had 280 miles under construction at an estimated cost of \$8,319,920. On the same date these records of June 30, 1921, show that Indiana had finished 21 miles, and had 137 miles under way at an estimated cost of \$4,959,948. Her original apportionment was \$7,415,298, and the May 31 records show that at that time she had left to her credit, and unobligated by approved projects, \$4,545,499. She has since filed a number of projects, but not nearly enough to come within millions of her share. She may yet have a chance to obtain the money the Government set aside for her several years ago. At any rate, she has the greatest opportunity of all these of doing much work at Federal expense right now and thus relieve to some extent the unemployment situation there.

## Motor Taxation in England

A PLEA for heavier taxation of motor trucks in England was uttered recently before the Institute of Transport by E. A. Brookes, surveyor of the Durham County Council. Mr. Brookes declared the present funds available for highway maintenance were insufficient and additional revenue would have to be provided. It was pointed out that it was to the interest of the owners of these heavy vehicles that additional funds be obtained, as improved highways would result in less wear and tear upon their trucks.

Some interesting figures were brought out in the discussion, among them being statements showing that self-propelled traffic on some English roads has increased from 45.1 per cent of the whole in 1912 to 92.3 per cent in 1920, and that the traffic of heavy motors has increased from 21.6 per cent in 1912 to 51.5 per cent in 1920. It was also declared that since 1912 the total traffic in weight has increased by about 290 per cent.

Mr. Brookes, in his argument, said the present fee of 39 pounds per year was inadequate and said vehicles should be taxed one penny per ton mile.

An interesting point was brought into the discussion, however, when it was declared that the term "road user"

was given too narrow a meaning, being applied only to the owner of the vehicles using the roads. The persons to whom, or from whom the goods were being delivered, it was pointed out, also fall in the category of road users, for they benefit by the motor truck delivery. Roads also increase the value of land facing the highways and the general taxpayers should be made to bear a part of the burden for their upkeep.

Apparently the situation in England somewhat reflects the situation in this country. If registration fees are increased it can but mean that the consumer must ultimately pay the difference. These fees, in many states, are the sole funds available, other than the federal appropriations, for road improvement, whereas as a matter of fact the farmer whose land faces the improved highway is greatly benefited in that the value of his land is increased, the merchant is benefited in that more goods can be delivered over the roads and more people from a distance are able to come into his stores and in fact all branches of industry are benefited by better roads.

Yet the burden of maintaining these roads bids fair to fall, to a large extent, upon the shoulders of the owners of heavy trucks.

# Transmission Standardization

Establishment of reasonable limits of parallelism and concentricity between flywheel, motor housing and transmission case is important. Manufacturers stand in their own light by refusing to adopt S. A. E. standards.

**S**OME of the most important parts of transmission gearsets have been standardized by the S. A. E., including the splined shafts on which the gears slide and the corresponding broached holes in the gears, the bell housings, the shaft ends and the tire pump mounting. There remain, however, a number of other features on which—manufacturers feel—standardization work could be done to advantage. What the problems are that confront the manufacturers of transmissions was well brought out in the report of the Transmission Subcommittee of the A. G. M. A. Standards Committee submitted at the recent Rochester meeting by W. H. Lyman of the Warner Gear Co.

Mr. Lyman considers that there are still too many types and sizes of bell housings for unit power plants. He admits that much creditable work has been done along the line of standardizing bell housings by the S. A. E., but unfortunately many car builders do not make use of the standards already adopted and stand in their own light in an effort to reduce cost of production and to meet competition.

The matter of establishing reasonable manufacturing limits of parallelism and concentricity between flywheel, motor housing and transmission case deserves serious consideration. The transmission manufacturer may hold his own work within reasonable limits, but the transmission may be secured to an engine in which the bored hole for the pilot bearing in the flywheel is oversize and not concentric with the snap fit in the crankcase; or, on the other hand, the bore of the crankcase for the transmission flange may be oversize, eccentric and out of parallel with the flywheel. Such misalignment of motor and transmission causes undue bearing wear, transmission strains and gear noise.

Misalignment will also produce a hard-working, grabby clutch action. This is particularly true of the gear-tooth, multiple-disc type of clutch, where there are so many points of contact and where it is necessary to hold the back lash reasonably close to prevent clicking of the teeth on the discs against the teeth cut in the flywheel or in a driving drum fastened to the flywheel. Mr. Lyman said that he had seen many flagrant cases of misalignment of transmissions and engines. For instance, engines where the face of the flywheel to which the clutch driving drum is attached and the face of the crankcase to which the transmission case is attached out of parallel as much as 0.070 in., and the bore in the crankcase to receive the snap fit of the transmission oversize and out of round as much as 0.045 in. Under such conditions it is no wonder that we have clutch trouble and noisy transmission gears.

It is admittedly somewhat easier to hold to close limits on the flange of a transmission case than it is on an engine crankcase, but reasonably close limits may be expected on the part of engine manufacturers. It is proposed that the A. G. M. A. Standards Subcommittee on Transmissions, the Engine Manufacturers' Association and the S. A. E. get together and work out a set

of reasonable tolerances that will insure good working conditions in the clutch, engine and transmission.

One of the problems which the new committee has set itself is to formulate recommended practice regarding center distance, width of face, pitch and pressure angle of gear teeth for given ranges of engine torque. In Mr. Lyman's opinion this problem should be approached carefully. For instance, his company has found it easier to produce quiet gears from oil-hardening than from case-hardening steel, owing to the lesser distortion during heat treatment of the former, and as quiet operation is such an important factor in gear work, the kind of steel to be used should be settled first.

The maker of transmission lubricants and the makers of transmissions have not worked together very closely. The automobile builder discovers that the lubricant he has been using during the hot and mild weather will not answer his purpose during the cold weather, because his customers complain of the hard shifting of gears, so he calls for help from some oil man and, sure enough, the oil man can help him out and furnishes a grade of lubricant that makes the gear shifting somewhat easier but in doing so the change of lubricant produces a howl in the transmission that was formerly quiet with the old grade of oil used. Now, instead of the car builder going after the oil man to meet a gear condition, he goes after the transmission builder to meet an oil condition. Some of the lubricant is so thick that it will not run out of a bucket turned upside down and surely lubricant of this consistency will not penetrate the small hole made in the stems of some designs of drive gears for the purpose of lubricating clutch bearings or other parts. Some improvement in this situation can undoubtedly be made by co-operation between the transmission interests and the oil people.

Another subject that deserves study is the best form of gear blanks. These blanks should be of such form that they can be easily manufactured and there should be no extreme heavy and light sections, as gears of that type usually distort heavily under heat treatment. In the case of small diameter gears with keyways in them, attention should be given to the amount of stock left over the keyway, to see that there is sufficient to prevent cracking.

The subject of wall thickness for transmission cases appears to be in a very chaotic condition at the present time, as wall thicknesses of 3/16 in. to 9/16 in. may be found. With a transmission of given capacity and number of speeds the cases of transmissions are very nearly alike in form and size, and there cannot possibly be such a range in the requirements of wall thickness as indicated by the above figures. The limits on the light side depend somewhat on the ability of foundries to produce sound castings and partly on the requirement of noiseless and vibrationless running, which characteristics are favorably affected by heavy walls. If any standardization of wall thicknesses is attempted it will be done in consultation with good reputable foundries.

# Germany's New Standardized Motor Fuel

Mixture of benzol and alcohol with tetralene has produced excellent results in road tests and races. Can be used with ordinary type of carbureter with no change in the fuel nozzle. Attempts to use tetralene alone proved unsuccessful, which led to government's adoption of the present standard.

By Benno R. Dierfeld

WITH the precipitous decline in the exchange value of the mark, Germany before long will be unable to buy any foreign motor fuel and will be compelled to use fuel of native production. A suitable home fuel for all kinds of motor vehicles is benzol, but, unfortunately, the quantity available for home consumption is inadequate. Another by-product of the German coke industry is naphthalene, which can also be used as fuel in internal combustion engines, but the fact that it is a solid at ordinary temperatures makes it necessary to use complicated devices for preheating, which makes it inconvenient for motor vehicle use.

During the war German chemists succeeded in converting solid naphthalene by catalytic hydrogenation into tetrahydronaphthalene, called tetralene for short. It is a liquid at ordinary temperatures and is produced at the rate of 100 tons and more per day by the Tetralin Co., Berlin W-8. This tetralene, with its high boiling point,

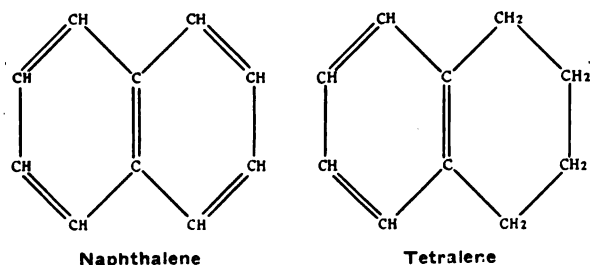


Fig. 1—Diagrams of Molecular Structure

is especially adapted for vehicle engines using a high compression ratio, because it is free from knocking tendencies. Tetralene ( $C_{10}H_{12}$ ) is a uniform chemical compound, and its molecular structure may be represented by the diagram shown at the right in Fig. 1. This structure may be compared with that of the naphthalene ( $C_{10}H_8$ ) from which it is made, as shown at the left in the figure, the transformation consisting in the addition of four hydrogen atoms to each naphthalene molecule.

As stated, tetralene is a liquid at ordinary temperature, water-white in appearance, of a specific gravity of 0.975. Its boiling point is 205 deg. Cent. (452 deg. Fahr.) and its point of solidification or freezing point is very low, minus 30 deg. Cent. (minus 22 deg. Fahr.). The calorific power of 11,600 kilogram-calories (20,900 B.t.u. per lb.) is very high, and the high flash point of 79 deg. Cent. (174 deg. Fahr.) insures safety in operation. Tetralene is not suited for use by itself in present types of aircraft and automobile engines, but by mixing it with fuels of a lower boiling point it can be used with-

out difficulty in the average vehicle engine. The admixture of these fuels with tetralene also lowers the specific gravity, whereby the necessity for changes in carbureter adjustment is obviated. Exhaustive tests in the Motor Laboratory of the Berlin Technical University by Dr. Schrauth and Diplom-Engineer von Keussler conclusively proved that very good results may be obtained with a mixture consisting of equal parts (by weight) of tetralene and gasoline, having a specific gravity of 0.720 to 0.735. According to Wa. Ostwald, a well-known chemist, a mixture consisting of equal weight parts of tetralene and benzol is an excellent fuel for motor cars and can be used without change in the fuel nozzle.

An important fact in this connection is that alcohol may be added to such tetralene-benzol mixtures in almost any desired proportion, as the addition of alcohol, on account of its water content, influences the combustion of the tetralene in a favorable manner. For this reason a tetralene-benzol-alcohol mixture seemed to be the most suitable fuel of home production for use in Germany. There is at the disposal of the German Government about 60,000 tons of benzol annually (provided only the standard benzol is used in the future); the tetralene works can produce 30,000 tons of tetralene annually and the Government might release 30,000 tons of alcohol for motor fuel purposes. This would yield a total of 120,000 tons of home motor fuel per year, or more than required by German motorists.

The new German standard fuel, called *Reichskraftstoff*, has the following composition (by weight):

50 parts benzol—25 parts tetralene—25 parts alcohol.

The name and composition are due to the noted chemist, Walter Ostwald. The specific gravity of the standard fuel, 0.865, is about the same as that of benzol, and its heat value of 9000 calories per kilogram (17,200 B.t.u. per lb.) or 8000 calories per liter (54,400 B.t.u. per gal.) is quite satisfactory. A new method of preparation has been developed which overcomes the tendency of the components to separate out when the mixture is cooled off or when benzol or water is added.

The distillation curve of the new standard fuel is most favorable and is shown herewith (in comparison with a distillation curve of gasoline as now sold in the United States.—Editor). The following table gives the proportions that pass over at different temperatures:

Per Cent (Volume)	Deg. (Fahr.)	Per Cent (Volume)	Deg. (Fahr.)
0—10	149—156	60	248
20	162	70	285
30	162	80	379
40	167	90	392
50	189	95	400



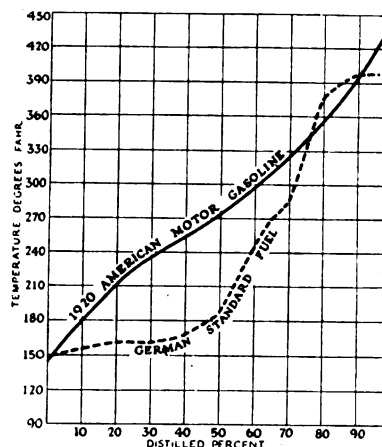
Up to 212 deg. Fahr. 54 per cent of the mixture passes over, and boiling begins at 147 deg. Fahr. Not less than 45 per cent of the mixture passes over at temperatures less than the boiling point of the most volatile constituent. It will thus be seen that in this case a mixture of very good vaporization qualities is obtained from components of comparatively high boiling point.

This standard fuel can be used in all ordinary carbureters without change in the fuel nozzle, but the air should be pre-heated to a somewhat higher temperature than with gasoline. Draining of water from the fuel strainer, as customary with gasoline, is not necessary, as the standard fuel dissolves water, and no trouble is experienced from water in the fuel. As the standard fuel is heavier than gasoline, with the same fuel nozzle the consumption will be less. Starting of the engine involves hardly any more difficulty than starting on gasoline. It should be specially emphasized that this new fuel is no emergency fuel, like the numerous fuel mixtures mentioned by the writer in a previous article in AUTOMOTIVE INDUSTRIES of Sept. 9, 1920, but is a convenient and all around satisfactory fuel that will be able to hold its own in competition with gasoline and benzol when the latter are again available in sufficient quantity.

An important factor in connection with any new fuel is the cost. In making a comparison with other fuels it is not proper to do so on the basis of the cost per unit weight or volume; what should be compared is the cost of a certain number of heat units obtained from the different fuels compared. The following table gives the data necessary for such a comparison (all figures relating to costs in Germany only, it has not been deemed necessary to convert them.—Editor.)

	Gasoline	Benzol	Tetra- lene	Alcohol	Stand- ard fuel (50-25-25 mixture)
Spec. gravity....	0.725	0.860	0.975	0.810	0.865
Heat value in calo- ries/kilogram ..	11,000	9,700	11,600	7,200	9,000
Heat value in calo- ries/liter .....	7,980	8,440	11,300	5,830	8,000
Retail price in marks per kilogram (August, 1921).	8.50	5.60	7.40	6.50	6.25
Price of 1000 calo- ries in marks...	0.77	0.58	0.64	0.90	0.69

As to the consumption with the new standard fuel, the tests of Professor Dr. Schrauth are interesting. For instance, a 35 hp. car, the Zenith carburetor of which was adjusted for gasoline, consumed on a run of over 1100 kilometers (685 miles), at an average speed of 40 to 45 km. p. h. (25-28 m.p.h.), only 12 liters or 10.6 kilograms per 100 kilometers (19.6 miles per gal.) with the standard fuel, while the consumption of gasoline of 0.730 specific gravity was 19.8 liters or 14.5 kilograms per 100 kilometers (11.9 miles per gal.). Other cars had similar consumption. With the standard fuel all cars



Distillation curves

showed very good performance, good starting and acceleration, and no popping in the carburetor in cold, moist weather. The highest car speed, which was 90 kilometers per hour (56 m.p.h.) with gasoline, could be increased up to 100 kilometers (62.2 miles) per hour with standard fuel. During the period, Oct. 4 to Oct. 7, the Allgemeine Deutsche Automobil Club, the largest German club, with 25,000 members, arranged a long road race for motorcycles and light passenger cars up to 24 hp.; for all vehicles the standard fuel was prescribed, and good results were obtained. Now the German government has adopted the new standard fuel and ordered its sale instead of that of pure benzol at the government fuel stations.

## Gasoline from Vegetable Oils

IN a recent issue reference was made to experiments by M. Mailhe in France with a view to making gasoline from vegetable oils. The item was not as clear as it might have been. A note presented by M. Mailhe to the French Academy of Sciences fully describes the process employed.

It is well known that the fatty oils cannot be distilled at ordinary pressures without partly decomposing. It occurred to the author that it might be possible to break them up more completely in contact with catalyzers mixed with both hydrators and hydrogenizers, at a temperature of 1000 to 1200 deg. F. To this end one can use to advantage electrolytic copper combined with magnesia, alumina or caolin. The mass is formed into balls with the aid of a binder. These balls are heated in a copper tube. At one end of this tube the linseed oil enters through a capillary tube. The vapors passing through the mass of the catalyzer give rise to two kinds of products, one liquid, which may readily be condensed; the other gaseous, which may be collected in a gasometer.

The liquid products are subjected to distillation and

that fraction which boils up to 300 deg. F. to hydrogenation on nickel at 350 deg. F.

It results from the above that the catalytic decomposition of linseed oil on copper-magnesia, followed by a hydrogenation on nickel of the most volatile products, has the effect of yielding aromatic hydrocarbons. There is a cyclization of the fatty chain, and as the cyclic products thus obtained are free from sulphur, it has been possible to obtain cyclohexane and its derivatives.

It will be seen that this catalytic process permits of obtaining from a vegetable oil, a mixture of gasoline and kerosene which may be used as a motor fuel. The gasoline has a specific gravity of 0.7607 and the kerosene of 0.8644. Both are soluble in alcohol in all proportions.

THE Aerodynamic Section, Bureau of Standards, is constructing a new wind tunnel 10 ft. in diameter. The design for the tunnel is finished and the material for its construction is being rapidly assembled. The completion of this tunnel will give the Bureau exceptional facilities for all sorts of research work involving the study of the behavior of objects in a windstream.

# Elementary Principles of Exporting Are Important

Proper shipping and packing and absolute accuracy in making out drafts and shipping lists may appear to be somewhat minor details in the export trade but they are highly important in the end. Increasing demand for American cars abroad opens an encouraging market for automotive manufacturers. This article was prepared by an experienced exporter.

**A** MERICAN manufacturers produce something over 25 per cent more goods than can be consumed within the boundaries of the country. Production is by no means at its peak and there are many countries that are ready to receive more American goods. This is especially true of American automobiles. Manufacturers, especially those who are comparatively new in exporting, sometimes regard the exporting end of their business as something mysterious; something beyond their ken. It is true that many manufacturers have lost money by attempting to export their goods, but in many cases this has been due to a lack of knowledge of the fundamental principles of exporting.

Fluctuations of foreign exchange, of course, have played an important part in keeping the danger signal before the manufacturer who sometimes feels that he might be able to sell some of his goods in foreign countries. But that is a situation that will be but temporary. It will not be righted in a day, but eventually it will be righted. When that obstacle is removed as it already has been to some countries, the American manufacturer should be ready to step into the foreign markets, and, proceeding along sound business lines, successfully compete with the manufacturers of any other country in the world.

## Basic Points Essential

There are certain basic elementary principles of exporting. These are known to most manufacturers who have shipped their goods directly from their factories to foreign ports, but there are many who have not yet entered this field. Then, too, there are many who have entrusted this work to agents. Extreme caution should be exercised in choosing the man to handle goods at the port of embarkation.

A man who has spent considerable time as a salesman in South America, declared recently that if more manufacturers realized they could forward an article for overseas shipment almost as easily as they can for domestic shipment there would be many more engaged in the export business than there are. While the things he regards as extremely important points may seem of a somewhat elementary nature, especially to the manufacturer who has been engaged in the export business, they are, nevertheless, things the manufacturer should know. A good many people have told of the race characteristics of the Latin-American and other nationalities, and have discussed the psychology of selling in various countries, but most of these writers have taken it for granted that the manufacturer would know what to do with his order after it was obtained. That is where many American manufacturers have failed.

A good salesman will always send forward with his order minute shipping directions, stating the number of copies of the invoice and packing list that are to go out with the draft. These requirements vary in different custom houses. Naturally these instructions should be adhered to.

**The American salesman can usually sell goods in foreign countries, at least once, but if his employer, the manufacturer, does not meet specifications, does not ship his goods properly or makes errors in making out drafts or other papers, the manufacturer has no right to expect that salesman to send in repeaters.**

One of the chief difficulties confronting the shipping departments in the past seems to have been making the contents of the shipping case conform to the packing list. On the surface this appears to be a very minor sort of thing that might happen to anyone whose employees became a bit careless. But it is important. If the contents of the shipping case do not correspond to the items listed the consignee is subject to a fine. Then, too, these exported goods are not being shipped to within telephoning distance, and if shortages occur the buyer is at the mercy of the seller, for the draft is always for the entire amount.

The packing of goods is important in itself. Boxes should be bound with steel strips and, if possible, sealed, for the curse of the foreign buyer is pilferage. Each case should be numbered and the numbers should correspond to those on the packing list. In most South American countries, except in the British possessions, it is necessary to mark on these cases, in kilos, the weight of the case, the gross weight, net weight and the tare. The cubical contents must also be marked. This completes the packing operations at the factory.

## Making the Draft

Then there are the operations in the office. It has been said that 50 per cent of all manufacturers in the United States are unable to understand the difference between a sight draft and a date draft and this confusion has been known to result in rejection of shipments. If goods are sold on terms of 60 days, it is usually understood to mean that the buyer must pay for the shipment 60 days after he accepts the draft. But many drafts are made payable sixty days after the date made out, and no matter how long it may take for the draft to reach the consignee, it is due and payable 60 days after it has been made out at the factory in the country. It should also be remembered in making drafts that the manufacturer must compute the interest covering the

time the draft is out and add the interest charges into the total amount, as overseas firms will not pay interest charges on drafts unless such charges are specified in the order.

All manufacturers' drafts should be attached to packing lists and invoices and can either be sent to the forwarder of the goods, to be attached to the shipping documents, which include consular invoices, ocean steamship bill of lading and insurance certificates. Or they can be sent to the correspondent bank to be held and attached to the shipping documents upon their arrival.

Manufacturers can make arrangements with steamship agents, express companies, or railroad agents to pick up their shipments and forward them, all charges collect, at the port of destination. The shipper can also make arrangements at his bank to discount his draft. In this case he must present to the bank the draft with the invoice, packing list and the railroad bill of lading. A representative of the forwarding agent then gives the bank a trust receipt, covering the value of the documents, and here the manufacturer's identity with the shipment ends, save for the fact that he is liable to his bank for the amount of the discounted draft until such time as the consignee pays the draft and the money is returned to the bank.

In making bills of lading they should be marked, "For Export." This marking entitles the shipments to free storage at the port of embarkation for a reasonable period and eliminates the possibility of the forwarding

agent including in his charges money expended for putting the goods in storage.

Manufacturers should demand from their forwarding agents duplicate copies of the ocean bills of lading, insurance certificates and all forwarding charges.

It is a good plan, in fact almost a necessary one if the order is big enough, to cable the consignee immediately the shipment is cleared, giving him the name of the ship the consignment has gone forward on and the date of departure. If the order is not large enough to warrant cabling then the information should be sent by letter, and enclosed should be a copy of the packing list and invoice. These should be marked "duplicates," and in case the originals are lost the duplicates will be available. These duplicates should be sent by mail even if a cable is sent.

All this information is not intended to be construed as an article on "Exporting Made Easy," for it is not easy. There are many things to be watched, but if they are watched carefully a great deal of trouble can be eliminated. The principles set forth, it is true, are elementary, but in many cases failure to observe these principles have resulted in lost customers. Exporting requires close study and thorough investigation. The reliable salesman in the field is usually pretty well acquainted with the necessary steps to be taken in shipping goods to his particular territory, and the manufacturer would do well to abide by the suggestions the salesman offers.

## Belflex Fabric Spring Shackle

IT is well known that the wear of spring shackle bolts is one of the main causes of cars becoming noisy in operation prematurely, and to eliminate this trouble, improvements in the lubrication of shackle bolts have been made by many designers in recent years. Another method of eliminating this trouble has been adopted recently by several designers, which consists in completely eliminating the familiar spring shackle. The first step in this direction apparently consisted in providing the spring master leaf with a scroll at the end and securing this scroll to the spring hanger, but this method has not achieved any great success, probably owing to weakness due to concentration of strains at the point of attachment. The latest designs for pivotless shackles make use of fabric, and one of them is the Belflex, which is illustrated herewith.

It is claimed for this shackle, which is manufactured by the Belflex Corp., that it requires no lubrication and cannot rattle or squeak; that it will outwear the average spring shackle and that it also performs to a certain extent the functions of a shock absorber.

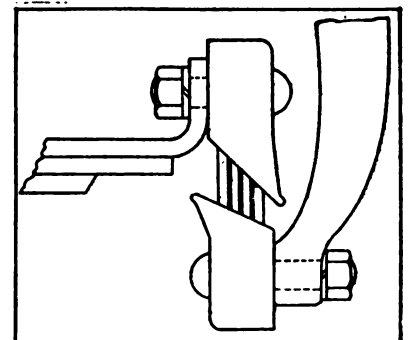
The tension type of Belflex shackle, which is the one here illustrated, is made by clamping together four or more strips of rubberized fabric, which thus form a link or shackle which is bolted fast to the spring at one end and to the frame bracket at the other. The required clamping pressure is obtained when the shackle is assembled on the car, when the nuts which hold the shackle to the spring and to the bracket are tightened up. The clamping faces of the top and bottom boxes protrude at an angle in such a manner that under rebound the fabric strips act as cushion between them, it is claimed. There is an appreciable difference in the

face angles of the two boxes, which is made necessary by the fact that the lower box is at all times rigid, while the upper one moves with the spring.

Thin corrugated separators are inserted between the fabric strips; they supply the required clamping surface and help to transfer the load from the clamping bolts to the cover and load plate. The fabric strips are composed of three plies of 37½ oz. duck, which has been given a skim coat of rubber. The top leaf of the spring is prepared for use with the shackle by punching holes for the bolts in it near the end and then turning the end up to the proper angle for setting the shackle link. The frame brackets are designed to give the link a vertical position under full load.

Endurance tests with these shackles were made at the mechanical laboratory of Cooper Union, New York, and gave results which are said to warrant the claims as to life reproduced earlier in this article.

Belflex spring shackle



# Advances in Power Presses and Dies Due to Automobiles

Demand of automotive industry has caused stage of perfection in forming and stamping operations that was hitherto unthought of. The ability of press and die manufacturers to successfully control the flow of cold sheet metal into certain shapes has aided economic production of cars.

By Henry J. Hinde\*

**T**HE art of producing sheet-metal stampings from a flat sheet while cold has made marked progress in recent years, and many articles are now made of sheet metal which were formerly produced by casting or forging, or in a lathe, milling machine, drill press or at the bench.

Forming and stamping operations especially have in many classes of work become very complex, and the art of drawing sheet metals, stimulated by the enormous demand of the automobile industry in particular, calling for most intricate shapes, has reached a state of perfection hardly imagined possible a few years ago. The results achieved by the ingenuity of the present-day press and die designers, and to no small degree also by the metallurgist, who comes into consideration through his improvements of the physical qualities of the metals used, are indeed revelations in economy of production, strength of stamped articles and the absolute interchangeability and beauty of appearance of the finished products.

## Development Due to Automotive Industry

The development of power presses, together with that of dies and special tools, has been so marked in the last twelve years, principally because of the demand for intricate stampings for the automobile trade, that it is believed a far greater advance has been made than at any other period in the history of the business. This development has not wholly been confined to the working of sheet metal, for, as previously stated, the demand for accurate duplication of parts and the great quantities in which they are desired has resulted in power presses being used for sizing forged steel parts which were formerly finished by means of saddle milling and similar operations. It has been found that manufacturers can produce greater quantities with much greater accuracy and with such a reduction in machine shop production expense by the use of what is known as knuckle-joint or cold-swaging presses in sizing the finished working surfaces on these forgings, that a number of equipments have been installed for work on steering knuckles, brake levers, connecting rods and other similar forgings and castings. These presses are built in sizes capable of exerting a pressure up to 2000 tons and over, and it is claimed that size limits of 0.001 in. can be successfully maintained in operations of this character.

Although this marked advance is due to the automobile industry more than to any other one factor in re-

cent years, at the same time the economical production of motor cars was made possible solely on account of the ability of the press and die manufacturers to successfully control the flow of the cold sheet metal into certain forms and shapes, by means of properly constructed dies and presses of such power and design that wonderful results have been obtained. As an illustration of this a wire-wheel hub is shown in Fig. 1.

This hub requires a blank 16½ in. diameter and 5/32 in. thick. Attention is called in particular to the numerous niches or pockets successfully formed into the circular shape, and also to the fact that the stamping was first drawn to a considerable depth at the narrow neck. The end of the neck or bottom of the stamping was then removed and this metal was made to flow back and expand to a considerable degree beyond its former small diameter without even stretching or thinning the metal in the reforming operations, thus proving conclusively how successfully the metal was controlled and forced to flow back into its larger diameter with an opening in the bottom much smaller than the former small diameter of the neck of the stamping.

In the production of brake drums, front and rear hubs and spoke flanges the conditions that have to be fulfilled by the dies are that the product shall be absolutely interchangeable; that no machine work shall be performed upon the stampings when coming from the press, excepting some reaming and thread cutting, and that the strength of the material shall remain unimpaired. In addition it is imperative that all cylindrical parts be smooth and true and of standard diameter, allowing less than the commercial tolerance of variation. The work involves a most careful planning of the interrelation of the several operations, so that at no time the material shall be overstrained or reduced in thickness, and that the dies shall not be subjected to excessive wear in order to maintain uniformity of size.

## A Straight-Column Press

A straight-column press has been developed especially for such work by the Toledo Machine & Tool Co. which is of unusually rugged proportions and weighs about 145,000 lb. It is double-gearred with a ratio of 40:1 and fitted with a very powerful friction clutch in combination with an effective brake and hand-lever control, so that the machine may be started or stopped at any part of the stroke of the slide up or down. The frame consists of four pieces—the bed, the two uprights and the crown—which are held together by four massive tie rods passing through the said crown, uprights and bed. When the frame is assembled these tie rods are

\*President and General Manager of The Toledo Machine & Tool Co. From a paper presented before the American Society of Mechanical Engineers.

heated. The nuts are then screwed home and the rods permitted to cool. In this manner, through the tendency of the rods to shrink, an enormous pressure is exerted by the rods upon the frame that renders the entire structure practically an integral one and brings all the working stress upon the tie rods.

Axle housings are made of steel plate up to  $5/32$  in. in thickness, and the requirements are that the stampings be perfectly straight and flat so that when the two halves of a housing are joined together by welding they form a perfect casing without warp. A powerful double-crank press developed for this purpose weighs about 95,000 lb. and is capable of forming and stamping cold at one blow axle-housing halves about 40 in. in length of steel plate up to  $5/32$  in. in thickness, the blank having been cut previously to proper shape.

One modern form of toggle drawing and deep-stamping press, such as is used for making engine pans, radiators and other similar articles of the comparatively lighter gages of metal, has two slides, an outer slide for clamping the blank and holding it while the work is being drawn, and an inner slide for doing the drawing, stamping and forming operation. Presses of this character are also made in the double-crank type with a considerable distance between the uprights and weighing as much as 600,000 lb. Such presses are used for body forming, for making cowls, dashes, fenders, etc.

#### Special Designs

The forming of channels and side rails for automobile frames and similar requirements has resulted in the designing and building of special presses particularly adapted for this work. The side rails, for instance, are preferably first blanked in a double-crank press as much as 218 in. between the uprights. The largest sizes of these presses weigh in the neighborhood of 500,000 lb.

The forming operations are performed in a specially designed press, the outstanding feature of which is that

the operation is diametrically opposite that of the ordinary toggle drawing or deep-stamping double-action presses. The channel-forming press has a movement entirely mechanical that brings the tools down and at rest on a flat blank, or sheet, by means of a toggle motion, and in this position the machine is capable of a resistance pressure upward of 2000 tons. While this first toggle movement is at rest, another movement is brought into play, forming up the sides of the channel or frame. The machine in its operation completes the one cycle when the stamping lies on the face of the dies completely formed, with the result that the web, or bottom of the stamping, remains as flat as it was in the original sheet. In other words, the bottom or web of the channel is held perfectly flat during the operation. Several of these presses have been built and are in most successful operation. They weigh upward of 600,000 lb. each. One of these presses with five men will do the work of three hydraulic presses with fifteen men, to say nothing of the large force required to straighten the rails when hydraulic presses are used.

Still another interesting feature that the automobile trade has developed is the smoothing-out process for certain of its stampings, more particularly the tapered, stamped-steel radiator front or casing. Because of its slightly tapering form it was found difficult to produce a stamping for this piece so free from waves, or buckles, that it would show smooth over the finally enameled and varnished surface. The requirements were successfully met by developing a set of tools to receive the finished stamping and allow an exceedingly small space for water to flow just inside of the stamping around the steel form supporting the stamping. It was necessary to exert a pressure of some 2000 tons on the outer surface of the stamping to prevent seepage or leaking, and to supply water to the die through a  $3/4$ -in. pipe by means of an accumulator with sufficient force to smooth and iron out the unevenness and waves in the original stamping.

## Keeping a Rubber Factory Clean.

**F**ACTORY cleanliness under the direction of a Sanitary Department was described in an address delivered by William Jameson, advisory engineer of the Fisk Rubber Company, before the National Safety Council at Boston recently. Mr. Jameson said that in one rubber factory a sanitary department was organized about two years ago under the supervision of a man who had no other duties than to keep the plant clean. A considerable amount of discussion and many conferences were held before any attempt was made to get under way. A few of the sweepers who were then under the supervision of production foremen were taken over; a week or so later another group was transferred to the sanitary department, and so on, until the entire group of sweepers had been transferred.

Immediately better results were obtained at a considerable reduction in cost. Some difficulty was encountered at first in defining the duties of the sanitary department in view of the fact that these men had been called upon to carry on so many different activities under the old plan. This condition was easily adjusted and in some cases it was necessary for the foremen to hire a helper to do the work the sweeper had been doing. In the plan in operation at this factory one superintendent exercises general supervision over the entire department assisted by two foremen—one for days and one for nights.

Three squad leaders of recognized ability—two on the day force and one on nights, perform emergency work and work with and check men when in squads or on special work.

During the day, in departments or locations where litter accumulates in great quantities, one or more sweepers are assigned and put in all their time in one locality. For the most part the sweeping is done by placing men in two squads, each squad looking after certain sections of buildings, covering all sections at least once daily.

The night sweepers work in one squad and usually start at the top floors and work to the basement, returning in the early morning to clean those places where the plant has been operated at any time during the night.

The entire day force and many of the night force work Saturday afternoons and make a general weekly cleaning, as most of the machinery is idle then and the sweepers have the opportunity of doing a thorough job.

In addition to maintaining plant sanitation, the sanitary department is also held responsible for provision of adequate toilet and washing facilities, in compliance with state rules and regulations. Moving of departments from one location to another, the changing from male to female help, etc., requires considerable vigilance to keep the matter within the law.





## Cause of Skidding at Turns

Editor, AUTOMOTIVE INDUSTRIES:

I have never been able to comprehend what seemed to me an adequate cause for the skidding of an automobile. The following considerations may be valid; I have never seen them in print.

In rounding a curve, the front wheels get into the straight-away while the rear wheels are on the curve. In addition to the deceleration of the rear wheels as they approach the straight-away there must be an inertia effect due to the fact that the inside and outside wheels are moving at different speeds while on the curve and at the same speed when they have entered the straight-away. I do not know how quickly this change takes place, but it would seem to be but a very short time.

Referring to the accompanying sketch, assuming arbitrary and perhaps impossible data for the purpose of illustration, suppose the inner wheel to be turning in a 10 ft. radius and the outer wheel in a 15 ft. radius. Then the inner wheel might be moving 12 ft. per sec. and the outer wheel 18 ft. per sec. at the position A.

Suppose we take 100 lb. as concentrated at each wheel.

The outer wheel would have  $\frac{(18)^2 \cdot 100}{64}$  foot-pounds of energy stored in it and the inner wheel  $\frac{(12)^2 \cdot 100}{64}$  foot-pounds of energy.

If on the straight-away they are both going at the rate of 15 ft. per sec., the outer wheel would have lost about

$$\frac{(18)^2 \cdot 100}{64} - \frac{(15)^2 \cdot 100}{64} = 211 \text{ foot-pounds of energy and}$$

the inner wheel would have gained about  $\frac{(15)^2 \cdot 100}{64}$

$$- \frac{(12)^2 \cdot 100}{64} = 126 \text{ foot-pounds of energy.}$$

If this change took place in one-tenth of a second it would have caused a pressure of 2110 lb. on the outer wheel and a pull of about 1260 lb. on the inner wheel.

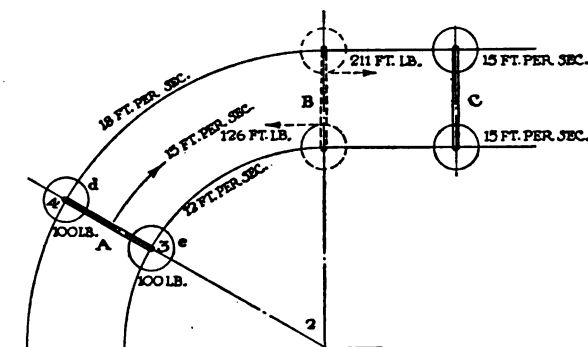
This might have a bearing on the spring suspension also.

These effects remind one of an athlete using a pair of dumb-bells to extend his jump.

E. J. STODDARD.

We doubt very much whether there is any particular tendency for a car to skid at the instant the driver straightens out the front wheels. In fact, this motion is the same as that which is commonly used to correct a skid.

Our explanation of a skid on a curve is as follows: The centrifugal force on a car while going around a curve tends to cause the whole car to leave its circular path radially. This tendency is resisted by the adhesion of the wheels to the road. The centrifugal force acts at the center of gravity and may be divided into two components, along the front and rear axle axes, which are the center lines of the two resisting forces. These components will be proportional to the weights on the front and rear axles, respectively. If the resisting forces (resistance to lateral skidding) were also proportional to the weights on the



respective axles, as they might be supposed to be, the front and rear wheels would begin to skid at the same time and there would be a sideways sliding of the whole car, instead of the slowing action which actually takes place. But owing to the driving force on the rear wheels the adherence of these wheels to the ground is probably much less than that of the non-driving front wheels. The result is that the centrifugal force and the lateral resisting forces are no longer in balance and the car slides more easily at the rear than at the front. Therefore, when the centrifugal force becomes great enough, skidding begins.—Editor.

## Low Unsprung Weight Axles and Spring Action

Editor, AUTOMOTIVE INDUSTRIES:

The universal joints in the DeDion type of drive are subject to the propeller shaft torque times the reduction rate divided by two, because of the balance gear. In such an example as was cited in your editorial of Nov. 3, the torque at the universal joints would be twice that of the propeller shaft, but at one-fourth the number of revolutions. Hence joints made sufficiently stiff to stand the torque would be very durable. The short rigid Cardan shafts running at low revolutions reduce to very small values the radial stresses due to unbalance or whip. The universal joints of the DeDion drive system are by no means as severely loaded as would appear from casual inspection.

It seems that the up and down motion of the wheel in the Rumpier system would vary the angular velocity of the drive to an unusual degree, and that it would be necessary to introduce an elastic member, such as a long propeller shaft, between the engine and differential to absorb this variation.

The Cowey suspension is very interesting. The writer at one time felt that the "sympathetic" action shown should be included in the cross spring design, but was discouraged by the complication involved. This seems to have been worked into one of the late cross spring constructions.

At one time a trial was made by securing two front half elliptic springs to a front axle in the usual manner, and then the eyes of the opposite springs were connected by long rods, threaded so that tension could be applied, draw-

ing the spring ends toward one another; thus twisting the spring slightly. This reproduced conditions where the springs were twisted, either by improper installation, or by centrifugal force, or by one wheel rising more than the other. The axle was inverted, with the springs resting on the floor, and a lever was used to press down the axle, thus flexing the springs. The spring action was found to be very erratic—a sort of flip flap—snappy motion, such as would be felt when pressing the bottom of a pan inward and outward. Take a flexible piece of steel, like a spring rule, and attempt to twist and bend it at the same time, and the peculiar action will be realized. Some such action may be accountable for the peculiarities exhibited by suspensions—for instance, the excessive stiffness recorded in the seismograph tests made by Dr. Liebowitz.

JOSEPH W. RIDGWAY.

## Uniformity in Fuel Quality

Editor, AUTOMOTIVE INDUSTRIES:

The recent editorial in AUTOMOTIVE INDUSTRIES regarding the necessity of Improving the Fuel as well as the Engine is very much to the point. It is quite possible to-day to build engines that can operate on almost any

liquid that will support combustion, but only along certain narrow lines would there be a chance of their being commercially successful. The great automotive industry and the equally great industry of supplying the required fuel were both built up on the foundation of a source of power of extreme simplicity embodied in the now more or less conventional gasoline engine. In spite of the education of the public in handling things mechanical any great departure from this simplicity will be a serious handicap to both industries.

I do not believe that we will have to fear any such result if the oil industry will really try to produce a fuel that can be handled satisfactorily in engines of simple form. The general characteristics of such a fuel are being better understood every day.

In closing I want to say a word regarding uniformity in the quality of fuel. Without a reasonable degree of uniformity we cannot expect to get any really economical operation. The automotive engine to be satisfactory must be to a large extent automatic in its operation. Wide variations in fuel characteristics in viscosity and evaporation temperatures will inevitably lead to waste because of the impossibility of correct metering or the proper application of heat.

HENRY M. CRANE.

## The Market in British Soudan

THE report on Anglo-Egyptian Soudan for 1920, written by Maj.-Gen. Lee Stack, the Governor-General, has just been issued by the British Department of Overseas Trade. The country continues to prosper, but ever-recurring throughout the report is the cry that lack of transport is holding the Soudan back. Difficulties of transport retarded trade with Abyssinia, held up lumber operations, rendered it impossible to transfer grain to famine areas, kept the produce of Darfur, Mongalla, and Nuba Mountains rotting in these provinces, forced Kas-sala cotton to rely on an insufficiency of camels, and restricted vaccination when a fearful epidemic of small-pox broke out in the Upper Nile.

The Soudan Government expects to have a \$4,000,000 budget surplus this year. This would be well spent in improving transport facilities. Work along this line has already started, however. Stone quarries and cement factories are being worked, forest and other roads are being built, wells are being bored so as to make arid areas accessible, and Khartoum (whose roads are considered too wide!) is being laid out afresh. A motor transport service has been instituted between Tonga and Talodi, while a fleet of surplus army trucks has substituted worn out cars on the Rejaf-Abu (Belgian Congo) road. Freight rates high on this route because gasoline is expensive and rubber tires cannot last on the rough roads. It is thought that iron-tired steam wagons will ultimately take the place of these trucks. Five applications were made to the Government for mechanical transport concessions last year. As it is not prepared to grant route monopolies to private concerns, however, no further action has yet been taken by the applicants.

The Soudan imports practically all its fuel. Both the Shell and Anglo-Persian groups are at present negotiating with the Government for the right to prospect for oil in the Red Sea littoral. Since oil has been struck in adjacent coastal regions there seems a chance that borings should prove successful. The Soudan Development Co., using charcoal-burning tractors in the country, is experimenting in growing wood of rapid growth for the purpose of maintaining fuel supply. The experiment, if successful, is regarded as being of importance.

As matters stand, the Soudan does not appear to be an attractive field for exporters looking for immediate sales, but the country has, without doubt, a big future, and an agency at Port Soudan or Khartoum should ultimately prove remunerative.

## Official Report on R-38 Disaster

THE official report of a court of inquiry appointed to look into the disaster to the R-38 throws some further light on that tragedy. It is brought out that the airship, having completed some 30 hours' trial, including 15 minutes at full speed—60 knots—was flying at a height of about 1200 ft. She was carrying out rudder and elevator tests at a speed of 45 to 50 knots. Almost extreme helm with a quick reversal was being used, which brought a heavy force on the after portion of the hull, due to the swing of the stern.

During this maneuver the structure failed between frames 9 and 10, the first indication of which to ground observation was a slackness of the fabric at this particular point.

The ship then broke into two portions. The forward portion caught fire at the fracture, at the moment of or shortly after separation. The fire probably originated in a spark from the electric leads, which became fractured at a point in the immediate vicinity of a similar fracture in the fuel mains. As all sources of electrical energy were situated in the forward portion only, the rear portion was not affected, as electric leads in the latter portion became dead immediately the fracture took place.

The fire in the forward portion spread rapidly, due to the presence of escaping gasoline in the keel. An explosion followed, which led to the collapse of the structure and the ignition of the liberated hydrogen gas.

A second explosion took place when the forward portion reached the water. Meanwhile the after portion descended comparatively slowly, but did not catch fire. Four of the five survivors were in this portion and were rescued uninjured.

# Marketing Costs and Their Tendency to Increase

Production economies are not likely to be secured rapidly enough to offset higher cost of distribution. The costs, therefore, must be reduced by a more efficient method of marketing. Increasing competition demands lower prices and to meet this demand all avoidable waste must be eliminated.

By Harry Tipper

**A**N examination of commodity prices extending over a period of the last century indicates that there were two periods of rise and fall, or what is termed "the long swing cycle of prices" in this century of consideration.

The low point reached between the War of 1812 and the Civil War is considerably higher than the low point reached about 1897, while the peak reached during the Civil War is not so high as the peak reached after the World War in 1920.

If a similar curve of commodity prices be taken from Great Britain from the Napoleonic War to the World War, this curve will show a general decline in prices up to 1896. The Crimean War and the Boer War did not disturb the economic fabric of Great Britain sufficiently to introduce a full peak.

At the close of the Napoleonic War from 70 to 80 per cent of the wholesale price of the commodity was involved in the materials, labor and capital required to produce the commodity.

In 1896 from 40 to 50 per cent of the wholesale price was required to furnish the labor, and raw materials and capital

for production. In this period of declining prices the percentage of the sales price involved in the distribution and marketing grew larger, while the percentage of sales price involved in manufacturing the products became smaller.

During the period of rising prices since 1896 the percentage of the sales price involved in the work of distribution and marketing has increased still further, so that there has been no change in this tendency.

An examination of these statistics indicates very fully that the concentration of manufacturing in larger units has been accompanied by a constant increase in the cost of distribution and marketing from those points.

Up to about the year 1900 the increase in the cost of distribution and marketing was more than absorbed by the increased economies effected in production and manufacturing, so that the sales prices could be reduced. Eliminating the peak produced by the Civil War, there is constant diminution in the sales price for nearly a century, due to the growth of machinery and machine methods, improved equipment of manufacturing and pro-

duction and the possibility of increasing the productivity of labor by these means. Improvements were made in the methods of distribution by the extension of the newer systems of transportation and their development, but these improvements were not sufficient to offset the constantly increasing requirements of distribution and marketing and the increasing proportion of the total cost entering into those elements of business.

Reading from the past history there is no indication that the cost of distribution and marketing will decrease. In fact, the costs have had a tendency to rise more sharply during the last twenty years and this would indicate the

general tendency of distribution and marketing to absorb a larger percentage of the sales price as the area of marketing increases and the intensity of competition becomes more severe.

In common with other lines of industry, the automotive manufacturer faces the probability of increase in the costs of marketing and distribution due partly to the increased difficulty in finding a market and partly to the intensity of competition for every portion of the market. It is not probable that the production econo-

mies can be secured at a sufficiently rapid rate to offset the increased cost of marketing and distribution, and consequently the elements of marketing must be analyzed more carefully in order that the wastes may be eliminated and the costs kept down by a greater efficiency in the methods. Even with bulk material, the price paid by the user of the material is usually double the cost required to produce the material and in the case of commodities passing through a number of different hands, when they arrive at the user, the final price is frequently 500 to 600 per cent more than the original production cost.

A considerable part of this cost comes under the head of avoidable wastes.

The organization of any establishment in business is in the best economic position when its marketing efforts are limited to the least amount of territory or area required by the character of the consumption and the intensity of the competition for that commodity. One of the largest elements in the avoidable wastes of marketing has been the tendency to the extensive cultivation of markets, because of our ignorance of the laws governing the cost of

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**T**HE growth of the automotive industry in the past has been rapid because there was a heavy demand for a product that superseded less efficient methods. That demand has been met to a great extent and the future growth of the industry will be in proportion to the general growth of the country from a standpoint of population, wealth and business activity. The old marketing methods that were justified because of the abnormal demands upon the manufacturer, must be discarded and more scientific and efficient ones installed.

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marketing and our ability to sell irrespective of that cost so long as the manufacturing capacity was not much more than the market requirements demanded.

Since the Civil War, during the years of declining prices following that period, the economies in manufacturing came with such rapidity that the wastes in marketing were easily absorbed unnoticed and the prices could be reduced without respect to the marketing wastes.

During the era of rising prices the manufacturing capacity of the United States was not larger than was required to meet the possibilities of the domestic market, and, as a consequence, there was not sufficient competition for the markets to require the reduction of price regardless of cost.

With the surplus manufacturing capacity possessed by the United States at present, the competition for the market will demand the reduction of the sales price to the lowest possible denominator and this cannot be done profitably without a re-examination of the marketing methods and an entirely new study of the economic basis upon which they should be considered.

It is common knowledge that in a large business, dealing with large volumes of material, in accordance with the law of diminishing returns the cost of getting a unit of sale increases as the volume grows, but no attention has been paid to the economic limit beyond which it is not profitable to increase the volume of sales on the present basis of efficiency.

Manufacturing establishments have been increased, because of the supposed possibilities of an increased market. While the increase in manufacturing has been justified during the era of rising prices, to secure a volume sufficiently large to take up this manufacturing capacity under present conditions may eliminate the possibility of profit, unless the proportionate cost of the market can be decreased by the introduction of better methods and the elimination of the present wasteful elements in the attempt to secure the orders.

In the automotive business particularly, the rapid absorption of these units of transportation into the economic fabric has built up a manufacturing capacity and a price condition, including an enormous number of inefficiencies and wastes extending all through the manufacturing end and becoming very obvious in the methods of marketing adopted. Because of the demand created by the necessity of absorbing this unit of transportation in adequate quantities, the price had no special relation to the cost and it did not suffer from any great intensity of marketing competition.

The automotive business is now approaching the period when having taken its place as an integral part of the social and business fabric, its growth will depend more exactly upon the growth of the whole fabric. In other words, its progress will be limited more definitely to the general progress.

Up to the present the business has grown much faster than the total population or the total wealth of the country, because it superseded less efficient methods and required this growth after it had proved its value. That adjustment is about over, and its future growth will be only in proportion to the general growth from a standpoint of population, wealth and business activity.

In the course of this rapid growth, speed of production and large contact with the market were the important elements of the problem to be met. Under such circumstances wastes of all kinds crept into the business end. With the large potential market in front of the automotive manufacturer, wide, extensive marketing methods carried with little relation to their efficiency were perhaps more suited to the conditions.

These conditions have changed and the marketing methods justified because of these conditions must be thrown to one side and newer methods adopted, more analytically determined and with strict knowledge of the manufacturing establishment, in proportion of its production in relation to the total market possibilities.

## Peruvian Business Situation

It is difficult to determine the number of automobiles in Peru. Returns from the provinces are slow in coming in, and in some cases do not arrive at all. For Lima the municipal authorities give the following figures:

Automobiles for public hire.....	629
Private automobiles .....	1300
Trucks .....	300
	2229

Assuming there are half as many automobiles and trucks outside Lima as in it, we have.....1114

Total number of automobiles and trucks in Peru...3343

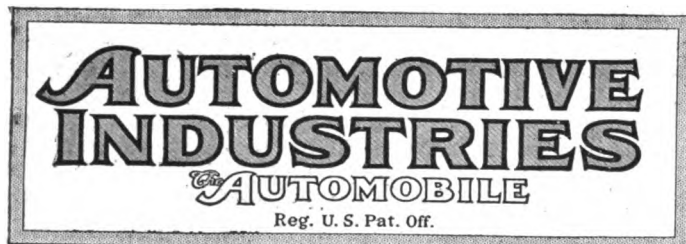
There are, however, probably more than this. From 1909 to 1920 there were exported from the United States to Peru 4836 automobiles and trucks. Enough more cars and trucks have been exported from the United States to Peru during 1921 to raise the number to 5000. Allowing that 25 per cent have been worn out, or destroyed by misuse, this leaves 3750. But no account has been taken of automobiles that came from Europe to Peru during the past ten years, some of which are to be seen in Lima.

The Peruvian import statistics for automobiles at first gave only the value; then weight and value; and beginning with 1917, weight, value and number, for automo-

biles, but only weight and value for trucks. In the subdivisions for weight and value the countries are indicated from which the goods came, but for number only the total is given without reference to country of origin. No figures are yet available for 1920. For the three years for which data are available Peruvian statistics show that the importations of automobiles alone, trucks not included, amount to 1798. Taking into account the number of automobiles and trucks that have come to Peru from Europe, it may not be erroneous to assume that there are 4000 automobiles in Peru, either running or that may easily be put in running condition if the owner desires.

There are probably 1000 tractors in Peru. Almost all leading North American makes are represented, and many European. A light tractor of 20 hp. and three plows seems to be the favorite. As Peru is a land of large farms, plantations or ranches, it would seem to lend itself well to the exploitation of the power idea in farming, and furnish an excellent territory for future tractor business.

Almost all leading makes of North American automobiles are in use in Peru, from the light car to the limousine, it being surprising how many high grade cars are to be found in the republic. Records of the municipality show that not more than 10 per cent of the cars and trucks in Lima are of European make.



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## Is a Fuel Stringency Near?

MOTOR fuel has recently been cheap; hence the need for economizing in its use has not been appreciated. There have, however, been recent marked increases in the price of crude oil and this has already been reflected in an increase in the price of gasoline. The fact that this has occurred at a time of year when the price of this commodity usually undergoes a seasonal decline is significant and the reason is not far to seek.

For several years our domestic consumption of petroleum has exceeded the domestic production. The widening gap has been filled largely by imports from Mexico. The Mexican fields, which have been phenomenal producers, have, with one important exception, gone to salt water, and their potential production fallen off with great rapidity. During the first half of the current year nearly one-quarter of our petroleum supply came from Mexico. The supply from present Mexican fields is extremely uncertain. Obviously, then, the oil situation in the United

States is in a critical state. Mexican crude is not rich in gasoline, but it has had a vastly important effect upon the price of domestic crude, and it is this price which must, in the last analysis, control the price of motor fuel.

Even in this year of general business depression petroleum consumption has continued to increase. It will continue to increase until price changes interfere, but there is nothing to indicate that petroleum production can continue to increase in proportion to increased demand. It seems certain that we shall never be able to produce enough crude in this country to meet the domestic demand unless a great increase in price materially curtail consumption. With the Mexican oil supply rapidly failing there is good reason to expect a fuel stringency with swift advance in price.

It is idle to assume that newly discovered domestic oil fields will result in a sufficient production to keep pace with a steady increasing consumption, for such discoveries have failed to do so for many years past. More oil will be discovered in this country, but that the quantity thus made available can replace the failing supply of existing fields, much less keep pace with an ever increasing demand, is incredible.

The obvious deduction which the automotive industry must face, unpleasant though it may be, is that motor fuel is practically certain to advance rapidly in price in the not distant future. We do not say that there will be a serious shortage of fuel in the near future, but we do anticipate a stringency in the supply which will mean considerably higher prices and have a pronounced effect upon automotive sales.

It is easy to argue that fuel cost is not a large item in the operation of the average car or truck, but it certainly is in the case of vehicles at the lower end of the price scale. A vehicle which uses three gallons of fuel a day 300 days in the year will cost the owner, for this item alone, \$270 a year with fuel at 30 cents a gallon. For a car costing around or under \$500 this is indeed a serious item. Suppose, now, that fuel doubles in price. At the same rate of consumption it is easy to see that the annual fuel bill would nearly equal if not exceed the first cost of the car. That such a situation would materially increase sales resistance can scarcely be doubted.

The only apparent way in which the automotive industry can combat this situation is to build more efficient vehicles—machines which travel much further per gallon of fuel. Better carburetion and vaporization systems are a step in the right direction, but only a step. We must have cars which are inherently more efficient—which travel more than twice as far per gallon of fuel as most cars now being turned out. It is not impossible. It is in fact well within the bounds of our present knowledge. It will, however, require study and experimentation and these require time. Therefore they must be started at once if the detrimental effects of a period of fuel stringency are to be mitigated or largely avoided.

We have published and shall continue to publish articles pointing the way toward more efficient engines and vehicles. Constructive comment in this connection from our readers will be appreciated.



## Measures to Create Employment

**I**N a recent issue of *AUTOMOTIVE INDUSTRIES* is an article setting forth the measures recommended at the President's Unemployment Conference for permanent relief from the present situation. Those measures, however, deal with questions of an economic nature, and, while they will have a direct bearing on the unemployment situation, they could scarcely be called emergency measures. There is little chance of any of the questions discussed becoming effective immediately, and the big problem confronting the entire country is how to lessen suffering during the coming winter months.

The conference did not forget this question, by any means, and the proposals made, if carried out conscientiously by industry, civic bodies and municipalities, will have an immediate effect in reducing the number of men who are out of jobs.

Aside from recommending a revival of the building industry, appropriations for more road building, co-operation of employment agencies, winter house cleaning and other relief measures, the conference suggested a few ideas for the manufacturer to consider. Among these suggestions were:

Part time work, through reduced time or rotation of jobs; manufacturing for stock; plant reconstruction and cleaning, with the consequent transfer of many employees to other than their regular work; reduction of the number of hours of labor per day; reduction of the work week to a lower number of days.

All these proposals can help the situation. Part time work will not give the workmen as much money as they are accustomed to, nor perhaps as much as they need, but it will at least keep them off the streets during the period of depression. The manufacturer is not the only one facing hard times, for his men are being forced to undergo privation and want until the factories of the land can return to their normal output. Plant reconstruction and cleaning could well be taken up at the present time, when only part time schedules are being operated upon.

## The Human Side of Industry

**"I** AM one of those who is strenuously opposed to any onslaught on organized labor at this time," said one of the best known and most respected engineers in the country the other day. "The American people," he went on to say, "are said to have a genius for organization. Regardless of what happens, workers, like every other class of our population, are going to have an organization of some kind. Organized labor at present is dominated by the higher types of skilled labor. If it were possible to destroy the present organization, there would be likely to arise in its place an organization dominated by the lower grades of intelligence comprised in the unskilled classes."

This is a point of view worth consideration, for other reasons as well as those given by this prominent engineer. Fundamentally the labor problem is not one of organization or of mass movements. It is distinctly a problem of individual study. The relation of the individual to his work, the opportunity which

that work gives for personal development and the factors of incentive involved are of primary importance in any consideration of the human element in industry.

There is no manufacturing problem more important in modern industry than this task of effectively adjusting the relation of the worker and his individual development with the ordinary work of industry. Only a certain part of the time of management can be spent in studying this important problem. It is essential, therefore, that as little energy be wasted as possible and that the time spent on the human problem be utilized constructively in study and experimentation rather than in mere battles for temporary advantage.

## More Air-Cooled Engines

**T**HAT we are on the threshold of renewed activities in the air-cooled field is quite evident. While much of this activity is no doubt caused by reports which have been circulated throughout the trade for a year or more that one of the largest companies in the industry has been developing a product with air-cooling, other interests have also been actively engaged in research along this line.

There is an increasing demand for higher thermal efficiency as one of the means of conserving fuel, and some engineers believe that air-cooled engines are inherently more efficient than the water-cooled type. It is quite certain that some things have been found out regarding air-cooling which will make it possible to overcome some of the few objections which have been offered to this type of engine. It is a significant fact that the one air-cooled car which has been manufactured in quantity has been highly successful and the earnings of this producer have been one of the remarkable accomplishments of the industry. It is certain that by the elimination of the water system, a certain amount of weight can be saved, which will have its effect on the economy. If the air-cooled engine runs at higher working temperatures it may, under certain conditions of operation, prove more economical. If the working temperature is higher than in the water-cooled car, there may be certain advantages in vaporization of the fuel which are also secured and which tend to increase the mileage possible per gallon of fuel.

Air-cooling in the past has been limited to a certain maximum size of cylinder, according to the views of many advanced engineers. However, it seems that discoveries which have recently been made in new cooling methods and particularly in increasing the effectiveness of the cooling fins may result in increasing the maximum cylinder size. If there is going to be a demand for smaller, higher economy cars, the average cylinder size will decrease and the difficulties of air-cooling will be lessened.

At any rate, we are surely on the eve of some important announcements in this field which will be anticipated with great interest by all automotive engineers. This is particularly true, as the field is not restricted to passenger cars, but covers trucks, stationary powerplants, tractors and aircraft as well.

# Eliminates Tire Mileage Guarantee

## Rubber Association Makes New Warranty

### Action on Product Claimed Defective Will Remain Optional With Makers

NEW YORK, Nov. 14—After an exhaustive consideration of the subject of mileage guarantees on tires, the tire manufacturers division of the Rubber Association of America has adopted the recommendations of a special committee providing for elimination of mileage guarantees and the adjustment abuses which have resulted. As a substitute, manufacturers have adopted the following standard warranty:

"We do not guarantee pneumatic automobile tires for any specific mileage, but every pneumatic automobile tire bearing our name and serial number is warranted by us to be free from defects in workmanship or material.

"Tires claimed to be defective will be received only when all transportation charges are prepaid, and when accompanied by this company's claim form duly filled out and signed by owner. If, upon examination, it is our judgment that the direct cause of the failure of the tire to render satisfactory service is attributable to faulty material or workmanship, we will, at our option, either repair the tire or replace it for a charge which will compensate for the service rendered by the returned tire, based upon its general appearance and condition.

"Pneumatic automobile tires in which a substitute for air has been used, tires used when not inflated to the pressure recommended by us, used under loads in excess of those recommended by us, used on wheels out of alignment, abused or misused, used on rims other than those bearing these stamps ( ), ( ), ( ), or which have been injured through accident or design, are not subject to claim hereunder.

"This company does not authorize any dealer or agent to make any other or additional Guaranty or Warranty."

This standard manufacturers' warranty would be printed on price lists, tags and stickers accompanying tires much in the same manner as the former guaranty was used. In announcing the change in policy which has been agitating the tire industry for years, the following statement was issued by the Rubber Association of America:

"A movement is well on the way to adoption throughout the tire industry to eliminate the chief evils which have for years caused loss to consumers, dealers and manufacturers through improper claims for adjustment, and manufacturers and dealers are working in harmony to produce the desired result.

"Motorists who take good care of their tires are the strongest contributing factor to future economy in tire costs. Adjustments based on claims other than because

of manufacturing defects strike at the efforts of the industry to secure tire economy. Dealers have been placed in the embarrassing position of losing the good will of tire users and manufacturers have borne the brunt of the loss due to claims which have arisen out of public misconception of the responsibility of tire manufacturers.

"All of the abuses have tended to increase costs and the whole purpose of the present movement is to eliminate the waste due to these causes.

"Under the plan there is a revision of the old guaranty in the form of a new manufacturer's standard warranty, aimed to clear up misunderstandings the public may have had regarding the manufacturer's responsibility. A standard claim form is also being placed in the hands of dealers.

"The manufacturers are taking steps to put the plan into effect immediately. The new manufacturer's standard warranty and the standard claim form have already been welcomed by the National Tire Dealers' Ass'n as a constructive measure. Through the plan all claims covering alleged defects will be presented in a uniform manner for consideration by the tire manufacturer.

"The form should result in the elimination of 'policy' adjustments, which have been the bugbear of the tire industry since its inception and have caused losses running into large sums annually. Hereafter manufacturers will consider alleged defective tires only on the basis of general appearance and the condition in which they are returned by the customer.

"No claims will be considered unless the standard claim form is executed by the tire owner. The claim form does not enter into the transaction between the dealer and the consumer at the time of sale, and is only to be used when the tire owner may have occasion to present a claim based on defective workmanship or material."

## C. A. Blake Appointed Winton Superintendent

CLEVELAND, Nov. 14—C. A. Blake, who for some time has been superintendent of the Stearns factory, has been appointed in a similar capacity at the Winton plant.

N. E. Ranny, purchasing agent for Winton, has resigned. His successor has not been named.

The Winton company is making a rearrangement of factory methods, both in the general office and in factory distribution, for the purpose of cutting down overhead and increasing production, thereby lowering the cost per unit.

## SIGNAL DEMURRER DISMISSED

CLEVELAND, Nov. 14—The Court of Common Pleas has refused to sustain a demurrer filed by the American Signal Co., manufacturer of the Simmons signal, in a patent infringement suit brought by the Protex Signal Co. of this city. The demurrer was for the purpose of finding how strong the court considered the Protex claims of unfair competition.

## British Optimism Maintained at Show

### Olympia and White City Sell Cars —Public Expects Lower Prices

LONDON, Nov. 12 (*By Cable to AUTOMOTIVE INDUSTRIES*)—Business optimism was maintained throughout the annual London passenger car show which closed to-day at Olympia and the White City. There were substantial sales of lighter cars and some of the heavier makes. Reports of large car business are too varied for analysis at this time.

There is a feeling on the part of the public that prices must drop and high body prices are a trade barrier at present. The success of the show has been due pre-eminently to the courage of the dealers. Private sales have been fair and there has been a much larger volume of inquiries than in recent months.

The somewhat improved financial situation and prospects of trade betterment have been the chief factors in this result. Money is tight everywhere and, therefore, it is the part of wisdom to exercise caution in accepting as facts reports now in circulation regarding the actual volume of trade at the show. A majority of the exhibitors professed to be satisfied with the business promised rather than the actual sales. The attendance has been 40 per cent better than last year notwithstanding the fact that the weather was cold throughout the week.

The location of the next show now is being discussed. It is generally accepted that the present plan of dividing the show between two buildings cannot be continued, because it has led to much dissatisfaction on the part of the trade.

## Maxwell Increases Output at Its Newcastle Factory

NEWCASTLE, IND., Nov. 14—F. D. Brebner, superintendent of the local Maxwell plant, states that production is to be speeded up to 150 cars a day. This will be an increase of fifty cars daily over the present schedule and will mean the employment of additional men.

The proposed output will necessitate a considerably larger force than the 900 now employed, the number probably being determined upon Brebner's return from Detroit.

## APPERSON BACK TO 1915

KOKOMO, IND., Nov. 11—Apperson Bros. Automobile Co. is operating five days a week on a schedule about equal to that of 1915 or 1916.

# Move to Drop Distributors Spreads

## Trend Is General Among Companies

### Several to Take Action as Soon as Present Contract Expires

NEW YORK, Nov. 15—While little has been said officially about the movement, which is rapidly gaining momentum among automobile manufacturers, for the elimination of distributors, there is a strong general trend in this direction. Several of the larger companies propose to begin this process of elimination when their contracts with distributors expire.

The Willys-Overland Co. was the first to put the sweeping change into effect by supplanting distributors with factory branches. The various divisions of the General Motors Corp. are reticent on the subject but there is reason to believe that it will be the policy of the corporation as a whole gradually to supplant its distributors. These are only examples to show the trend and numerous other companies propose similar action.

#### Dealers Gain

It is contended that with the distributors, or middlemen, out of the field, it will be possible to make a more liberal discount to the dealer, keep in closer contact with the individual dealers and promote more intensive selling efforts. Manufacturers realize that competition in future will be keener than it ever has been in the past and they are clearing the decks for action.

They contend that they must progress in the race for business or fall back, for they cannot stand still. All of them are determined to give better service for they hold that those companies which take best care of their customers will profit most in the long run. Willys-Overland already has taken a step in this direction by making a material increase in the discount given its dealers on parts.

#### Radical Changes in Lines

Another evidence of the realization that better values must be given purchasers if the race for business is to be successful is found in the extraordinarily large number of new models which are being brought out and which are contemplated for display at the New York and Chicago shows. While it is true that a majority of these models show nothing that is revolutionary, the trend in all of them is towards refinements and improvements which will appeal to the ultimate purchaser and give him better value.

Radical changes have been made in a good many lines, however, and more are

in prospect at show time. As a consequence the prospect who visits the shows next year will find more of interest to him than has been the case for several years. It will be decidedly to his advantage to do considerable "shopping."

In several lines, at least, final price adjustments have not been made and there will be further reductions coincident with the shows. There is nothing to indicate that these additional reductions will be made at the expense of quality and it is quite possible that some of the new lines which differ radically from their predecessors may, increase their prices slightly to cover the added cost of improvements embodied in the cars, but the general trend will be downward.

#### Shows to Stabilize Prices

There is strong hope in every quarter of the industry that the shows will bring a real stabilization of prices. Dealers in all sections of the country contend that the frequent price changes of recent months have added of late to sales resistance and that business cannot be placed on a solid foundation until there is price stabilization for a considerable period. This feeling is not particularly surprising in view of the fact that several companies have reduced their prices after giving positive assurance that the "final reductions" had been made.

There is a growing belief on the part of manufacturers that general inability of distributors and dealers, because of credit difficulties, to stock cars for the winter as heavily as usual will result in a decline in the volume of production for the next four months at least.

(Continued on page 996)

## Willys Denies Rumors Relating to Bugatti

LONDON, Nov. 14 (By Cable to AUTOMOTIVE INDUSTRIES) — Willys-Overland Crossley, Ltd., has acquired the right to manufacture the Bugatti car in Great Britain. The Bugatti is a small Italian car which formerly was made in Germany but now is built in Alsace. It has enjoyed wide popularity on the Continent and has taken part in numerous contests. Fuel economy is one of the arguments advanced in promoting its sale. The car has been sold in England heretofore, but has not been made in this country.

NEW YORK, Nov. 15—It was stated at the headquarters of the Willys-Overland Co., of which Willys-Overland Crossley is a subsidiary, that nothing had been heard here of any contract to manufacture or sell the Bugatti car in England.

## Takes Big Mortgage on G. M. Building

### S. W. Straus & Co. Purchases \$12,000,000 7 Per Cent Serial Bonds

NEW YORK, Nov. 16—Pierre S. du Pont, president of the General Motors Corp., announced to-day that S. W. Straus & Co. had purchased from the General Motors Building Corp., a subsidiary of General Motors Corp., \$12,000,000 first mortgage 7 per cent serial bonds maturing serially from 1922 to 1946.

These bonds are secured by the corporation's new office building at Detroit. This building, which has just been completed, represents an investment of more than \$20,000,000. It occupies an entire block 300 x 500 feet, is 15 stories tall and is the largest office building in the world. This loan represents one of the largest real estate mortgages ever recorded.

In connection with the underwriting, S. W. Straus & Co. said:

"The General Motors building has been leased for a term of 30 years by the General Motors Corp. at an annual rental fixed at an amount sufficient to pay the combined principal and interest charges on the bonds in each successive year, after the payment of all operating expenses. Under the covenants of the trust mortgage the bonds are to be paid off in yearly serial installments, the coupons being payable twice a year, May 1 and Nov. 1.

"The trust mortgage requires the General Motors Building Corp., subsidiary of the General Motors Corp., to make 300 approximately equal monthly payments to S. W. Straus & Co. of \$85,000 each. These payments automatically provide in advance a fund of a little more than \$1,000,000 a year from which the coupons are cashed, the balance being used for the serial retirement of the bonds.

"The bonds constitute a direct closed first mortgage on the building, land and equipment as well as first lien on the income from the property.

"The General Motors Corp. with some of its subsidiary and affiliated companies has already moved into the building and will shortly occupy substantially 50 per cent of the space and whatever remaining space not immediately required for the occupancy of the company is being sub-leased. Construction on the building was commenced in 1919 and the greater portion of it was completed in April 1921. It is now proposed to complete the partitioning, interior finishing and equipment of the remaining portion at an estimated cost of \$3,300,000.

"The General Motors Corp. states that its decision to complete the interior of the remaining portion of the building at this time is based on the fact that there is every indication of an active demand for the space at satisfactory rentals. It is anticipated that the new construction will be completed by May 1, 1922."

## Goodyear Holds Diamond Patents

### Seiberling Denies Rumors That He Has Rights for Tire Tread

AKRON, Nov. 14—With the sale of the Portage Tire & Rubber Co. of Barberton, Ohio, to Frank A. Seiberling finally ratified by Referee in Bankruptcy Harry L. Snyder, and needing only a confirming order from Judge C. D. Westenhaver of the Federal Court of Cleveland to permit consummation of the deal, the former Goodyear president is expected to make formal announcement within the next few days as to definite plans for re-entry into the tire manufacturing business.

#### Portage Sale Probable

Unless attorneys for the Portage stockholders' protective committee file a petition of protest against the sale of the plant to Seiberling, with Judge Westenhaver before Nov. 19, the sale will become automatically confirmed by decision of Referee Snyder. And should the petition be filed it is considered doubtful if Judge Westenhaver will permit any further review of the hearing before Snyder, having already remanded the case to Snyder's bankruptcy court for final decision, following the latter's first confirmation of the sale and the subsequent protest of Portage stockholders.

While these negotiations are going on Seiberling is marking time and anxiously awaiting the time when acquisition of the Portage plant will pave the way for his "come back" as the "Little Napoleon of the tire industry."

With acquisition of the Portage plant Seiberling will be able to enter production at the rate of 5,000 tires and 6,000 tubes daily. The Lehigh Tire & Rubber Co. of New Castle, Pa., which he acquired at receiver's sale, has a capacity of 2000 tires and 400 tubes daily, employing 750. The Portage plant, employing 1500 men, can be built up to a daily capacity of 3000 casings and 2000 tubes.

#### Holds Machinery Patents

Rumors extant in Akron to the effect that Seiberling still held the patent rights on the diamond or famous Goodyear All-Weather tire tread, and had given the Goodyear company a 60-day notice to discontinue the manufacture of that tread, are emphatically denied by Seiberling.

"I did hold the patent rights on the diamond tread but in the reorganization of Goodyear and my own retirement from the presidency of the company, I assigned the patent rights to Goodyear," states Seiberling. "Even if I did now hold them I doubt if I should ever compel Goodyear to quit manufacturing the tread, for my interest lies in promoting Goodyear, not injuring Goodyear, and in helping to continue to protect Goodyear's good name."

Seiberling does, however, hold the patent rights on most of the tire building machinery used by Goodyear and

has given the company shop rights thereto, receiving thereby a royalty on every Goodyear tire made.

Seiberling has development engineers and rubber chemists working upon new tread designs and new tire processes. He announces that he expects to introduce an entire new line of cord and fabric automobile tires and motor truck tires, all of which will constitute a rather radical departure from present tires.

His plans are said to include the organization and financing of a holding corporation, of which he naturally will become the directing head, for the operation of the two rubber companies. That he is still endeavoring to acquire other rubber companies is not denied. The organization of a holding corporation will mean the flotation of a sufficiently large stock issue to permit capitalization and Seiberling announces that when he finally reveals his full plans, the people of Akron and the country in general will have an opportunity to join with him in his new venture.

Seiberling admits that his plans are fully completed and are ready for public announcement as soon as the sale of the Portage company to him is consummated. Portage stockholders, who protested the sale to Seiberling, proposed to refinance and to reorganize the company, buying it in themselves. Seiberling's bid for the Portage plant is admittedly the best offered.

## Selden Business Gained 103 Per Cent in October

ROCHESTER, Nov. 14—Stockholders of the Selden Truck Corp. were informed at their annual meeting that business of the company for October was 103 per cent in excess of September sales. Enough business has been booked for the remainder of the year to assure a healthy increase over 1920.

George C. Gordon was re-elected president of the company. Other officers elected were William C. Barry, Robert H. Salmons, Hal T. Boulden and Wilbur F. Reynolds, vice-presidents; S. P. Gould, secretary and Edwin B. Osborn, treasurer. Charles H. Stearns and Ralph H. Bollard were elected to the directorate, Bollard representing the New York financial interests in the company.

## Halladay Motors Corp. Makes Two New Models

NEWARK, OHIO, Nov. 14—The Halladay Motors Corp., is bringing out two new models, one the Falcon Six and the other the Falcon Light Four. The prices are as follows:

	Six	Light Four
Roadster .....	\$1,595	\$1,295
Touring .....	1,595	1,295
Sedan .....	2,395	2,085
Coupe .....	2,295	1,990
Cabriolet .....	1,795	1,495

The body fittings are brought up to date with the adoption of cylindrical headlamps. The four cylinder model can be fitted with a heavy duty engine with 3½-in. bore instead of 3¼-in. bore at an additional cost of \$200.

## Rail Commission Blames Automobile

### Holds It Responsible for Low Earnings of Pacific Electric of Los Angeles

LOS ANGELES, Nov. 14—The motor car is declared to be chiefly responsible for the low earnings of the Pacific Electric of Los Angeles in a report completed by the engineering division of the State Railroad Commission. This report consisting of two large volumes, was introduced at the hearing of the application of the Pacific Electric to increase rates held here. Had it not been for the financial backing of the Southern Pacific, the parent company, the electric system would probably have gone through a receivership, the report asserts.

#### Travel Increases

Changes in the present rate schedule are called for, if general principles laid down in the engineering survey are approved by the commission, according to the engineering department. As showing the effect of automobile competition, attention is called to the fact that while the traction territory has doubled in population and according to an accepted transportation maxim travel has quadrupled, the electric lines carried fewer passengers in 1920 than in 1914.

The choice whether the railway or the motor bus shall go rests ultimately with the people, the report says, and adds:

"It is the experience, however, not only of California cities, but of practically every community where this choice has had to be made, that the time is not yet here when the street car can be dispensed with and its place taken by the jitney."

On the subject of motor transportation in general the report says:

"It is well known that there is much confusion and great lack of reliability on the subject of motor transportation costs. Our study appears to confirm the opinion held by us heretofore, that under normal conditions and in a great majority of cases, the jitney or motor bus cannot compete with the electric lines and that the real costs of motor transportation are higher than commonly figured and higher than the costs of electric transportation. This in the face of the fact that electric transportation has to sustain a heavy investment in permanent way, while the motor service carries no such burden."

#### INTERLOCKING REORGANIZED

AKRON, Nov. 14—The Interlocking Cord Tire Co., of which the receivership was lifted recently, has been reorganized by stockholders with Edward Kohl as president and has resumed tire production in its Mogadore plant near Akron. Production for the present will be 50 tires daily. The company went into the hands of a receiver with indictment of its former officers for alleged violation of the Ohio blue sky law.

## Spring Shortage of Cars Foreseen

### Many Dealers Are Unable to Finance Stocks for Winter Months

NEW YORK, Nov. 15—Slackening of production, which had been expected in the passenger car field this month, already has become apparent, especially in the medium priced lines. The falling off includes such companies as Ford, Dodge, Buick and Studebaker. While the Ford November schedule calls for 85,000 cars it is flexible and production will be continued on the basis of sales.

While these companies, which have been running at top speed for many weeks, are slowing up, other manufacturers who have not done so well are now benefiting from new models and new prices. Maxwell is conspicuous in this list and its new models have brought many congratulatory comments. Advance reports of the new Chalmers line indicate that it will be on a par with its companion car and that the two together will do much to rehabilitate the Maxwell-Chalmers combination.

Numerous other companies have brought out new models embodying many improvements or contemplate doing so in the near future. As a consequence, with the price concessions which have been made in the past year, purchasers of cars hereafter will get better value for their money than they have for a long time.

There is much interest and speculation both inside the trade and out over the air-cooled line with which the General Motors Corp. is experimenting. There have been many unauthorized and inaccurate reports regarding General Motors plans in this connection. They have been set at rest by the official statement by President duPont that plans for manufacture and sale of these models must be held in abeyance until the experimental development work is finally completed. The cars are being developed under the direction of C. F. Kettering, who has charge of the corporation's engineering work, and it is not proposed to put them on the market until they are satisfactory to their sponsors in every respect.

Much interest has been aroused by the affidavit of M. B. Leahy, general sales manager of the Durant Motor Co. of New York, which stated that a total of 24,817 shipping orders had been received at the close of business Oct. 22. If this pace is maintained Durant will be one of the biggest pro-

ducers in 1922. Deliveries of the "Four" have begun and production will increase steadily. No date has been set for putting the six-cylinder Durant on the market.

Manufacturers' schedules are being curtailed to a greater extent than otherwise would be the case because of their determination to build only for actual sales and dealers generally are not inclined to stock cars heavily for the winter months. This is not due to any skepticism on the part of the dealers as to the future of business but rather to difficult credit conditions. Many dealers, especially in the smaller towns, have found it impossible to finance stocks of cars to carry them over the winter. It is feared that this condition may result in a temporary shortage in cars in some popular lines in the early spring.

## Tire Shipments Show Decline in September

WASHINGTON, Nov. 14—Analysis of business conditions by the Department of Commerce based upon reports of trade associations and other co-operating bodies, shows that domestic shipments of tires and tubes indicated a seasonal decline of from 25 to 30 per cent during September. Stocks of pneumatic tires declined 14.5 per cent and solid tires 25.7 per cent, while inner tube stocks showed an increase of 4.5 per cent. Stocks of each of these products are from 30 to 45 per cent less than the average of the six months, November, 1920, to April, 1921. Production, on the other hand, is from 60 to 200 per cent above the same six months average.

Imports of crude rubber increased 4.4 per cent in September and were 23.9 per cent greater than for the same month of 1920. Consumption of crude rubber by tire manufacturers made the seasonal decline amount to 36.5 per cent in September with tire and tube production dropping correspondingly.

## Three American Firms to Exhibit at Brussels

PARIS, Nov. 6 (*By Mail*)—The Belgian automobile show, the last of the European series, will open in the Palais du Cinquantenaire, Brussels, on Dec. 3 and will close on Dec. 14. The exhibition is international and is open to the entire automotive industry, there being sections open for passenger cars, trucks, motorcycles, tractors, accessories, and bodies.

In the passenger car section France has a majority with 31 exhibitors. Italy is represented by five firms; America will have Studebaker, Case and Overland; England is sending two makes of cars, and the Belgian passenger car makers in the show are Metallurgique, Minerva, Dasse, Imperia-Abadal, Excelsior, F. N., Nagant, Miesse, and Somea. There are 208 exhibitors.

## Dealers Organize in Pennsylvania

### Association Idea Emphasized at Meeting Which Unites 689 Men in Industry

HARRISBURG, PA., Nov. 15—The Pennsylvania Automotive Association was organized here yesterday and to-day with 200 members. It is affiliated with the National Automobile Dealers Association and will include in its membership car and truck distributors and dealers, jobbers, automotive equipment dealers, repairmen and various other classes of people in the automotive trades who will be classed as associate members.

The association was formed with the two-fold purpose of employing co-operation to alleviate trade troubles and mobilizing favorable public opinion for the good of the industry.

The meeting was held in the chamber of the House of Representatives at the State Capitol and was attended by 156 representative men in the trade, mostly dealers, who spoke for local associations in 60 cities and towns, representing 689 members.

### N. A. D. A. in Charge

Details of the organization were conducted by Harry G. Mooock, general manager, and P. F. Drury, assistant general manager of the N. A. D. A.

There was no thought expressed that the association would be able to solve the used car problem, or make dealers' relations with manufacturers 100 per cent satisfactory.

The meeting itself developed a valuable exchange of ideas through addresses and an open forum. Speakers included Mooock, Drury, Wayne Hearne, who is doing educational work in dealer organization throughout the country, Alfred Reeves, general manager of the National Automobile Chamber of Commerce, Harry Meixell, Jr., secretary of the Motor Vehicle Conference Committee, Neal G. Adair, editor of *Motor World*, and A. V. Cummings of the *Automobile Trade Journal*.

### Wayne Hearne Speaks

Hearne declared that the 1922 dealer will have a keen appreciation of honor, will tend toward becoming an exclusive dealer instead of handling various lines, "because exclusiveness makes for expertness," will control his prospects and assign them to salesmen best fitted to handle them, instead of letting them remain the "property" of individual salesmen, will "quit worrying about a contract and sell merchandise that he has faith in as long as he likes the factory policy and the factory likes his representation."

Of the manufacturers, Hearne said: "You say the factories compel you to trade. Can you call yourselves business men when you let someone else run your business? You ought to run it yourselves or get out."



## Hawkins Outlines Service Methods

### Inefficiency in Selling Plans Are Also Discussed at Mana- gers' Convention

NEW YORK, Nov. 17—Adoption of an efficient and satisfactory service policy as a means of increasing sales was advocated by N. A. Hawkins of the advisory staff of the General Motors Corp. in an address before the Service Managers' Convention at the National Automobile Chamber of Commerce.

Hawkins referred to the car owner as the service manager's "boss," and declared that unless the service department functioned to the satisfaction of that "boss" the department was a failure.

#### Parts Stocking Necessary

A good many things enter into the matter of efficient service, it was pointed out, and the speaker went on to describe methods of meeting some of the obstacles encountered. One important point discussed was the matter of dealers not carrying a complete stock of car parts.

Hawkins advocated the stocking of dealers' shops with sufficient parts so that there would be an elimination of telegraphic orders, parcel post and express deliveries. All these items, of course, must ultimately be borne by the purchaser of the part, and unless the dealer is adequately stocked the cost is materially increased. In this connection it was also shown that by the manufacturer keeping his dealers stocked with parts from the factory, the so-called "pirate parts" would be largely eliminated.

Hawkins declared that the job of keeping old cars running is more important than selling new cars, for the car owner who is satisfied with the service he receives on an old car will, when the time for replacement comes, place an order for a new car of the same make as his old one.

#### Would Zone Cities

Somewhat aside from the question of service, Hawkins touched upon the inefficient selling methods in use in many cities, and offered as a remedy the zoning of cities according to population and territory. It was shown that it was possible in New York to-day to have 40 salesmen selling the same car call on a single prospect the same day. This, he said, was due to the fact that salesmen representing different dealer organizations were not confined to any one district, but were given free play throughout the entire city.

The discussions that followed Hawkins' address centered about several topics, one of the most talked of being the "pirate part" evil. Several service managers were of the opinion that all parts that were not easily distinguishable should be trade-marked. The fact

## FIRST DURANT SIX DRIVEN TO MUNCIE

NEW YORK, Nov. 15—W. R. Willett, president and general manager of the Durant Motor Car Co. of Indiana, will start from this city for Muncie to-morrow in the first Durant six to be turned out and tested at the Long Island City plant of the Durant Motor Car Co. of New York.

Experimental work on the Durant six, which will be scarcely recognizable as the former Sheridan of the General Motors line, has been practically completed and production will begin in the near future at Muncie.

Deliveries of the Durant four to purchasers have been begun from the Long Island City plant.

was brought out that manufacturers buying a certain part might reject material that was submitted to them for the construction of that part.

The parts manufacturer, in turn, would go ahead and construct the articles of that rejected material and sell directly to the dealer upon the representation that the part was the same make as that used in the original car. Naturally, the part could be bought considerably cheaper than it could from the manufacturer. Placing of trade-marks upon such parts, it was pointed out, would eliminate this evil. It was also agreed, in this connection, that there are many parts which can best be serviced by the parts manufacturers, and that there should be little attempt by the dealer to undertake such work.

Parts prices were also thoroughly discussed and most of the delegates were of the opinion that there should be a reduction in those prices, especially since there has been a reduction in car prices. How this should be accomplished, however, was left largely to the individual manufacturer to determine.

There was also a discussion as to whether the list price of each part should be made to include the tax and transportation charges, so that each part could be purchased for the same amount of money throughout the country. Generally, it was agreed that parts prices should be listed f.o.b., although there were strong arguments for the other method.

#### A. E. VINTON DIES SUDDENLY

INDIANAPOLIS, Nov. 11—A. E. Vinton, assistant general sales manager of the National Motor Vehicle Corp., died suddenly at his home here although he had been in apparently normal health. Vinton first joined the National organization in 1909 and served continuously with it until 1917, when he became associated with the Mansfield Tire & Rubber Co. He returned to the National as assistant general sales manager in August of this year.

## Tire Production Less in September

### Decline of 600,000 in Stocks on Hand—Pneumatic Ship- ments Decreased

NEW YORK, Nov. 15—A reduction of approximately 1,100,000 in the number of pneumatic tires produced in September as compared with August was reported to the Department of Commerce by the Rubber Association of America in its statistics on production, shipments and inventory. There was a decline of about 600,000 in stocks on hand, but a falling off of 840,000 in shipments of pneumatics. The figures by months since November, 1920, which was taken as the base month, up to October follow:

#### PNEUMATIC CASINGS

1920	Inventory	Production	Shipments
Nov. ....	5,170,928	915,651	1,262,159
Dec. ....	5,508,380	506,111	1,327,153
1921			
Jan. ....	5,319,605	703,430	965,417
Feb. ....	5,193,018	819,892	1,073,756
Mar. ....	4,597,103	1,163,314	1,614,651
Apr. ....	4,527,445	1,651,418	1,785,951
May ....	4,451,668	2,100,917	2,085,882
June ....	4,154,456	2,313,265	2,643,850
July ....	3,892,037	2,570,524	2,757,581
Aug. ....	3,934,583	3,043,187	2,894,442
Sept. ....	3,340,798	1,929,268	2,047,929

#### INNER TUBES

1920	Inventory	Production	Shipments
Nov. ....	5,480,354	1,002,886	1,366,997
Dec. ....	5,786,929	508,446	1,481,285
1921			
Jan. ....	5,586,163	740,824	1,042,617
Feb. ....	5,415,464	916,627	1,129,881
Mar. ....	5,044,861	1,346,483	1,643,690
Apr. ....	4,916,772	1,762,122	1,983,571
May ....	4,751,880	2,210,040	2,342,567
June ....	3,825,098	2,359,928	3,232,673
July ....	3,122,815	3,020,981	3,603,248
Aug. ....	3,649,319	4,430,152	3,804,060
Sept. ....	3,827,830	3,274,822	2,645,758

#### SOLID TIRES

1920	Inventory	Production	Shipments
Nov. ....	294,043	23,299	36,628
Dec. ....	303,473	16,297	40,823
1921			
Jan. ....	303,753	21,220	29,116
Feb. ....	304,374	23,355	29,599
Mar. ....	283,800	28,710	43,926
Apr. ....	269,985	28,859	42,090
May ....	264,633	35,156	40,122
June ....	240,336	28,395	49,867
July ....	220,003	35,123	55,678
Aug. ....	216,367	55,694	66,866
Sept. ....	161,832	37,441	50,276

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" include only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

#### SPOKE COMPANY SOLD

PINE BLUFF, ARK., Nov. 15—The Pine Bluff Spoke Co. has been sold by C. A. Dunning and associates to Peers & McGlone of Shreveport, La., who will operate the plant on an increased capacity. Last year in nine months the factory turned out more than \$500,000 worth of spokes for automobiles. Buick, Dort and Oakland were among the makes of automobiles supplied.

## S.A.E. and Petroleum Institute Cooperate

### Former Will Furnish Several Speakers for Annual Meeting of Latter

NEW YORK, Nov. 15—The second annual meeting of the American Petroleum Institute, to be held at the Congress Hotel, Chicago, Dec. 6, 7 and 8, 1921, will include two sessions in which members of the Society of Automotive Engineers and other men prominent in the automotive industry will take a conspicuous part.

The most important sessions from the automotive standpoint are those to be held on the mornings of Tuesday, Dec. 6, and Wednesday, Dec. 7, and the evening of the latter date. The speakers at the morning sessions referred to will include the following:

#### To Discuss Fuel Problems

Quantitative Survey of Petroleum Industry in Respect to Motor Fuel Production by Dr. Van. H. Manning of the A. P. I.; Quantitative Survey of Automotive Engine Fuel Requirements by a representative of the National Automobile Chamber of Commerce; Qualitative Requirements of Motor Vehicle Fuel by Henry M. Crane, representing the S. A. E.; Qualitative Limitations in Marketing and Refining by Frank A. Howard of the Standard Oil Co. of N. J.; Volatility of Motor Fuel as Marketed in the United States by N. A. C. Smith of the U. S. Bureau of Mines; What Constitutes True Volatility, by R. E. Wilson of the Massachusetts Institute of Technology; Limitations Imposed on Economy by Volatility Changes by F. C. Mock and Practical Effects of Too Low Volatility by O. C. Berry. David Beecroft, as President of the S. A. E., will speak briefly on the general subject of research.

At the evening session on Wednesday, Dec. 7, Harry L. Horning will make an address in which he will discuss some of the fuel problems of the automotive industry.

One purpose of the foregoing sessions is to promote a better mutual understanding in relation to fuel problems which concern the fuel producers on the one hand and the producers of equipment which uses the fuel on the other.

#### Sessions Open to Public

Other sessions, the subjects of which have not as yet been announced, will be held in the afternoon and evening of the first two days of the meeting and the morning and afternoon of the concluding day. The speakers at these sessions will include the following, most of whom are prominent officers of various companies in the petroleum or closely related industries:

Walter C. Teagle, Thomas A. O'Donnell, Amos L. Beaty, D. W. Moffitt, Edward L. Doheny, Edward Prizer, Frank Haskell, J. D. Collett, Paul Shoup, Louis C. Sands and Edward C. Finney, first assistant secretary, Department of the Interior.

The concluding event of the meeting will be the dinner to be held on the

## INTERESTING SCHOOLS IN SAFETY CAMPAIGN

WASHINGTON, Nov. 15—Posters are being distributed by the Highway and Highway Transport Education Committee announcing prizes to be awarded grammar school children for the best essay on "How Can I Make the Highways More Safe" and the rewards to grammar school children for the best classroom lesson for their grades which teach children safe behavior on the highways.

The contest is endorsed by the United States Bureau of Education for the purpose of conserving and developing useful material for safety education. The prizes are donated by the National Automobile Chamber of Commerce.

The posters also announce the rules of the contest and the books on safety which the committee recommends to contestants.

evening of Dec. 8. The speakers at this dinner will include Robert W. Stewart, Harry F. Sinclair, J. C. Donnell, Henry L. Doherty, A. C. Bedford and Sir John Cadman of London, formerly His Majesty's petroleum executive.

All sessions are open to the public.

## Department of Commerce Issues Output Figures

NEW YORK, Nov. 14—Publication of production figures for the automobile industry, covering both passenger cars and trucks has been begun by the Department of Commerce. The National Automobile Chamber of Commerce supplies the figures for its members and the Department of Commerce obtains the statistics from manufacturers who are not members of the N. A. C. C. The report for the quarter ended Sept. 30 shows a production of 474,188 passenger cars and 37,322 trucks or a total of 511,510.

The figures for the three months follow:

	Passenger Cars	Trucks
July .....	163,998	10,801
August .....	166,393	13,076
September .....	143,797	13,645
Total .....	474,188	37,322

The showing for the third quarter of this year, in comparison with the same period of 1920, is amazing. Production in July, August and September of last year with figures from non-members of the N. A. C. C. missing was approximately 560,000, or only about 50,000 less than this year.

#### CHARLES R. LAMBERT DIES

DETROIT, Nov. 12—Charles R. Lambert, president of Clayton & Lambert Mfg. Co., manufacturer of pressed metals and gasoline tools, died this week after an illness of several years.

## Action on Maibohm Awaiting Creditors

### Postponement of Reorganization Also Due to Federal Tax Claim

SANDUSKY, OHIO, Nov. 15—The sale of the Maibohm Motors Co., for the purpose of reorganization of the company, has been postponed until Nov. 28 in order to determine priority of a claim for Federal taxes and allow other creditors to align themselves in the matter of the reorganization.

It is asserted by officers of the company that approximately 90 per cent of the claims are now represented by the creditors' committee, which has worked out the plan for reorganization. The plan contemplates the issuance of about \$600,000 of 7 per cent non-cumulative preferred stock to be issued to creditors to the amount of their claims. This stock would have full voting power and elect its own board of directors, thus having full control of the company until it is retired.

Heading the committee of creditors is E. G. Kirby, trust officer of the Commerce Guardian Trust & Savings Bank, Toledo, and serving with him are R. E. Hayslett of the Hydraulic Pressed Steel Co., Cleveland, and N. T. Brotherton of the Brotherton Knoble Advertising Co., Detroit. W. J. Corr, secretary of the company, has been appointed receiver and trustee in bankruptcy by Federal Judge John M. Killits.

The complete reorganization of the sales department of the company is contemplated following the corporate reorganization. Chairman Kirby of the creditors' committee declared that the plant is expected to turn out between 600 and 1000 cars for the year 1921. He said production of 400 cars would enable the company to take care of its overhead expenses and preferred dividends.

The capitalization of the new company has not yet been determined. It will, however, go into business with nearly \$800,000 of assets and no liabilities.

#### MOVING WILLYS FOUNDRY

TOLEDO, Nov. 15—The aluminum foundry of the Willys-Overland Co. is being moved to Pontiac, Mich., where it will be housed by the Wilson Foundry & Machine Co., an allied plant. By moving the plant, all related foundry operations will be brought together and considerable space will be saved at the main plant here.

#### DURANT PARTS FOR CANADA

TORONTO, Nov. 14—W. C. Durant stated here recently that his contracts with the parts makers call for the establishment of Canadian plants for the making of parts for the Canadian Durant 4 and 6 models. In the connection Continental and Auto-Lite were mentioned.

## Tire Prices Drop to Lowest Levels

**Goodyear, Miller and General  
Reductions Range from 10  
to 30 Per Cent**

AKRON, Nov. 14—Automobile tire prices have gone to the lowest level in the history of the tire industry, with announcement of drastic price reductions, effective Nov. 15, by most of the major tire companies of Akron.

The long expected break in tire prices came Nov. 12 and followed leads taken by the Firestone Tire & Rubber Co. of Akron and Mason Tire & Rubber Co. of Kent, both of which made price revisions Nov. 1. Firestone cut 20 per cent on cord tires, 10 per cent on fabrics and 10 per cent on truck tires. Mason made a blanket cut of 15 per cent.

Goodyear, Miller and General simultaneously announced their new price schedules Saturday. No announcement at the time was forthcoming from the Goodrich company. The cuts range from 10 to 30 per cent.

### Below Pre-War Level

The significance of the new price schedules is the fact that they bring tire prices to below their pre-war levels by nearly 15 per cent. Another outstanding feature is the fact that the larger cuts are made in prices of cord tires, thus cutting almost in two the margin of price difference between cord and fabric tires, and making it possible to buy cord tires within 25 or 30 per cent as cheaply as fabrics.

The Goodyear cuts announced are 30 per cent on the 3½-in. and 4-in. straight-side cord tires, 26 per cent on the 3½-in. clincher cord tires, and 20 per cent on all 4½ and 5-in. cord tires. Cuts on fabric prices range from 10 to 20 per cent. Goodyear makes no announcement of truck tire revisions.

The Miller Rubber Co. cuts cord tire prices from 20 to 30 per cent and makes a 10 per cent cut on fabrics and a cut ranging from 10 to 20 per cent on truck tires. General price cuts are 20 per cent on cords, from 10 to 20 per cent on fabrics, and 10 per cent on truck tires.

### Smaller Size Cut Greatest

"The fact that tires can now be marketed at less than pre-war costs while at the same time the quality of the product has been greatly improved," says the Goodyear statement made in connection with the company's price revisions, "shows that the rubber industry has done its bit toward bringing back normal stabilized business conditions. The result has been obtained by taking advantage of the present abnormally low costs of raw materials and by increased efficiency of manufacture and distribution, and rigid economies of operation.

"Automobile owners will be interested to know that we have been able to bring down the price of the popular cord tires to where they are not much more expensive in first cost than fabric tires. The differential between the two types in fact has been cut

practically in two. The largest reductions have been made in the smaller sizes where the larger volume of use permits the greatest reduction in manufacturing and distributing costs.

"We believe that business is going to right itself and drive ahead just as soon as the cost of living is adjusted to the income of the consuming public, and the rubber industry is not going to be the last to forward that return to normal."

### Goodrich at Low Mark

AKRON, Nov. 15—The B. F. Goodrich Co. has announced drastic tire price reductions effective to-day. The reductions are on practically all sizes of fabrics and cord automobile tires, solid and pneumatic truck tires and inner tubes.

On the popular sized cord tires the price cuts average over 22 per cent. The Goodrich schedules make the following reductions:

Sizes	Old Price	New Price
30 x 3½ cords.....	\$24.50	\$18.00
32 x 3½ .....	32.90	25.50
31 x 4 .....	40.70	29.40
32 x 4 .....	41.85	32.40

The percentages of cuts taper down according to the larger size tires, being from \$65.10 to \$57.60 on the 37 x 5 and from \$61.90 to \$54.75 on the 35 x 5. Fabric cuts are smaller comparatively, the larger cuts being made in cord prices to bring cord tires nearer the fabric tire costs, Goodrich officials say.

As Goodrich led the field with a 20 per cent cut last May, the new cut carries Goodrich prices to their lowest level, based on mileage records.

(Continued on page 997)

## Fusion Is Under Way of Benz and Rumpler

PARIS, Nov. 6 (By Mail)—Negotiations are in hand for a fusion of the two German firms Benz and Rumpler. The Benz company is the biggest exclusively automobile concern in Germany, with passenger car, truck and Diesel engine factories at Mannheim. It employs about 10,000 hands at the present time.

The Rumpler concern was one of the biggest producers of airplanes in Germany during the war, with factories in the suburbs of Berlin and at Augsburg, in Bavaria. This year, Rumpler, who was an automobile engineer before taking up aviation, produced an automobile of revolutionary design which he intended to build in his Berlin factory and also to have built in other factories under license. Benz never has built airplanes, but was prominent in aviation engines during the war.

### EARL ADDS UNIT

DETROIT, Nov. 14—Earl Motors Co., Inc., has taken over the Jackson Metal Products Co. and the plant will be operated in the future as an Earl manufacturing unit. Most of the sheet metal work for the bodies gasoline tanks, radiator shells and enameling work will be done in the new plant. With the addition of this work the Earl car will be about 80 per cent constructed in the Earl factories.

## A. E. A. Continues Its Sales Program

**Motion Pictures at Annual Con-  
vention Visualize Work of  
New Department**

CHICAGO, Nov. 15—The Automotive Equipment Association, in annual convention here this week, recommitted itself to the sales promotion program authorized at the Mackinac Island convention in July. The work of the campaign to date and plans for the future were visualized for 500 manufacturers and jobber members and their sales representatives in an address by Ray W. Sherman, merchandising director, and in a motion picture presentation of the means by which the association is trying to educate the retail trade to "ask 'em to buy" and so broaden the outlet for the products of the industry.

The story of the sales promotion work made a decidedly favorable impression upon both manufacturer and jobber members. It won for the merchandising department assurances of the working support of members which is necessary in the undertaking of organizing the industry itself to carry out the details of the campaign.

### No Large Field Staff

The association has discarded all suggestions for a large field staff or for extensive appeals to the trade by mail in favor of education of the retail trade through the agency of the jobber salesman, with the manufacturer salesman assisting wherever circumstances permit.

The motion picture showed how a typical salesman demonstrated the profit possibilities in automotive equipment merchandising to a typical garageman and converted the garageman to the better merchandising idea. The movie will be used throughout the country, particularly during the automobile show season and at trade association meetings, to further the campaign.

The business exhibit held in connection with the convention profited somewhat in sales by manufacturers to jobbers through the stimulation resulting from presentation of the sales promotion idea. On the whole, however, jobbers bought lightly. The price reduction trend in the equipment field and the ambition of the jobbing houses for quick turnover were responsible.

Howard M. Dine of Dine Dewees Co., Canton, Ohio, jobber, was nominated for president and C. C. Gates of the Gates Rubber Co. of Denver, vice-president.

### BENZ PLANT CLOSED

NEW YORK, Nov. 15—A dispatch from Frankfort on the Main states that the large automobile works of Benz & Co. at Mannheim have been closed because of "terroristic excesses" of the workmen who are stated to have forced their way into the directors' room and threatened the directors and engineers with physical violence.

## Report of Packard Shows Operating Loss

### Reduced Assets of Company Reflect Reduction in Inventories During Year

DETROIT, Nov. 15—Packard Motor Car Co.'s annual report read at the stockholders' meeting showed an operating loss for the year of \$987,366. Of this \$389,347 was chargeable to the factory and \$598,018 to branches. After paying dividends on preferred stock and setting aside reserves for contingencies, the surplus showed a reduction of \$4,833,776. The surplus now totals \$15,923,895. The balance sheet showed cash and readily marketable securities of \$10,323,000 and current liabilities of \$3,807,342.39.

Directors of the company were all re-named at the annual stockholders meeting and the officers were re-elected by the directors.

### Outlook Optimistic

President Alvan Macauley in his annual statement said:

"We have passed through the trying year in excellent financial condition as the balance sheet indicates. Our various products are fully developed and perfected; our distributors have held together remarkably well, and we are in a position to manufacture and sell, we believe, on a basis competitive with the best among modern manufacturers. With the organization in all its branches working splendidly together, and with a unanimous support and cooperation on the part of the directors of this company, the management looks forward to the future with great confidence.

"After setting up as liabilities amounts owing for current purchase and pay rolls, and reserves for unmatrued indebtedness including interest on bonds, and taking into account \$9,853,500 of outstanding debenture bonds and a reserve of \$2,500,000 for contingencies, the company's net worth is \$42,598,795.93. After deducting from the company's net worth the preferred stock at par, the common stock is shown to have a book value of \$23.39 a share."

### Assets \$58,759,638

Total assets of the company of \$58,759,638.32, compared with \$62,808,276.76 a year ago, reflect the reduction in inventories during the year as do the current assets of \$36,167,538.57, compared with \$40,116,589.53 on Aug. 31, 1920. Current liabilities of \$3,807,342.39 also show a reduction as against \$12,442,004.57, part of the latter amount having been refunded in the \$10,000,000 of 10-year 8 per cent gold bonds, dated April 15, 1921, of which \$9,853,500 was outstanding at the end of the fiscal year.

Besides inventories, amounting to \$13,714,703.61 at the Detroit factory and \$7,515,741.84 at the branches, current assets include \$4,523,715.75 in cash, against \$4,314,809.89 a year ago, \$5,800,000 in U. S. Certificates of indebtedness and \$178,123.56 in marketable securities, against miscellaneous investments of \$207,535.43 a year ago, accounts receivable \$3,290,993.71 compared with \$4,882,-

189.47 and deferred installment notes and bills receivable \$1,144,260.10 against \$1,352,727.66.

Current liabilities consist of \$2,188,269.72 in accounts payable and pay roll and \$1,619,072.67 accrued interest and liabilities not due. In the previous year current liabilities included \$5,000,000 of bank loans, \$4,087,549.40 in accounts payable and payrolls and \$3,354,455.17 in Federal taxes and miscellaneous liabilities not due.

Touching on economies effected during the year, President Macauley's report says the company was able to reduce productive labor and manufacturing expense 68 per cent from the amount expended for these two items the previous year. The sales outlook for the coming year he describes as encouraging the anticipations of a profitable and increasing business.

## Agent Obtains Damages in Suit Against Hassler

COLUMBIA, S. C., Nov. 14—David C. Shaw of this city was awarded \$15,000 damages in the United States District Court here in a suit brought against Robert H. Hassler, Inc., of Indianapolis. Shaw sued for \$175,000.

The action grew out of an alleged breach of contract regarding the agency for automobile shock absorbers, manufactured by the Hassler company, and covering exclusive distributing rights in the State for a period of not less than five years. Under this contract, Shaw said he accepted and sold one car load of shock absorbers, building up at the same time, a sales force throughout the State. A second car load of shock absorbers arrived, Shaw testified, and he was notified that he was no longer State agent, and the Columbia Compress Co. instructed not to deliver the car to Shaw, refused to turn it over to him.

The defendant concern claimed the right to terminate the contract and also set up the plea that Shaw, by his alleged failure to pay for the car, had in effect canceled the contract.

This is the second time that the suit has been tried, the first hearing having resulted in a mistrial.

## Dealers Purchase Little at Government Auction

ATLANTA, Nov. 14—Automobiles and motor trucks of an original value of perhaps \$200,000 were sold at public auction at Camp Jesup, near Atlanta, all sales being made to the highest bidders regardless of the price. Most of the equipment was reported to be in comparatively poor condition because of the ravages of weather, but considerable of it was still in working order and was sold at ridiculously low prices. Buyers were present from all over the southeast, including a number of dealers, but only a comparatively few sales were made to dealers. The sale included 116 White motor trucks, several Packard trucks and a number of touring cars.

## Gunn Designs Car for Colonial Motors

### New Company Enters Medium Priced Field in Canada—Production in 1922

DETROIT, Nov. 17—Colonial Motors, Ltd., has been incorporated at Windsor, Ont., with a capital of \$1,000,000 for the manufacture of a specialized unit car to be known as the Canadian, which will sell in the medium price field.

The former plant of the Detroit Insulator Co. at Walkerville has been purchased and production will be started soon after Jan. 1. The output for 1922 is expected to range from 2000 to 3000.

The car will be made in the usual body styles and has been designed by Earl G. Gunn, who was formerly a designer with the Premier and Packard among other companies. The car follows conventional lines except for the elimination of a front axle for which a transverse spring construction is substituted. The engine will be six cylinder type. Body and chassis construction are designed primarily to meet Canadian road conditions. Cars built for export trade will follow special designs to meet conditions in the countries to which they are shipped.

George L. McCain is assistant engineer of the company. Officers have not been elected, pending final development of plans. William Lorimer of Windsor, Ont., and L. A. McCalla are representing the prospective directors in the completion of manufacturing plans.

## Allied Motor Commerce Plans Transport School

INDIANAPOLIS, Nov. 8—The ways and means committee of the recently organized Allied Motor Commerce, Inc., has decided to found a national motor transport school at Indianapolis for the training of executives for motor transport organizations and also plans to establish an extensive data collection and information bureau on all phases of motor transport, availing itself for this purpose of the new motor transport terminal soon to be erected by the Indiana Highway Transport and Terminal Association.

The bureau will also concern itself with highway questions and promotions and make it part of its work to show the public that advancement along this line for truck use interests every taxpayer as well as the transport men and companies directly affected by the roads.

The chairman of the committee is Joseph P. Hayes of the Heating and Plumbing Contractors Association.

### CURTISS ENLARGES FIELD

MONMOUTH, ILL., Nov. 14—The Curtiss-Iowa Aircraft Corp. has been authorized to do business in Illinois and of its \$250,000 capital stock \$36,850 is to be devoted to business in Illinois.

## Lincoln Inventory Halts Production

### Issuance of Receiver's Certificate Probably Not Necessary to Continue Business

DETROIT, Nov. 16—Inventories are still in progress at the plant of the Lincoln Motor Co. and probably will not be finished before the end of the week. Until this task is completed no more cars will be built and no operating schedules will be determined upon. Sales demand will be met from the reserve of cars on hand when the receiver took charge.

H. L. Stanton, vice-president of the Detroit Trust Co., has taken over the active executive work of directing the company. He is being assisted by President H. M. Leland and Vice-President W. C. Leland, acting in advisory capacities. Stanton is the corporation officer of the trust company and has acted as receiver in several reorganizations of automotive companies. He thinks it unlikely that the services of an automobile executive will be sought.

#### Creditors Co-operating

The receiver has not determined how much money will be available to continue the business, but President Ralph Stone of the Detroit Trust Co. thinks it likely there will be enough without the issuance of receivers' certificates. In this connection he declares that the creditors are co-operating to the fullest extent in helping place Lincoln on a sound business footing.

Completion of cars now in process will give the company an additional margin to work upon and a fair number of sales are expected in November, although not the 200 hoped for at the beginning of the month. Orders are reported coming in steadily, distributors finding the demand well up to seasonal standards and in some districts exceeding it.

The receiver states that sales policies of the Lincoln company will be continued, at least for the present. This will mean operating on a sales basis with the possibility of a sales campaign being launched later. A telegram was sent to all distributors to-day by the receiver promising active co-operation at the earliest possible moment and declaring the company was prepared to fill all orders for cars as well as to meet all service demands.

#### Company Ready to Resume

A definite statement of assets and liabilities is now being prepared. Until it is available definite plans cannot be announced for the operation of the plant. Only minor changes have been made in the organization. The office force is being reduced but otherwise the company is staffed to resume operations. Creditors are being asked to forward statements of their accounts for comparison with the company's records.

Through an error, it was stated in AUTOMOTIVE INDUSTRIES last week that

the Lincoln company has filed a voluntary petition in bankruptcy. The court action involved only the appointment of a receiver upon petition of a creditor asking for a receivership for the protection of assets and continuance of the business pending reorganization.

No announcement has been made concerning reorganization plans but it is understood the Lelands lost control of the company when mortgage bonds were issued last July.

NEW YORK, Nov. 16—Formation of a stockholders' protective committee for holders of the Class "A" issue of stock of the Lincoln Motor Co. is announced here. Frank W. Blair & Co. was appointed chairman and the other members chosen were Robert K. Cassatt, Joseph A. Bauer, George S. Franklin, George F. Fuller and G. Herman Kinnicutt.

The committee requested holders of the issue to deposit at once stock certificates with the Central Trust Co. of New York, the Union Trust Co. of Detroit, or the Commercial Trust Co. of Philadelphia. Temporary receipts will be issued by the depositaries in exchange for the stock certificates deposited.

The Class "A" stock, \$50 par, comprises most of the outstanding issues, totaling \$8,000,000, while the Class "B," of no par value, has 160,000 shares outstanding.

## War Supplies Reimported Pending Senate Action

WASHINGTON, Nov. 16—Every effort is being made to expedite the passage of the so-called Graham resolution which would impose a tax of 90 per cent on automobiles, trucks and other war supplies reimported to this country. The bill is on the Senate calendar and will be considered after the conference report on internal revenue revision is adopted.

The bill as passed by the House was favorably reported by the Senate Finance Committee in August, but on objection of one or two senators it was not adopted at that time.

Reports have been received this week, however, showing that quantities of surplus war material have been shipped to this country, as importers or distributing agencies here are taking advantage of the legislative delay.

## Auto Body Co. to Start Durant Body Work Dec. 1

LANSING, Nov. 16—The Auto Body Co. has doubled its working force and will gradually increase the number throughout the winter as the new models of Durant and Earl cars get into production.

A regular schedule on Durant bodies will start Dec. 1. Production already has begun on the Earl touring bodies, and the present schedule will be maintained throughout November and December, when it will be increased.

## Truck Tax Basis Is Same As Candy

### Old Scale Retained in Conferees' Agreement on New Revenue Bill

WASHINGTON, Nov. 16—The Senate and House conferees on the tax revision bill have agreed on the manufacturers' excise tax which shall apply to motor vehicles and automotive equipment. No change has been made in the old scale, which is as follows:

Automobile trucks and automobile wagons, including parts and accessories, 3 per cent.

Other automobiles and motorcycles, including parts and accessories, 5 per cent.

Tires, inner tubes, parts or accessories for motor vehicles sold to any person other than a manufacturer or producer of motor vehicles, 5 per cent.

In addition to motor vehicles, this stigma taxation will apply, under the agreement of the conferees, only to yachts and motor boats costing more than \$100, cameras, candy, firearms, hunting and bowie knives, daggers, sword canes, metallic knuckles, cigar and cigarette holders, automatic slot device vending machines, servants' liveries, hunting and shooting garments, works of art and a few other luxuries which cost more than a stated amount.

An agreement has been reached for a repeal of the taxes which had been in force on furs, musical instruments, sporting goods, moving picture films, chewing gum and electric fans.

As a result of the decision of the conferees, motor trucks which are expected to save the country from disaster in the event of a railroad strike, are taxed on the same basis as candy. Passenger cars, which President Harding has stated are an indispensable part of the life of the country, are taxed on the same basis as works of art and automatic vending machines.

## To Offer Cotta for Sale Dec. 15 as Going Concern

ROCKFORD, ILL., Nov. 14—The Cotta Transmission Co., which has been operated by trustees since its bankruptcy last spring, will be offered for sale Dec. 15 as a "going concern." Frank Wean, referee in bankruptcy, has approved the creditors' plan for disposal of the plant and Rockford financiers are attempting to raise funds to buy in the plant to prevent its removal from this city or its operation by other than local capital.

Thirty-one creditors with claims of \$233,042 favored the plan approved by the referee; 23 with claims of \$165,440 voted to continue the present operation with no fixed plan of its termination. If bids opened next month are not adequate, it is likely the company will continue operation as in the past until favorable offer is secured.



## Stocks Sufficient in Peru This Year

Need for Cars, Trucks and Tractors Will Be Felt  
in 1922

LIMA, PERU, Oct. 27 (*By Mail*)—For the rest of 1921 there is perhaps sufficient stock of automobiles, trucks and tractors here to supply the needs without importations but this will change as the year turns. Parts, accessories and tires will have to be imported even before 1922. The summer begins in Peru in the middle of December and about this time automobiles are in greater demand.

After the summer has passed the next stimulus for the automobile trade will come from the increased buying that always precedes the national holidays that are celebrated for several days in the latter part of July. In the latter half of 1922, the automobile business ought to be in full swing again in Peru.

### Cotton Prices Help

Favorable factors that lend to this view are the increasing strength of the Government and the rising price of cotton, with corresponding response by the exchange. Sugar, wool and other products are expected to accompany cotton in its rise.

There is an incipient movement in favor of good roads, which it is hoped will increase, for it will contribute not merely to the larger sale of automobiles, but to the greater and more rapid development of the country.

The latest increase in the use of automotive equipment in Peru has been in the direction of the truck, rather than either tractor or automobile. In the light truck the Americans appear to be having the advantage, while in the heavy trucks perhaps the Europeans are making the most sales.

The total of firms in the capital that are now or have been recently direct importers of automotive equipment is over fifty. Some have temporarily retired from the business but they may return or their places may be taken by newcomers. This number takes no account of the firms in provinces which are importing direct, and whose number will constantly increase.

The Peruvian statistics show the ports of entry of the automobiles imported, and for 1919, the last year for which data is available, the value of the automobiles that went direct to the provinces without touching Lima, amounted to almost 25 per cent of the total value of the automobiles imported. The growth of automobiles used in the provinces is the first thing to be watched in the future development in Peru.

The number of garages in Lima is also more than fifty. These garages are not strong enough to do direct importing, but they furnish centers for propaganda work. They house each from 7 to 75 automobiles. It may be assumed

there are 25 garages in the provinces.

There are six vulcanizing shops, or tire repair shops in Lima, and as many in the provinces. There are six street gasoline pumps in the capital, and eight, possibly more, small stores where gasoline, oil, grease, accessories, and in some cases, tires are sold.

## BULLETINS

NEW YORK, Nov. 17.—The Seiberling Rubber Co. with a capital of \$55,000,000 has been chartered in Delaware. The principal figure in the company will be F. A. Seiberling, former president of the Goodyear Tire & Rubber Co., who is now building up a chain of small tire plants. The Delaware company will act as a holding corporation for these various enterprises.

DETROIT, Nov. 17.—Announcement is made by the Paige-Detroit Motor Car Co. that Paige dealers will be able to offer a car in the light car field early in 1922. It is stated that plans are so far advanced that the new car can be shown at the New York and Chicago shows although no information has been made public as to specifications or price.

LANSING, Nov. 17.—Quantity production will be started at the Lansing plant of the Durant Motor Co. of Michigan on Dec. 20. It is proposed to turn out 4000 cars by March 1. The work of equipping the plant is being hurried to have everything in readiness by Dec. 20.

### UTAH SUBMITS NEW PLAN

SALT LAKE CITY, Nov. 15.—Bonding company representatives, in accordance with an agreement reached several months ago, have submitted to the commissioner of insurance a new form of policy which, although it is not so broad in its scope as the one which was declared unlawful and non-enforceable by the attorney-general, will still protect innocent parties holding title in a car that may be confiscated through its driver's illegal operations in the liquor traffic.

### DUESENBERG PRODUCING

NEW YORK, Nov. 14.—Duesenberg Automobile & Motors Co., Inc., Indianapolis, Ind., is now in production and delivering cars. It will exhibit at the New York Automobile Salon, to be held at the Commodore Hotel from Nov. 27 to Dec. 3, at which time it expects to appoint its distributor for the Metropolitan district.

### INDORSE SHEPPARD BILL

CHICAGO, Nov. 15.—United States Senator Sheppard's bill to encourage highway motor transportation was indorsed at a meeting here of the executive committee of the Shippers' Warehousing and Distributing Association, comprising traffic representatives of some of the leading manufacturing companies of the country.

## Sees Enclosed Cars as French Favorite

Prediction Also Made That Great  
Market Will Be for  
Small Makes

NEW YORK CITY, Nov. 15.—Henri Depasse, Studebaker representative for France and the French colonies in northern Africa, has arrived in New York with the shipment of \$1,500,000 worth of parts of American motor trucks secured from the American Expeditionary Force camp at Langres, which he will try to sell in this country. Depasse has represented American cars since 1907, when he was Ford representative, up to the present. He considers the sedan or other enclosed types the car of the future in France notwithstanding the favor with which the open type has been held for so many years.

The greatest movement in the automobile industry in France is the development of the small car which was pioneered by Citroen immediately after the armistice. At that time the older French companies openly manifested great opposition to the Citroen organization. Today Citroen is recognized and is in a class by himself in this field.

Recently eleven different French concerns have entered the small car field, and practically all of these makers are unknown in the French manufacturing field. Some of them are stable, well-financed organizations and should prove permanent factors in the industry, while others are not. With gasoline selling at a high price there are many automobiles in France not in use because of the fuel cost.

DePasse believes there is a great market in France for the small car as France to-day has relatively few automobiles in ratio to her population. The low-priced automobile is selling to the farming community and its field is broadening proportionately. To-day the three factors working against the sale of American automobiles in France are exchange, import duty and the price of gasoline.

## N. A. C. C. Seeks Dealer Suggestions for Shows

NEW YORK, Nov. 10.—Considerable attention was given by the directors of the National Automobile Chamber of Commerce at their last meeting to the big shows this year, and it was made plain by them that they would welcome suggestions by dealers as to how the above shows could be made more helpful in promoting the sale of cars and assisting dealers.

The N. A. C. C. is seeking a keynote for the advertising which will be used in connection with the expositions this year. The suggestion has been made that it might be advisable to arrange dinners for the dealers who attend the New York and Chicago shows, but there is a feeling that this would do little to advance the sale of cars.

## Economy Considered In Purchase of Car

Survey Is Made by Dealers Association Among 100 Representative Owners

ST. LOUIS, Nov. 15—Manufacturers could expand the medium priced motor car buying field by impressing upon the prospect that it does not "cost a small fortune to keep that kind of a car," according to the analysis by the National Automobile Dealers Association of a number of inquiries recently sent to buyers. Economy was a prevailing consideration in the purchase of the car. Inquiries were sent to 100 car owners who were divided into ten purchasers from each of ten dealers.

The inquiries as sent out by General Manager Harry Mook of the N. A. D. A. developed some rather interesting things that the dealers could do also to sell more motor vehicles. A number suggested that cars were too much misrepresented by salesmen. Then, the sales manager and the salesmen should agree on what representations are to be made by the salesmen. Some sales were lost because the salesman's story was out of line with the house policy.

Some dealers are still too independent, this questionnaire reveals. Courtesy to the customer was stressed by all the buyers as being much needed among the salesmen in the trade. The salesman should get the prospect behind the wheel.

### Price Cut Not Considered

Some of the salient facts developed by the questionnaire were that 20 per cent of the cars purchased were enclosed models. The purchaser disposed of a used car that on the average was 28 months old which he had driven on an average of 19 months for 17,159 miles.

In purchasing a car the reputation of the dealer influenced 50 per cent in the purchase. In two-thirds of the cases the reputation of the manufacturer was an influence.

Comfort and convenience was a consideration among 75 per cent, possession of the same make of car by friends a consideration in 40 per cent, personal friendship with the dealer or salesman a factor with 20 per cent, and trade-in allowance on a used car with 35 per cent.

A rather unexpected angle to the price situation was brought out in the answer to the following question, "Motor car prices are lower now than for many months. Did price reductions help you to decide to buy now?" Seventy-five per cent said price reductions had nothing to do with it.

### SALEM RUBBER FORMED

SALEM, OHIO, Nov. 14—Salem Rubber Co. has been organized with a capital stock of \$250,000 to operate the plant of the Porter Rubber Co. in this city in the manufacture of cord and fabric tires. E. A. Tinman, Willoughby, formerly of

the Portage Rubber Co., Akron, is president. W. H. Sabol, Niles, president of the Niles Rubber Co., has been elected vice-president J. Schwab, Philadelphia, president of the Philadelphia Motor Tire Co., treasurer, and Grant Hill, Salem, general manager of the Porter Rubber Co., secretary. New machinery will be installed for a daily production of 250 tires.

## More Manufacturers to Drop Distributors

(Continued from page 987)

The feeling is becoming apparent that so far as passenger cars are concerned, sales for 1922 will not exceed those of 1921, which has been a much better year than had been expected. Some car makers believe that there may be a temporary shortage of cars in the spring because of the refusal of dealers to stock heavily and the determination of manufacturers to build only enough cars to meet immediate needs. There will be few manufacturers who will store cars in warehouses this winter.

Passenger car manufacturers have no illusions about the difficult position of the dealers. They do not expect bankers to look with favor upon the stocking of automobiles very far beyond immediate requirements. Many dealers are going out of business, and some distributors who have not shown a profit for the past year expect to discontinue their lines. As a consequence there probably will be reduced selling representation during the next year, not only in numbers but in quality, and this is one of the problems which the industry is facing. The result will be competition for the dealers who remain in the field and the education of new men.

These conditions probably will bring about an attitude of greater independence on the part of dealers who remain in business because they realize that they will have little difficulty in obtaining satisfactory lines. Most of them hope that manufacturers will curtail production for the next few months so that there will be a temporary shortage in the spring. They believe that this would do much to clean up the surplus of used cars now on the market. They blame over-production by manufacturers for much of this trouble. Much of their money is tied up in used cars.

### SEEKS LA CHANCE'S REMOVAL

NEW YORK, Nov. 15—Mrs. Robert B. Honeyman, Jr., daughter of the late John K. Stewart, founder of the Stewart Mfg. Co. and the Stewart-Warner Speedometer Corp. of Chicago, has asked the Surrogate Court to remove her uncle, Leander H. LaChance of Chicago, as administrator of her father's estate. She alleges that her uncle and Martin Taylor, a New York attorney, have mismanaged the estate to their own advantage and that her uncle has caused himself to be elected president of the two companies founded by her father. Her allegations are flatly denied by LaChance.

## Road Act Is Help To Every Industry

Completion of New Highways Will  
Tend to Increase Automobile Sales

WASHINGTON, Nov. 15—Enactment of the Federal Highway Act will be of great economic benefit to all lines of industry, according to opinions expressed in Government circles. The President's conference on unemployment made public a statement showing that 6262 miles of new roads will be built, giving employment to more than 150,000 workers in 30 States. The completion of these roads will naturally have a tendency to increase automobile sales in the territories where sales have been restricted by inadequate highway facilities.

What the new appropriation will mean to the country can be judged by the use of the \$275,000,000 previously appropriated, according to the Department of Agriculture. Practically \$200,000,000 of that money has been put to work in projects which are either entirely completed or now under construction. The exact amount was \$199,823,427 on Oct. 31. To match this amount the States have appropriated \$265,529,090.

### Apportionment Little Changed

It is estimated by the Bureau of Public Roads that the Federal aid roads under construction on Oct. 31 were giving employment to about 250,000 men, either directly on the actual road construction or indirectly in the production and transportation of materials used.

Apportionment of the fund to the States is almost the same as in the previous act, the fund being divided into three parts, one part apportioned according to population, one according to area and the third according to mileage of rural and star mail routes. A new feature is the stipulation that no State shall receive less than one-half of one per cent of the total fund which, in this case, amounts to \$365,625. This stipulation will increase the amount received by four of the smaller States, i.e., Delaware, New Hampshire, Rhode Island and Vermont.

## Ford Shipments Totaled 87,947 During October

DETROIT, Nov. 15—Revised figures on total Ford shipments for October give a total of 87,947, closely approaching the 90,000 schedule set for the month. Early November shipments are continuing high and business is expected to approximate closely the October total.

Foreign trade conditions continue to show improvement. The Manchester, England, plant is turning out over 100 cars and trucks daily. The Copenhagen plant is building approximately 700 cars monthly. Shipments of 2100 cars and trucks were made to the Buenos Aires plant in September and 1650 in October.

## Tire Prices Drop To Lowest Levels

United States, Syracuse and Keystone Follow Action of Other Companies

(Continued from page 992)

NEW YORK, Nov. 14—A reduction in prices on its full line of tires, including cords and fabrics for passenger cars and solid and pneumatic tires for trucks, has been announced by the United States Rubber Co. The reduction cannot be calculated on a percentage basis because the prices vary according to type.

The 30 x 3½ fabric casing has been reduced to \$10.90 from \$15.75. This heavy cut is said to bring the price of this size lower than it ever has been made by any one of the "big four." It is stated that the announcement of the reduction is made at this time to aid dealers in making their plans for 1922. The new prices, which became effective Nov. 11, will extend to tire purchasers throughout the country.

### Syra Cords Lower

SYRACUSE, Nov. 15—Syracuse Rubber Co., Inc., manufacturer of Syrac Cord tires, has announced, effective today, a 20 per cent reduction on its cord casings; 20 per cent on its fabric 30 x 3½ special five ply; and 10 per cent on its cord truck casings, fabric regular casings and cord tubes. The reductions are from the price list of Sept. 1, 1921. The company has added a 30 x 3 fabric tire to its line.

### Keystone Meets Goodyear

NEW YORK, Nov. 15—Reductions which bring prices of its product identical with those of the Goodyear Tire & Rubber Co. have been made by the Keystone Tire & Rubber Co., effective immediately.

### NEW TIRE FOR GOODRICH

AKRON, Nov. 17—While official confirmation is lacking, it is understood that the B. F. Goodrich Rubber Co. soon will bring out a new low priced tire to be called the "Black Diamond." It is reported that the price for the 30 x 3½ size will be about \$10.60.

### SIGNAL TRUCK REDUCED

DETROIT, Nov. 16—M. B. Hoagland, representing the reorganized Signal Motor Truck Co., announces price reductions on the Signal line ranging from \$400 to \$900. The prices follow:

	Old Price	New Price
1 ton.....	\$2,475	\$1,950
1½ ton.....	2,925	2,450
2½ ton.....	3,275	2,875
3½ ton.....	4,275	3,675
5 ton.....	5,300	4,400

It is stated that the company will make no change in the construction of the trucks. Incorporation papers will soon be filed at Lansing after which officers and directors will be elected.

## ACCESSORIES BOUGHT WITH FARM PRODUCTS

ATLANTA, Nov. 15—A co-operative crop marketing plan to assist Georgia farmers in disposing of this year's crops was launched by the Atlanta branch of the Ford Motor Co. at a meeting of the district salesmen.

Under this plan authorized Ford dealers throughout the State will either purchase diversified products from the farmers direct, or sponsor the organization of buying groups for this purpose in their respective communities, with the co-operation of the State Bureau of Markets.

In addition to this plan, all dealers have been authorized to accept as payment for automobile parts and accessories at current market prices, any diversified farm products.

## Burke Sells Sheridan Holdings to Durant

MUNCIE, IND., Nov. 17—D. A. Burke, who purchased the Sheridan Motor Car Co. from the General Motors Corp. with W. C. Durant and associates a few months ago, has sold the major portion of his holdings to the Durant Motor Co. of Indiana. He will continue, however, to be a stockholder in the Indiana company and also in Durant Motors, Inc. There will be no severance of his relations with Durant and it is understood that he soon will accept a high position in the parent Durant organization in New York. The Sheridan car was designed by Burke when Durant was president of General Motors.

### ASKS MICHIGAN APPROVAL

NEW YORK, Nov. 17—The Durant Motor Co. of Michigan has applied to the Michigan Securities Commission for approval of its \$5,000,000 capital stock. Of the total capitalization it is reported that W. C. Durant held \$1,300,000 and the other directors \$1,000 each. The assets of the company are listed at \$1,499,258.

### PATERSON POLICIES UNCHANGED

FLINT, MICH., Nov. 15—Announcement is made by W. S. Paterson, president of the W. A. Paterson Co., maker of the Paterson car, that the recent death of W. A. Paterson will in no way alter the policies of this company.

### AUSTIN FINANCED

LONDON, Nov. 4 (By Mail)—It is a satisfactory sign of the upward trend of the automobile trade here that this week the court has approved a settlement of the affairs of the Harper Bean Car Co. It is also stated that a financier has been found to take up £200,000 10 per cent debentures in the Austin Co.

## METAL MARKETS

WHILE the pig iron and steel markets present a rather uninteresting appearance the aluminum situation shows developments of importance to the automotive industries. The sole domestic producer of aluminum, never given to the blowing of trumpets in matters affecting sales policy, has apparently determined to meet all foreign contestants for desirable business and obviously will not permit price to stand in the way of a continuance of relations with those automotive consumers whose aluminum requirements are quantitatively or qualitatively important.

Amid the conditions that prevail in the aluminum market as the result of cheap offerings of foreign metal, made possible by the continuing abnormality of exchange, and postponement of tariff legislation, expediency dictates the course pursued by the domestic producer which apparently consists of judging each inquiry and order upon its individual desirability and determining price on that basis as a means of maintaining the home market. Stocks of foreign aluminum ingots in the United States are roughly estimated at 10,000 tons.

Certain it is, however, that the tonnage of foreign aluminum now in this country will continue to act as a depressing market factor over many months to come, unless artificial measures are resorted to so as to take most of this metal off the market. Rumor has it that Detroit banking interests took 2000 tons of foreign ingots at 18c. a lb. and are holding the metal for the accommodation of a group of consumers who will draw from this warehouse stock whatever tonnages their operating schedules call for and who are thus relieved of the financial burden of carrying this stock on their own account.

The British aluminum interests are not taking any part in the price slashing contest. They have built up a certain steady trade in the United States and are more concerned about conserving this than about quick liquidation or accumulations. The Swiss and Norwegian producers also refuse to meet the prices named by some of the German and French interests. Amid this international skirmish for American dollars in exchange for foreign aluminum the American producer is no longer permitting grass to grow under his feet, but has seemingly taken what may be characterized as the aggressive defensive when it comes to worthwhile business.

Pig Iron.—The market rules quiet with little probability of incisive changes in its tone over the remainder of the year.

Steel.—No change in conditions is visible. All automotive steels are nominally unchanged in price and the movement continues to be chiefly a hand-to-mouth affair. In sheet prices there continue to be sellers who are ready to make concessions.

Aluminum.—The market for aluminum sheets has turned more active. Foreign sellers name slightly higher asking prices, undoubtedly in response to cables advising stronger sheet markets abroad. Swiss interests are reported to have received an order for 100,000 lbs. of flat sheets at a price supposed to be below 30c.

Copper.—Brass mills are reported to be buying more freely as the result of augmented operations which have now reached one-half to two-thirds of capacity. Most consumers refuse to pay more than 13c. and, if producers will not sell at that level, prefer to await further developments.

## INDUSTRIAL NOTES

**American Tractor & Harvester Co.**, Stuttgart, Ark., has perfected a transmission for transmitting power from the motor of Fordson and other tractors to operate the mechanism of binders and other harvesters. The device consists of five cog wheels with appropriate housing to attach to the rear of a tractor, with a telescoping shaft extending to the binder. The device transmits power to the binder while making short turns, crossing levees, etc. The device is used in the Arkansas rice fields.

**Speedway Engineering Co.**, which has been engaged in the manufacture of valve head, parts and accessories for automobiles, has been incorporated for \$100,000. Plans have been made for expansion and the moving of the concern to larger quarters where production on an increased scale will be undertaken. The directors consist of Rufus E. Welborn, Herbert C. Welborn and Wilbert C. Hunt. The company succeeds the Craig-Hunt Co., which met financial difficulties.

**International Motor Co.** reports that deliveries of its trucks to customers for the first nine months of 1921 were at the rate of 70 per cent of its best previous year. Orders for October were better than for any month since May, and November thus far is as good as October. The company had expected in the third quarter to recover probably two-thirds of its losses for July and August, but the three months showed an actual operating profit in excess of \$12,000.

**International Wheel & Rim Co. of Canada, Ltd.**, has been incorporated under Dominion of Canada charter with Joseph M. Crenan as president and general manager, with temporary headquarters at Toronto. Arrangements have been made that insure production within sixty days of Culp-Crenan steel disc wheels and Culp demountable rims. Associated with Crenan is a syndicate of Toronto and Hamilton capitalists.

**Horrocks Rubber Co.**, incorporated for \$50,000, has been organized by Arthur C. Horrocks, formerly education director at the head of the Goodyear Industrial University in Akron. Horrocks has leased the plant of the Denmead Tire Co., in East Akron, and has started on production of tubes and tire accessories.

**Pre-Selex Gear Shift Corp.** has opened a Detroit office in charge of Franklin A. Miller, vice-president. All sales and advertising work will be handled from this office. The new gear shift is being studied by engineers in a number of leading factories in the Detroit district.

**Kendell Engineering Co.**, Fort Wayne, has been organized by C. A. and R. L. Kendell, formerly connected with the Chopla Piston Ring Co. of Detroit and Auburn, Ind., to manufacture piston rings.

**Steam & Gas Auto Co.**, Birmingham, has changed its name to the McCormack Brothers Motor Car Co., Inc., and has increased its capital stock to \$56,000.

## Gary Truck Acquires Chase Tractor Assets

TORONTO, Nov. 14—Chase Tractors Corp., which has a modern plant in this city, has sold its assets to the Canadian Gary Truck Co., a subsidiary of the Gary Truck Co. of Indiana. The consideration is said to be in the neighborhood of \$1,400,000 although the payment is not all in cash.

The Canadian Gary company will have an authorized capital of \$4,500,000, of which \$500,000 preferred is soon to be offered. The price of the property is given as \$750,000. It is proposed to exchange securities with present shareholders of Chase Tractors on a basis of one share of Canadian Gary, pfd., and a bonus of 50 per cent of common for each share of Chase, pfd.

It is expected that the new corporation will manufacture Chase tractors as well as Gary trucks.

## Underwriters Adopt Limited Endorsements

NEW YORK, Nov. 15—The Western Automobile Underwriters' Conference has voted to put into effect to-day a limited coverage, endorsement and a theft limitation endorsement for Cleveland and Cuyahoga County, Ohio. These endorsements are made mandatory, one or the other but not both, and the rates are reduced 20 per cent for such limitation. They provide that the company shall not be liable for an amount greater than 80 per cent of any actual loss or damage sustained.

The Western conference also has adopted a form of limited theft cover to be applied in Chicago and Cook County, Ill. This is to be effective to-day, and is in the form of an endorsement limiting the percentage of liability for loss from 75 to 95 per cent, according to list prices of cars insured. For the use of the limited cover a credit of 50 per cent of the theft rate is to be allowed on classes of cars where the 75 to 85 per cent limit is to be used.

## Non-Competitors Form Body for Foreign Trade

LANSING, Nov. 14—Associated Machinery Corp. has been formed by Novo Engine Co., this city, Pawling & Harnischfeger Co. and Chain Belt Co., Milwaukee, and the Insley Mfg. Co., Indianapolis, for the purpose of promoting foreign trade.

Each of the companies produces non-competing products and by handling them in conjunction with each other economies are made possible. Equal shares in the stock of the company are held by each member. The officers are Henry Harnischfeger, president; Clarence E. Bement, vice-president, and Clifford F. Messenger, secretary and treasurer. Lionel R. Vinall-Moon is managing director in India and Charles L. Langlotz manager of the New York office.

## STOUGHTON PLANT BURNS

STOUGHTON, WIS., Nov. 16—Twenty complete trucks and the truck plant of the Stoughton Wagon Co. were destroyed yesterday by a fire which for a time threatened a part of the town. The damage is estimated at nearly \$400,000. The fire is believed to have started when one of the workmen passed too close to a tank of gasoline with a lighted acetylene torch.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

Although the general trend of the money market for the last few weeks has been downward, during the past week, in which there were two holidays, call money, ranging from 5 per cent to 6 per cent as against 4½ per cent to 6 per cent in the previous week, was higher than was expected in some quarters.

Sixty and ninety-day maturities were quoted at 5 per cent to 5½ per cent; four and five months' maturities at 5½ per cent, and six months' maturities at 5½ per cent to 5¾ per cent as against 5 per cent for sixty-day paper, and a range of 5¼ per cent to 5½ per cent for the longer maturities up to six months in the previous week. Prime commercial paper remained unchanged at 5 per cent to 5½ per cent.

The New York Reserve showed a decrease of \$34,691,000 in total reserves, which was largely accounted for by a reduction of \$34,571,000 in total gold reserves. Total earning assets increased \$65,964,000. The ratio of total reserves to deposit and Federal Reserve note liabilities combined decreased from 83.1 per cent to 79.9 per cent, while the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, decreased from 136 per cent to 128.1 per cent.

An important announcement of the past week was that made in the British Parliament that Great Britain is about to resume interest payments on its debt to the United States Treasury. This annual interest charge will be about \$50,000,000 besides the accumulated interest amounting to \$500,000,000.

The report of the foreign trade of the United States for the month of October showed that exports increased by approximately \$21,000,000, while imports gained about \$4,000,000 as compared with the previous month. The total of October exports was \$346,000,000 as compared with \$325,000,000 in September, while October imports amounted to \$183,000,000 as against \$179,283,000 for September. The excess of gold imports at \$39,558,265 compared with \$64,066,492 in the month of September and was the lowest for any month since January. The Official Crop Report of the United States for Nov. 1 indicated that the harvests of all the leading crops are less than for 1920, an aggregate loss of fully 640,000,000 bushels as compared with a year ago being reported.

## BUS SERVICE IN SPOKANE

LANSING, Nov. 16—The Olds Motor Works has received an order from the city of Spokane for 16 Oldsmobile truck chassis. The trucks will be shipped at once and will be used by the city as the nucleus of a municipal bus service which will aid in facilitating the handling of passenger traffic within the city.

## MEN OF THE INDUSTRY

Clyde P. Brewster, active in the automotive industry from its early days, has been elected vice-president and general manager of the Express Spark Plug Co., of Alexandria, Va. He started in 1905 as branch manager of the Jones Speedometer Co. of Chicago and in 1911 became Philadelphia branch manager of the Stewart-Warner Speedometer Corp. Four years later he joined the Edward A. Cassidy Co., Inc., of New York, as district representative, soon being appointed Detroit branch manager. Following the war he became associated with the Lyons Storage Battery Co., Philadelphia, of which he became sales manager in 1920.

Clifton Slusser, superintendent of the Goodyear California Co., has been transferred to the Akron Goodyear factories to assist vice-president and factory manager Paul Litchfield, in revision of staff department personnel. Harry Blythe, personnel director at Akron has been assigned to California in Slusser's place. Whether the change is to be permanent, has not been announced.

F. L. Ryan has been appointed Pacific Coast manager of The India Tire & Rubber Co. of California, distributing branch of The India Tire & Rubber Co. of Akron. Ryan was at one time manager of the Sacramento branch of the B. F. Goodrich Co. and later was sales manager of the Goodrich Los Angeles branch. He will make his headquarters in San Francisco.

Robert G. Elwell, formerly general manager of sales and advertising for the Allen Motor Car Co., Columbus, has become assistant sales manager of the Auburn Automobile Co., Auburn, Ind., and will share in the work of Charles M. Strieby, also assistant sales manager. Elwell will look after merchandising and advertising.

Keith Lindsay Morgan, formerly with the Colt-Stratton Co. and later with the Kelsey Motor Co., is now associated with Wilson K. Farrington, New York, and will specialize in direct mail advertising, particularly as it can be applied to the selling of such products as motor cars, trucks, tractors, equipment and machinery of all kinds.

Truman Berry and Charles Sanderson, Whittier, Calif., have been elected to the board of directors of the Leach Motor Car Co. of Los Angeles to fill vacancies. Berry has been allotted distributor's territory in Orange county, California, and vicinity for the Leach Biltwell car.

Henry M. Lewis, formerly sales engineer with the Hyatt Roller Bearing Co. has joined the Klaxon sales organization with territory covering the eastern territory, including New York, Pennsylvania, Delaware, New Jersey, Maryland and the District of Columbia.

James M. Clarke, sales manager of the National Motor Car Co., Indianapolis, has resigned and moved to Boston where he has taken an interest in the company handling the National and the Earl Motors product for New England.

George B. Hendrick, publicity manager for the Fisk Rubber Co., has been elected vice-president of the Massachusetts Chamber of Commerce and will give his entire time to that work.

William W. Shepherd who for 15 years has been in the automobile advertising field, has joined the Class Journal Co. He will make his headquarters in Chicago.

William H. Edwards, formerly collector of internal revenue in New York City, has been

elected a director of the Keystone Tire & Rubber Co.

C. A. Engelman has been appointed assistant sales manager of the New Era Spring & Specialty Co., Grand Rapids.

E. H. Fitch, formerly with the Goodrich Tire & Rubber Co., has been appointed manager of the Republic Rubber Corp.

Thompson Auto Co., Detroit, distributor of Maxwell and Chalmers, will also distribute the Rolls-Royce in that territory.

A. R. Erskine has been elected president of the Board of Lay Trustees of the University of Notre Dame, succeeding Dr. William P. Breen.

Higher Priced Cars Gain  
in New York Territory

NEW YORK, Nov. 15—Registrations of new passenger cars in the metropolitan district fell off in October 404 from the September record. Figures just compiled by Sherlock & Arnold, publishers for dealers of the *Automobile Sales Analysis*, show a gain in higher priced cars, of which 426 were registered in October, to 331 in September, but the medium and low priced registrations dropped off from 4004 to 3595. The totals were 4334 in September and 3931 in October.

The high month of the year was June, with 7017 registrations.

The figures are for ten counties in and around New York City.

The summary of the year, to date, follows:

	Approximately below \$2,500	Approximately above \$2,500	Total
January .....	483	146	629
February .....	1,409	210	1,619
March .....	3,396	488	3,884
April .....	4,811	575	5,382
May .....	5,468	584	6,052
June .....	6,522	495	7,017
July .....	5,457	386	5,843
August .....	4,216	350	4,566
September .....	4,004	331	4,335
October .....	3,505	426	3,931
Total to date .....	39,307	3,990	43,297

Treasury Extends Time  
to File Amended Returns

WASHINGTON, Nov. 16—Extension of the time for filing amended returns in cases in which appreciated or inflated values have been used in determining invested capital will undoubtedly prove a boon to automobile manufacturers and dealers. Secretary of the Treasury Mellon has extended the time for filing amended returns and making payments of additional taxes due Jan. 15, 1922.

Under the provisions of Treasury Decision 3240, tax payers who had included appreciations in their income and profits taxes for 1917 and subsequent years were required to file amended returns within ninety days and pay the additional taxes. There were many appeals from the automobile industry to the effect that it would be impossible to make payments at this time. In some cases the additional amount due the Government exceeded \$100,000 and it was manifestly impossible to raise this cash by Nov. 24.

## FINANCIAL NOTES

Stewart-Warner Speedometer Corp. in a comparative balance sheet as of Sept. 30 shows assets of \$23,385,353, as compared with \$21,321,226 Dec. 31, 1920. Cash on hand on the former date amounted to \$1,014,169, as against \$32,854 on the latter date. Notes and accounts receivable were \$1,693,640, compared with \$1,528,648 Dec. 31. Inventories on Sept. 30 totaled \$2,671,446, as against \$3,998,697. Among the current liabilities accounts and vouchers payable on the September date were \$187,791, and on the last of the year \$312,407. The surplus Sept. 30 was \$7,961,124 and on Dec. 31 \$8,041,938. On the former date the net assets applicable to the 473,815 shares (no par) of capital stock amounted to \$10,953,050, or \$23.12 per share, after deducting patents, trademarks, good-will, etc., carried at \$9,439,124, or \$19.92 per share.

Federal Motor Truck Co. sales were \$400,000 in October. Third quarter shipments were 35 per cent greater than second quarter shipments and the final quarter of 1921, based on the October record, is expected to be twice the total sales during the second quarter. A comparison of the company's condition Nov. 1, 1921, with Dec. 31, 1920, shows that on the former date assets totaled \$3,695,767 and on the latter \$4,525,340. Cash and securities on Nov. 1 were \$288,876 and on Dec. 31 \$355,798; accounts receivable on the former date \$270,866 and on the latter \$228,310. Among the liabilities, notes and acceptances Nov. 1 amounted to nothing and on Dec. 31 \$352,734, while accounts payable on the date this year were \$63,046 and none on last year's date. The surplus on Nov. 1 was \$778,732 and on Dec. 31 \$806,812.

Kelsey Wheel Co. has been operating close to capacity since June and indications are that high schedules will be maintained through the balance of the year. Since operations in the first half were not greatly curtailed, it is likely that earnings for the full twelve months of this year will exceed last year's record net profits of \$1,916,000, which, after charges and preferred dividends, were equal to \$17.25 a share on the \$10,000,000 common stock outstanding. It is estimated that directors will consider an initial dividend on the common stock in the near future.

Reynolds Spring Co. has declared a quarterly dividend of one and three-fourths per cent on its preferred A stock, payable Dec. 31, to stockholders of record at the close of business on Dec. 22, 1921.

Wayne Oil Tank & Pump Co., Fort Wayne, has issued its ninety-first common stock dividend.

Bill to Prevent Seizure  
of Cars Delayed in House

WASHINGTON, Nov. 16—Filibusters against the Willis-Campbell anti-beer bill in the Senate have delayed the enactment by the House of the Dial bill, which is of particular interest to automobile dealers as it provides for the protection of their equity in motor vehicles in the event of seizure for illegal transportation of alcoholic beverages. The Dial bill was passed by the Senate several months ago. It provides that an innocent party to a seizure for bootlegging should not lose whatever equity is involved in the car.



# Calendar

## SHOWS

- Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.
- Nov. 27-Dec. 2—New York, Automobile Salon, Hotel Commodore.
- Jan. 28-Feb. 4—Chicago, Automobile Salon, Hotel Drake.
- Jan. 7-12—New York, National Automobile Show, Madison Square Garden, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 23-Feb. 4—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.
- Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.
- Feb. 6 to 11—Winnipeg, Can. Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

- Nov. 12-27—Buenos Aires, Annual Motor Show, La Pabellon de las Sosas, Automovil Club Argentino.
- Nov. 26-Dec. 3—Shanghai, China, Automobile Show.
- Nov. 28-Dec. 3—London, Motorcycle Show.
- Dec. 3-14—Brussels, Belgian International Automobile Show.
- March, 1922—Santiago, Chili, Annual Automobile Show.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.
- Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the

Brazilian Centenary Association Automobillista Brasileira.

## CONVENTIONS

- Nov. 14-19—Chicago, Annual Meeting and Business Exhibit of Automotive Equipment Association.
- Nov. 21-23—Atlanta, Third Annual Convention of American Farm Bureau Federation.
- Dec. 6-8—Chicago, Second Annual Meeting of American Petroleum Institute.
- Dec. 10—New York, American Institute of Mining and Metallurgical Engineers.
- Dec. 20—Philadelphia, American Society of Mechanical Engineers.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.
- Jan. 17-20, 1922—Chicago, American Road Builders Association.

Jan. 30-31—Chicago, Fifth Annual Convention, N. A. D. A., La Salle Hotel.

Jan. 30-Feb. 2—Boston, Sixth Annual Conference of the International Delivery Association, Copley Plaza Hotel.

June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

- Detroit, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.
- New York, Jan. 11-14, 1922—Annual Meeting.
- Chicago, Feb. 1
- Minneapolis, Feb. 8—Tractor Meeting.

## Railroad Replaces Trains With Buses

### California Company Will Operate Over Routes Where Tracks Are Laid

SAN FRANCISCO, Nov. 16—The Pajaro Valley Railroad Co., operating between Spreckels and Salinas, has entered the motor bus field in an attempt to replenish its treasury and to make up for some of the losses suffered in competition with motor bus and motor truck lines in that section.

With the granting by the California State Railroad Commission of permission to operate motor buses instead of certain trains over its lines, the Pajaro Valley Railroad becomes the first rail line in the State to enter the field of automotive vehicle operation.

At the hearing on its application for permission to substitute motor buses for certain of its trains, the railroad company's representatives showed that it is and has been for some time losing money, and that the operation of these motor passenger vehicles would replenish the treasury. Accordingly, permission to operate passenger, express and freight service by motor cars was granted to the company, on condition that the same rates charged for train service should apply to the automobile service.

A few permits have been granted in California to operate motor bus and truck lines as auxiliaries to the regular rail service, but never before to operate them over routes where tracks had been laid, and over which regular train service was to be discontinued in favor of the motor service.

## HINKLEY INCORPORATES

DETROIT, Nov. 15—Incorporation papers have been filed by Hinkley Motors, Inc., which will take over all the

assets of the Hinkley Motors Corp. which were sold by the trustee on Nov. 2. The new corporation has taken a long lease on the recently completed Hinkley plant in Ecorse and will begin production of Hinkley motors immediately. The board of directors is composed of C. C. Hinkley, president; Leon Alvarez, vice-president and secretary; Henry M. Butzel, treasurer; Fred J. Fisher, Charles T. Fisher, Louis Mendelsohn and Aaron Mendelsohn.

## Commercial Car Added To Line of Dort Motors

FLINT, Nov. 15—The Dort Motor Car Co. has added a commercial car to its line, the same to be placed on the passenger car chassis with heavier springs.

The new model is built to carry 1000 lb. and is offered as a chassis with lamps, lamp brackets, front fenders, running boards, radiator, hood, windshield, seat frame, cowl board and body to rear of front seat at \$685; with driver's cab and curtains added, \$715; with cab, curtains and all-steel express body, \$780, and with cab, curtains, express body and canopy top at \$825, all f.o.b. factory.

## To Move North American Factory to Springfield

SPRINGFIELD, MASS., Nov. 14—Tire factories in this district are operating at capacity. The Adirondack Tire Tube Co., which plans to absorb the North American Process Co., purposes to move the production of the last-named company's tires from Malone, N. Y., to Springfield.

Paramount Rubber, Consolidated, which holds important patents on seamless rubber goods, is considering a proposal to unite with the two concerns named in building a plant here. Construction plans, as discussed in conference here, call for a factory of about 75,000 feet floor space.

## Dallas Is Expecting November Increase

### All Automotive Lines Share in Improvement During Past Month

DALLAS, Nov. 15—More than 950 automobiles were sold by Dallas retailers during the month of October, of which number more than 800 were new cars. The value of the business done was approximately \$1,275,000. The business transacted by the wholesale dealers, according to the best figures available for the month, was about twice that of the retailers. October sales included more than 100 cars sold at more than \$3,000 and between 50 and 75 selling at from \$3,500 up.

The retail automobile dealers are of the opinion that actual sales for November will equal or surpass those of October. At present the indications are there will be a 10 per cent increase in the retail sales during this month.

The October truck business showed an increase, dealers say, and add that indications are that November sales will be still better.

Automobile dealers and farm implement concerns handling tractors declare the October business in that line was much better than that of the preceding month. They claim the sales thus far in November are exceeding those of October. No figures were available for the actual number of tractors sold by Dallas dealers during the month of October.

## HUNT JOINS CHEVROLET

DETROIT, Nov. 16—O. E. Hunt has been appointed chief engineer of the Chevrolet Motor Co. He will have general supervision of engineering in all Chevrolet plants. Hunt formerly was connected with Packard and Hares Motors.



# AUTOMOTIVE INDUSTRIES

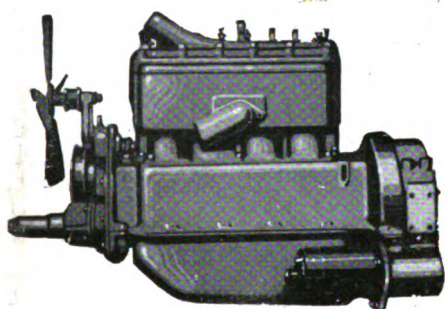
## The AUTOMOBILE

Vol. XLV  
Number 21

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, NOVEMBER 24, 1921

Thirty-five cents a copy  
Three dollars a year

### The Best Proof of the Four Cylinder Motor Is Its Place in the Truck Field



Trucks are now actually doing 15% of the total land haulage of the country. This is a splendid tribute to the four-cylinder engine, since fully 94% of all truck models are equipped with four-cylinder motors.

To be profitable, truck performance must be as nearly uninterrupted as possible; it must entail low maintenance and must be economical of

gasoline, oil and tires.

The importance of the engine is paramount. It must be steady and powerful, simple of construction and well made to endure in truck service.

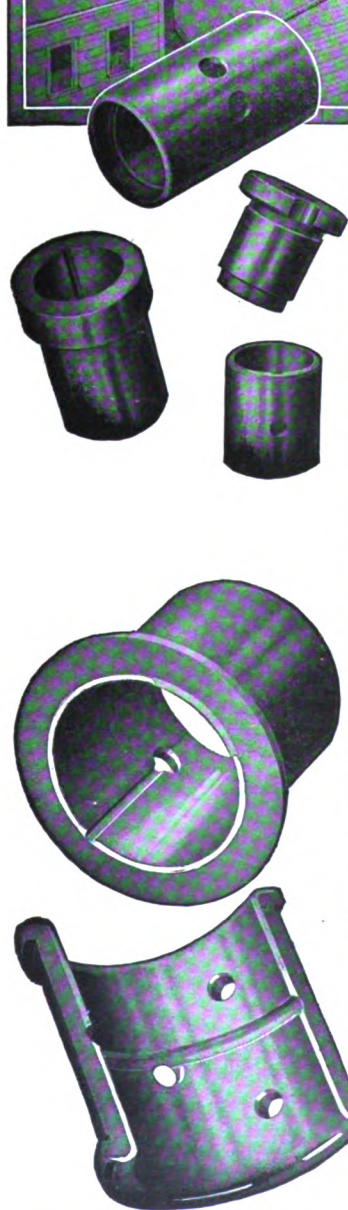
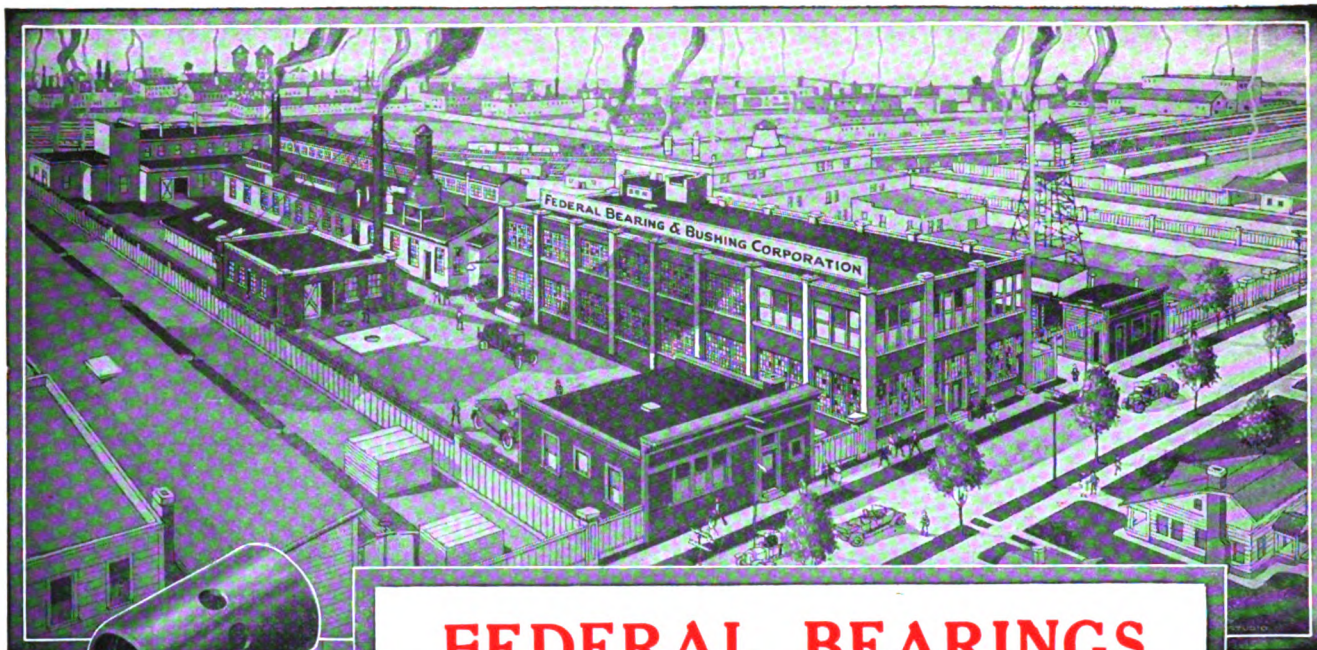
Particularly is this true in the speed-truck, where in addition to load, it must cover the ground quickly.

The Lycoming Motor has a well established place in the speed-truck field, because its sturdiness, its dependability and its ability to give consistent service under all reasonable conditions have made of it an equipment asset to both manufacturer and owner of a speed-truck. Write for booklet describing Model "KB" and giving specifications.

**LYCOMING MOTORS CORPORATION**  
Williamsport, Pa.







## FEDERAL BEARINGS

### UNIFORMITY

The Babbitt lining in every Federal Bearing shows the same tough, fine-grained, homogeneous structure because every Bearing is chilled immediately after it is lined.

### SOLIDITY

Every Federal Bearing is guaranteed absolutely free from porosity, because the process of manufacturing makes it impossible for the Babbitt to contain air while cooling.

### 100% BOND

Unlike all other methods of manufacturing Bearings, the Babbitt lining and Bronze Back of every Federal Bearing is Bonded UNDER PRESSURE while the adhering alloy is at a constant temperature.

### EXCELLENCE

Every Federal Bearing is manufactured from the highest grade materials, machined accurately and subjected to the most rigid inspection, because "FEDERAL, DETROIT" must be stamped on the back.

EVERY FEDERAL BEARING IS LINED BY

## CENTRIFUGAL FORCE

(Process protected by patents)



**FEDERAL BEARING & BUSHING CORPORATION**  
**BABBITT-LINED BRONZE-BACK BEARINGS - BRONZE BUSHINGS - BRONZE CASTINGS**  
**DETROIT - MICHIGAN**

# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, NOVEMBER 24, 1921

No. 21

## Growing Demand for Low Priced Closed Car

Closed car sales have grown in spite of great difference in open and closed car prices. Wide market apparent for cheaper closed models. Break with coach building tradition necessary. Bodies, designed for mass production, necessary and practicable.

**T**HERE is a definite demand for a low-priced closed car. It has become generally recognized throughout the industry that price is the chief obstacle in the way of vastly increased closed car sales. In many ways a rather large part of the automobile public has evinced its desire for closed bodies, but the great differential between touring and closed body prices has prevented that desire from resulting in volume of sales. Norval A. Hawkins stated recently that the automobile owner is the boss of every man within the industry. And it may be added that in the long run this boss is going to get what he wants.

He has expressed a strong desire for closed bodies at a comparatively low price. He believes that the difference between closed and open body prices is too great and that it must be reduced. This is the demand of the boss. The industry must and will meet that demand as it has in the past.

The sale of closed cars has increased very greatly during recent years, despite relatively high prices. Closed cars have constituted a constantly increasing percentage of total production for the last two or three years. In 1919 closed cars comprised 10 per cent of the total production; in 1920, 17 per cent. Regardless of increasing desire on the part of the public for closed cars, however, the sale of this type of vehicle is definitely limited so long as there is so wide a difference in price between it and the open model.

In other words, the increased percentage of closed cars, in spite of the high-price differential, indicates clearly the trend of demand, while obvious financial limitations of certain parts of the public place a fairly low limit on possible ultimate closed car sales so long as this price differential remains.

This growing interest in a cheap vehicle, which will provide protection from the weather and still retain lines pleasing to the eye, has brought the permanent top into considerable prominence. A recent questionnaire, for instance, showed that 33 out of 49 manufacturers who answered feel that there is a definite tendency toward the use of the permanent top as standard equipment. While this, of course, is not directly related to the closed car problem, it is another indication of the general tendency toward a permanent form of protection.

As the automobile has taken its place very definitely as a utility vehicle, a majority of users need an all-year car. Many others, even those who use their cars primarily for pleasure purposes, desire such a model. There are undoubtedly many persons to-day who use open cars throughout the year, often at the price of considerable personal discomfort, simply because of the high-price differential of the closed models.

These facts indicate that there is a definite field for the cheap closed car. Reduced prices on closed



models would automatically increase sales very greatly and would aid materially in eliminating the seasonal character of car selling and production. If a satisfactory cheap closed job were produced many people, in addition to the classes already mentioned, would undoubtedly be interested. People who never considered closed cars before, because such jobs were out of their price range, would immediately become potential buyers. It is significant that the cheapest closed car on the market has the greatest volume of sales, as has the cheapest passenger car. This is natural and, perhaps, obvious, yet has an important bearing upon an examination of the possible market for the cheaper closed job.

### Reducing Production Costs

There are two possible methods of reducing closed body prices. One is to utilize present methods more efficiently and build the usual carriage bodies of the past at a lower price. There is an opinion in certain quarters that the average closed body of to-day could be profitably sold at a lower price.

The possibilities in this direction, however, are comparatively small. To manufacture a closed body which will leave but a small differential from open body prices involves a radical departure from present body building methods. It is the development of a utility type closed body, manufactured rather than built, that gives promise of volume growth in closed body sales.

There will always be a class of buyers, of course, which will demand de luxe closed bodies and fine coach work. But this class does not include the great mass of automobile owners who comprise the market for volume sales. This latter class desires neat, efficient lines and adequate protection from the weather. They want a lower price and to get it are willing to forego a piano-like finish and curves in body and roof which hark back to the middle ages for their origin.

There is nothing offensive to the eye in simple, straight lines. Yet the use of such lines in body design will allow cheaper and more efficient manufacturing methods. The automobile maker has been a pioneer in manufacturing methods in many ways; he has not allowed himself to be hampered by tradition in chassis production methods. Yet the clinging tradition of the coach builder has kept body design and body production methods far behind the rest of the car. There is no reason, fundamentally, for building up every closed body like a small yacht.

Simpler body design will result in simpler construction methods. These, in turn, will bring about standardization and interchangeability, and consequently lessen body service problems. All this can be done without sacrificing, except to a limited extent, the artistic features of the closed body.

Work along these lines has already been started, and at least one company is producing commercially a model which embodies many progressive design and construction ideas. The surface has only been scratched, and the problem is equal in importance to any facing the engineering departments of the industry at present.

It is impossible at this time to point out definitely and in detail how this utility body can be designed and built. This must be the subject of considerable research and experimentation. Yet certain broad principles stand out clearly and form a basis of procedure for such studies.

Some consider it impossible to provide sufficient strength in a delicately rounded body without using expensive forms of construction. It is also difficult to provide water-tightness in bodies of this form without using expensive methods. Construction is expensive because these curves require hand-work. On practically all of the high-priced bodies it appears impossible to

stamp out the metal work on dies. Hand-hammering is required and the hand-hammerers in a body sheet metal department are among the highest paid laborers in this industry.

To mold a sheet of aluminum around the curved corners of a sedan body requires a great amount of skill. It is necessary, to make a successful job, that the sheet metal worker not only hand-hammer the metal to shape accurately, but also, while working on the metal, keep it heated to a temperature which will anneal the metal and free it from internal strains. Even to secure the preliminary form of the curved sheet metal part, hand-hammering must usually be resorted to.

Simple, straight pieces of wood are far less expensive to cut and form than the many curved pieces required in the ordinary type of sedan, town car, limousine or coupe. The average closed body is really a built-up job. It is not made on a quantity production basis. The various units are not put through, completed and assembled as are other parts of the automobile. Consequently, trimming and interior finishing is a lengthy job, involving some of the most exacting methods practised by the upholsterer. Ways can be found to eliminate these difficulties. But precedents must be shattered. The problem must be approached from a fresh viewpoint.

Experts state that if bodies were made so that they could be assembled instead of built up in the usual manner, the time necessary for trimming operations would be reduced from one or two days to two or three hours.

One car recently announced, for example, has its top made as a separate piece. The head lining is stretched across the body before the top is put on. This does away with the intricate fitting and inconvenient interior tacking which is necessary with the usual fixed-roof type of closed car, but which must be done in cramped positions and is therefore slow and expensive.

### Practical Methods

Considering the closed car as a business man's vehicle, used in daily work, several important design concessions could readily be made for the sake of more economical production and lower price. Among these are:

1. Exposed screw heads might be permissible.
2. Straight lines may replace curves without spoiling the appearance or usefulness of the car. The purpose should be chiefly to fill the buyer's needs and increase sales, rather than to satisfy the body builder's ideas of art.
3. The body might be trimmed to some extent with half-round molding or other standard forms of trim which are inexpensive.
4. Four doors are not necessary in a car of this kind. The two extra doors cost a great deal of money, prevent standardization as regards glass sizes, window framing sizes, etc. If such standardization were effected cost would be materially reduced.

These things are simply typical of many others of similar nature, some of which are known and some of which will be discovered, which will effectively reduce closed body prices. Coach builders' tradition, however, must be forgotten, and methods passed down for centuries must be scrapped if progress is to be made.

The primary reason that present closed bodies are so expensive appears to be that too much expensive hand labor is required, and that too expensive materials are employed. When chassis parts are made in quantity certain limits and tolerances are established, and in making the individual pieces the limits are observed and jigs are employed so that when pieces which are to go



together are assembled they fit without hand-work. In short, interchangeability is maintained. In Europe such a thing was not heard of a few years ago and even to-day it is customary to do a lot of hand filing and fitting before chassis parts are assembled. This has greatly retarded the automotive industry there by reason of the great expense involved. The situation with respect to the closed body is similar in this country. We have simply failed to adapt fully our quantity production methods to closed body manufacture.

One reason for this is that body styles change, and expensive tooling is often avoided because of fear that style change will make it necessary to scrap tools before they have served to effect the economy for which they are intended. This situation can and must be changed. The public as a whole will willingly give up the latest fad so long as there is a compensating saving in price and they are not asked—as they need not be—to accept something that is displeasing to the eye.

The interchangeable veneer panel is already produced in quantity, as is the metal panel in some instances. Might it not carry this idea further, but employ methods which will not require hand fitting later? In other words, use jigs and gages which insure perfect assembly without fitting. Again, why not make sub-assemblies which can be quite or nearly finished, including, perhaps, all but the final painting operations? These should be arranged to go together without fail in a final assembly which is built up in a few moments, not fitted together piece by piece, occupying in the meantime, perhaps for a month or more, valuable floor space. Problems of getting good joints and of hiding or rendering inoffensive the fastening means present difficulties, but they are not insurmountable.

It might well be possible to use interior trim that is less expensive than the present costly fabrics, and to prepare this on light frames which can be quickly fastened in place. Such units would, of course, be made on the bench, the covering fastened on by rapid machine methods, and the slow tacking in awkward positions within the body largely or wholly avoided.

In at least one plant closed body roofs are already made in a separate piece and fastened on after some of the trimming is in place. A similar procedure might easily be followed in respect to other units, such, for example, as the complete back framing of the car, if the design was laid out with this in mind.

Cheaper wood can be used for some body parts in which the stresses are lighter than in the more important members, where adequate strength and stiffness is of prime importance.

There is room for much improvement in respect to external finishing. Enameling could no doubt be more extensively used. Painting and rubbing down by hand for a dozen or more coats of paint and varnish gives a fine appearance, but is much too expensive in time and material and not at all in keeping with modern production methods. Spray painting is used for wheels and some chassis parts. It may well be adaptable on body parts, at least for certain kinds of finish or for some of the earlier coats. If a built-up assembly is feasible,

it should be possible to do much painting on sub-assemblies before final assembly.

Some of these are only suggestions which may or may not prove practicable. They should, however, be given consideration in common with all other suggestions looking toward less expensive closed body production, for only in this way will we bring this phase of manufacturing in step or on a par with our advanced methods of chassis part production.

The opinion of men within the industry indicates strongly that cheaper closed bodies are possible and that action along this line can be expected in the near future.

One large body manufacturer who graduated into this business from the old carriage days and who has been president of one of the largest body manufacturing establishments in Detroit, stated: "We will design closed bodies within one year which will cost about two-thirds of what they do to-day."

Another manufacturer is of the opinion that closed body prices can be brought very close to open body prices. He is experimenting with a body which can be built up in units and shipped, if necessary, in this form. He believes that this method, similar to the fabricated ship idea, will result in manufacturing economies and will reduce prices materially.

Some engineers are still of the opinion, however, that the public will not accept bodies built along economy lines which will, of necessity, lack certain features not contained in the coach-built job. A body engineer, whose company produces a \$1,000 car in great quantities, believes that the public demand for full pillars, plate glass, four doors, window regulators, and so forth, is responsible for keeping up the price of closed bodies. This company, however, has been working for five years endeavoring to get a closed, all-steel body which could be finished within four or five days. In other words, make an enameling proposition out of it.

As might be expected, body engineers connected with firms making higher priced cars are not convinced of the possibilities of radical design changes on their product so far as bodies are concerned. Buyers of high-priced cars are always likely to demand the refinements given by coach building methods.

A general survey of the field indicates a strong belief in the possibilities of reduced cost in closed body construction. Body designers and production men will have to co-operate and experiment together to solve the problem. It is almost certain, however, that the body production man is going to play a larger part in body design than he has in the past.

Even at the present time, in fact, there is scarcely a body engineer in the industry who will not admit that he could bring out a cheaper, yet satisfactory, design if he wanted to shatter precedent and perhaps sacrifice something in the way of ornamentation and esthetic beauty. Many believe such a body would create serious sales resistance, however, and are dubious as to the reception which the public might give. It is certain, however, that the public is demanding lower closed body prices, and the problem of giving such prices without arousing prejudice against a new type body is urgent.

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**WE** must abandon the hand-fitting methods used in the old-fashioned coach builders' and custom body builders' plants and adapt body construction to the same interchangeable quantity production methods used in the manufacture of chassis parts, if the price of the closed body is to be materially reduced.

There is an insistent demand for moderately priced closed body cars which must be met. It can be met only by following the methods which made it possible to produce low-priced chassis. When so met it will greatly increase the market for the closed car, just as the application of quantity production methods increased the market for the low-priced open car.

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# Several Changes Made in Cole Eight

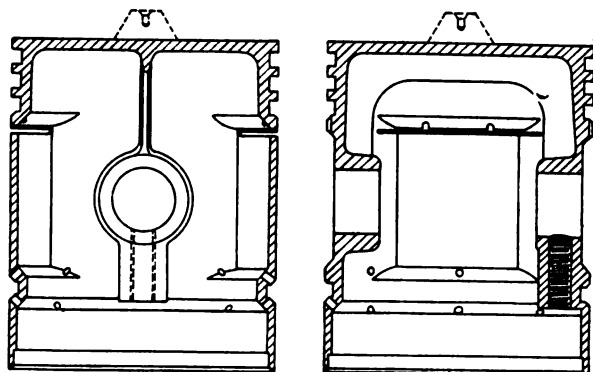
Improvement made in aluminum alloy piston which now is slotted below ring belt. Thermostats added to cooling system. Pressed steel clutch cone reinforced and provided with clutch brake. Brake operating linkage redesigned and frame stiffened. Improvements in chassis and body.

**A** BRIEF outline of the mechanical and other changes made in the Cole car for the coming season was given in the news columns of a recent issue, and herewith are presented illustrations and further details of these changes. One of the changes pertains to the aluminum pistons which now, as formerly, are of what is described as the constant clearance type. These pistons are cast in metal molds of an aluminum alloy and are slotted circumferentially below the lowest of the three piston rings above the piston pin. The slot is cut by means of a 1/16-in. saw and extends over an arc of 83 deg. on each of the two pressure sides of the piston. By means of central ribs the load due to the gas pressure is transferred directly from the piston head to the pis-

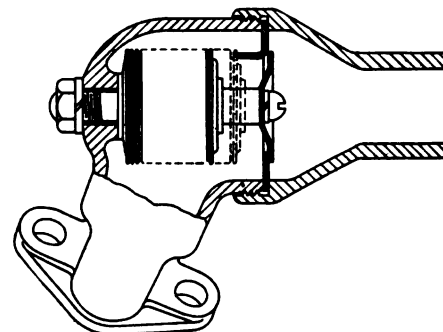
ton bosses. A maximum foot pressure of only 20 lb. releases the clutch. Provisions are made to lubricate the clutch release bearing through a tube located on the front of the dash. This tube leads directly into the bearing and a few drops of oil squirted into it periodically will keep the clutch release lubricated.

Another improvement is the use of coil type clutch springs in place of flat springs. These are mounted in small cages and can be adjusted to give the desired effect. The clutch brake shoe is on a spring and the cone is flanged over with a stiffening flange at the rear against which the clutch brake shoe acts.

Another improvement is the relocation of the centers



(Left)—New Cole pistons are of constant clearance type. (Right)—Sylphon thermostatic valve



ton bosses. There are four rings on the piston, three above and one below the piston pin. The lowest of the three upper rings is a double "pressure-proof" ring. At the top of the piston a clearance of from 0.019 to 0.021 in. is allowed and at the bottom of from 0.0015 to 0.0025 in. From the latter figures it will be seen that the pistons are a snug fit in the cylinder even when cold. By casting the piston with a wide relief area around the ends of the piston bosses a sort of crosshead effect is obtained. Around the bottom piston ring there are eighteen 5/32-in. holes drilled at 45 deg., to act as oil drains, and similar oil drain holes are cut below the lowest of the three upper rings.

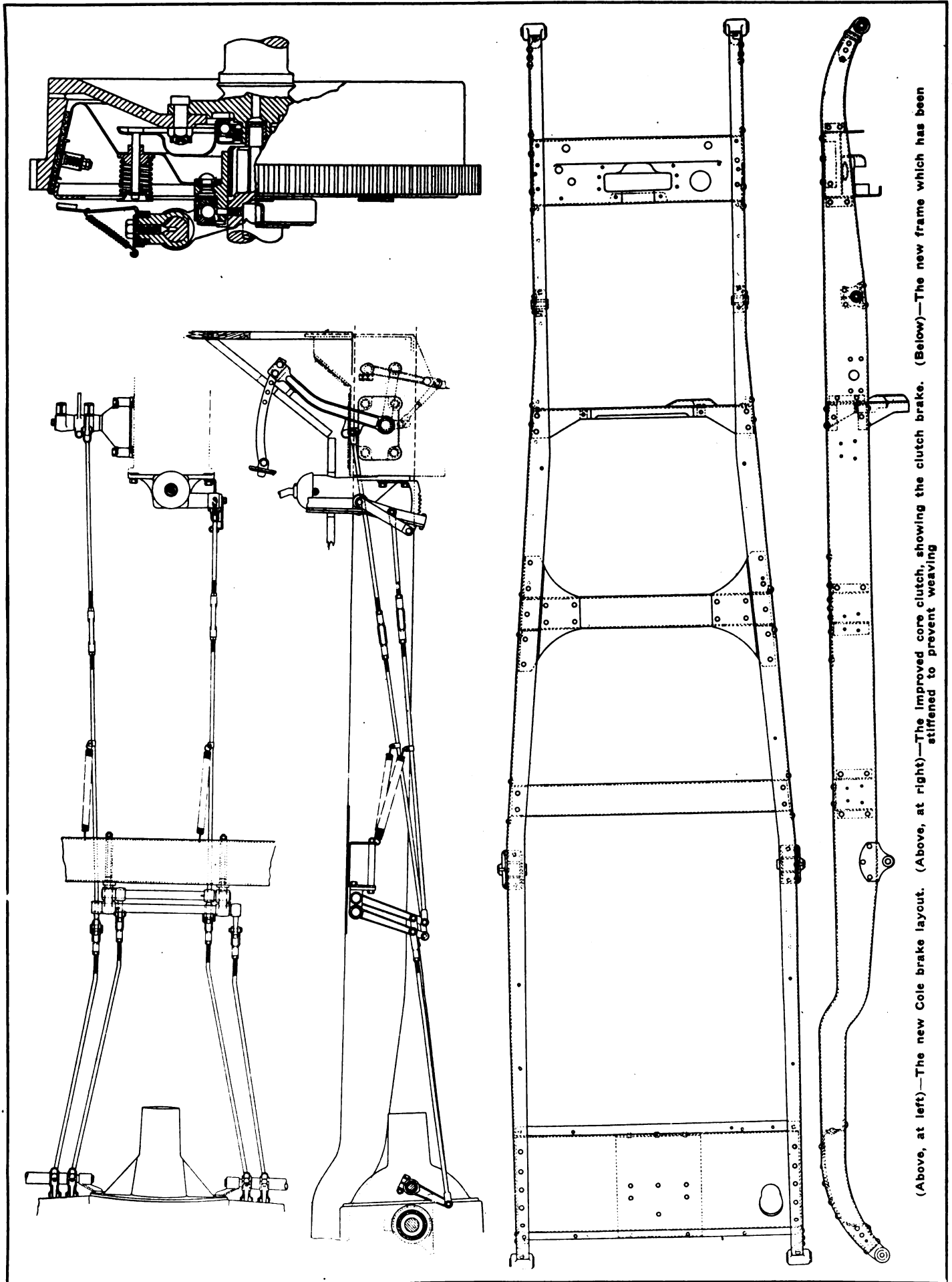
An alteration has been made in the water system by the incorporation of thermostats which are placed on the water outlet of each cylinder head and used for the purpose of regulating water temperature and shortening the period of time required for warming the engine. The thermostats are of the sylphon type and are set to open at 150 deg. Fahr.

The clutch has been improved in a number of details. It is still of the cone type with fabric facing, but it now requires materially less pedal pressure to release it and the cone is reinforced at the circumference to prevent distortion. The clutch is equipped with a braking device which begins to function immediately upon release of the clutch and automatically increases in effectiveness as the clutch is withdrawn farther. Its pressure can be

adjusted as occasion demands. A maximum foot pressure of only 20 lb. releases the clutch. Provisions are made to lubricate the clutch release bearing through a tube located on the front of the dash. This tube leads directly into the bearing and a few drops of oil squirted into it periodically will keep the clutch release lubricated. The inverted type with the pivot center below the center line of the axle is now used for the operating link which, in connection with the Hotchkiss drive, gives maximum brake effect without chatter, it is claimed. The leverage has been increased so that light foot pressure will apply the brakes fully. The service brakes are external contracting and the emergency, internal expanding. The brakes are lined with Multibestos and have an area on the service brake of 240 sq. in. and on the emergency brake, 210 sq. in. The reduction from the brake pedal and hand lever to the rear axle is 4 to 1. Oilless bushings are employed in the brake shaft.

The frame has been stiffened considerably in this new model. Additional members have been provided front and rear to prevent side weaving. The independent radiator and front engine support cross-members formerly used are now combined into one rigid, wide unit, materially strengthening the frame to resist twisting strains. A new cross-member is located behind the transmission gearset and ties the frame securely at this point to prevent body strains. Welded, anti-squeak material is now used between all sheet metal parts, and a thick, wide cork anti-squeak is placed between the body and the frame to give a firmer and quieter support for the body. The spring shackles are now made adjustable to permit of eliminating noise caused by side slap, and the radiator

(Continued on page 1025)



(Above, at left)—The new Cole brake layout. (Above, at right)—The improved core clutch, showing the clutch brake. (Below)—The new frame which has been stiffened to prevent weaving

# Engineering Features of British Cars Evidenced at the London Show

Marked increase in number of 70 cu. in. engines one outstanding feature. Gains in percentage of overhead valves, aluminum pistons, pressure lubrication, heated manifolds and spiral bevels are noted. Magneto ignition still predominates. Four-speed gearset is losing ground.

By M. W. Bourdon

**T**WO features stand out prominently after a study of the exhibits at the London show. The first is the increasing number of makers who apply their energies to more than one or two chassis models, and the second is the large number of new chassis with engines of approximately 70 cu. in. displacement, offered either for two-seated bodies with dickey seats or for small, four-passenger bodywork.

Concerning the multiplicity of chassis models, this was a feature of British plants before the war, but at the 1919 show there was a clearly apparent tendency to specialize. Many firms who had previously offered up to five or six different chassis had got down to one or perhaps two. But at this year's show the old order is again in evidence. Wolseley, for instance, has four entirely different chassis of 7, 10, 15 and 20 hp., including one two-cylinder and one six-cylinder model. With these four chassis is offered a range of bodies numbering nearly twenty, taking into account alternative equipments.

In my cabled report of the show I referred to the comparatively large number of new models falling within the light car class. At Olympia this type was shown by such well-known firms as Wolseley, B. S. A., Standard and Rover, as well as by over twenty others of less renown. It shows considerable divergence in power plant practice, as will be realized when it is said that the little Wolseley has a horizontally opposed twin-cylinder, water-cooled engine, the B. S. A. a 90-deg. Vee air-cooled, the Standard a four-cylinder, water-cooled overhead valve, and the Rover a horizontally opposed, air-cooled engine. Then, too, the Wolseley has a unit power plant, in which it resembles the Rover; the B. S. A. has an amidships gearset, while the Standard has it bolted to the head of the propeller shaft casing.

Most of these miniature cars are offered as two-seaters, some of them with a dickey seat. They weigh in this form from 1000 to 1300 lb., which is quite sufficient load with a full complement of passengers for engines of less than 70 cu. in. displacement. In several cases, however, they are offered with small, four-passenger bodies and then weigh little, if any, more than the two-seater with dickey. But this phase of British automobile development is so important that it is proposed to deal with it separately on another occasion.

Meanwhile it may be said that the light four-seaters with engines of from 75 to 100 cu. in. are still developing and are in even greater favor. In some cases the engine has been slightly increased in size to cope with the additional weight of better bodies, heavier axles or longer springs. But the type remains, and to suggest to a

maker that his "light car" is no longer in that category is to raise in him something approaching ire. The light car is by far the most popular type at the moment, but where the class begins and where it leaves off it is impossible to say.

Two concerns associated with the S. T. D. combination—namely, Sunbeam and Talbot—have put forward new overhead valve models which are small, high-class jobs. These have 14-hp., four-cylinder engines (2 13/16 x 4 3/4 in.) and, with four-passenger bodies, sell at £720.

In what may be termed full-size cars there has not been much development during the past year. Armstrong-Siddeley has come forward with a new 18-hp., six-cylinder model having the main characteristics of the 30-hp. model, which is being continued. The additions of Straker-Squire and of Guy were referred to in my cable. Talbots are offering a 15-hp. and a 25-hp. as new types, though they are of the same general design as those they displace.

The only radical departure from normal practice in cars over 15 hp. is in the new 20-hp. Vulcan, which has a cuff valve engine, a short sleeve being reciprocated above the cylinder proper by means of a two-cycle cam groove. This design is claimed to enable 82 b.h.p. to be developed at 3200 r.p.m. by a four-cylinder, 3 1/2 x 5 1/2-in. engine, with an m.e.p. of 114 lb. and a compression ratio of 4 1/2 to 1.

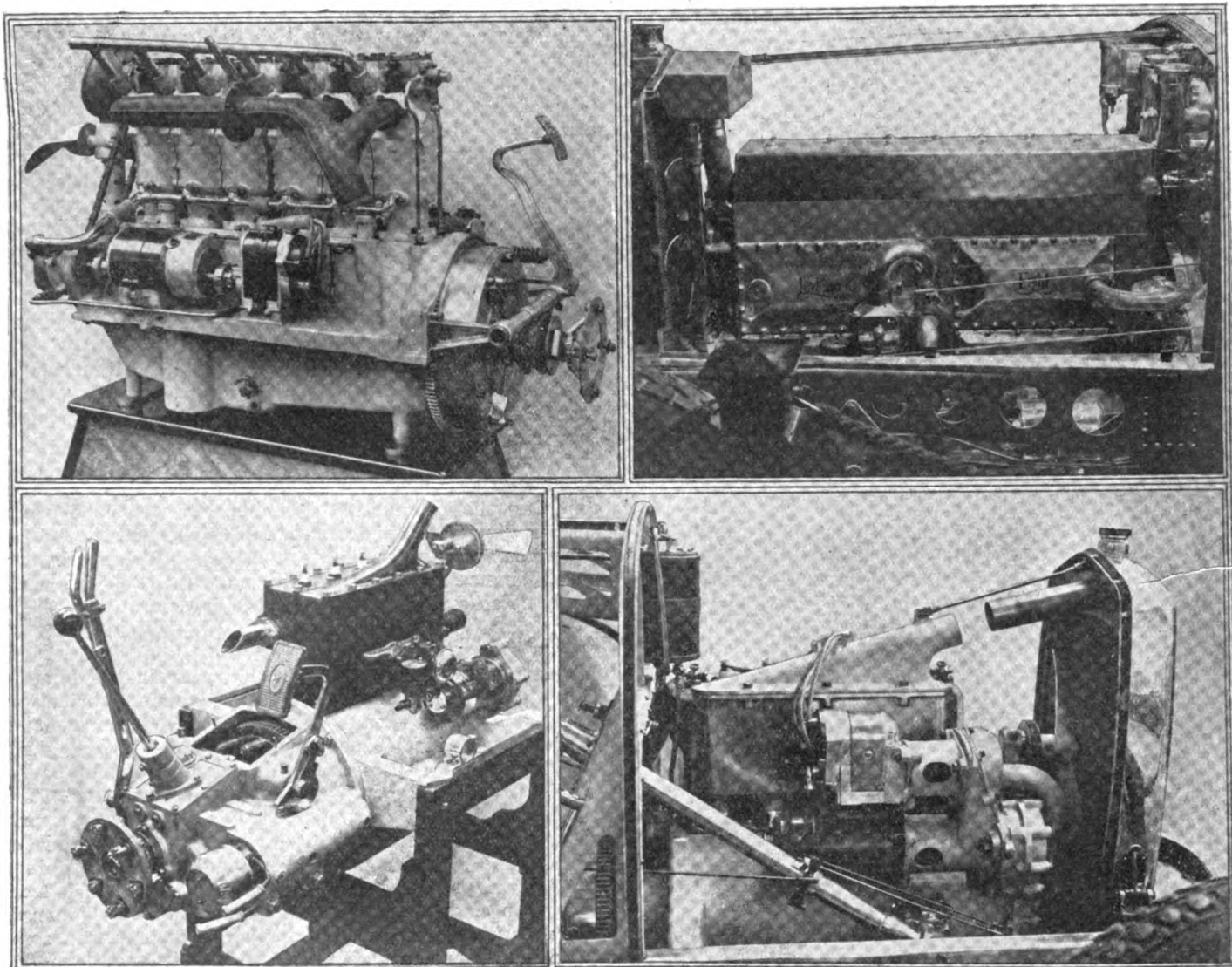
## Number of Cylinders

This year's show does not bring to light any marked move away from the outstanding popularity of four cylinders, as was made apparent by the figures given in my cable report. There are more two-cylinder engines than last year, and these now represent 8 per cent of the total.

The Guy "8," with cylinders set V fashion, is alone among British cars representative of this type, and the same can be held to apply to the Leyland straight 8, though brief particulars are to hand concerning two new British-built cars with engines of this type.

Detachable cylinder heads have slightly increased in number, and now they are found on 53 per cent of engines, as compared with 49 last year. Block-cast four-cylinders have given way slightly on account of the prevalence of pair-casting in recent introductions, but are still found in 90 per cent of all four-cylinder motors. Among six-cylinder engines all possible groupings are met with; pairs and threes predominate, with 40 per cent each, blocks and singles being represented by 10 per cent each.

The plan of forming the cylinder block as a unit with the upper half of the crankcase has been adopted on



(Upper left)—Straker-Squire 30 hp. six cylinder engine, unique in having overhead camshaft on separately cast cylinders. (Upper right)—Leyland straight-eight block engine, camshaft driven by triple eccentric rods. (Lower left)—Power unit of new 12 hp. (2 $\frac{3}{4}$  x 4 $\frac{3}{4}$  in.) Star. (Lower right)—Enfield-Allday generator-magneto cylindrical support brackets, with silent chain drive to magneto

the new 20-hp. Vulcan and the new 14-hp. Sunbeam and Talbot aluminum engines. These, however, are the only representatives of this type of construction, cast iron for the cylinders and aluminum for the crankcase being almost universal.

#### Valve Arrangement

Overhead valves have increased in popularity, now constituting 24 per cent of the total (+2.5 per cent), while L-head cylinders, with 66 per cent to their credit, show a drop of 6 per cent. Three makers are using sleeve valves, all of a different type—namely, Daimler with the Knight, Argyll with the Burt & McCullum and Vulcan with the Howard. These are isolated cases where the inlet valve is superimposed on the exhaust, but this arrangement is not seen on cars of any great renown.

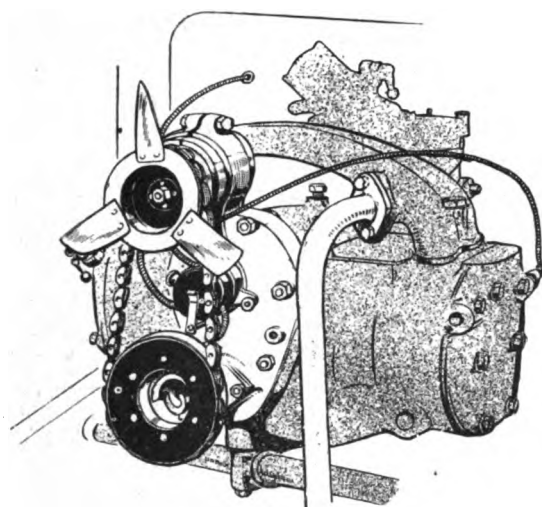
As regards push-rods and rockers for overhead valves, rarely indeed does one fail to find some special provision for automatic lubrication of the rocker bearings and their joints in the push-rods. In the 11-hp. (now 8x4 5/16 in.) Standard, the 18-hp. and 30-hp. Armstrong-Siddeleys, the Lanchester, Wolseley and one or two others the rockers or the overhead camshafts, as the case may be, receive pressure lubrication from the main system. In the new Sunbeam engines, all of which have push-rod operated overhead valves, and in the 14-hp.

Talbot a branch pipe from the main pressure system is carried along over the rocker shaft, and has small holes drilled on the underside of it to allow drops of oil to fall on to the grooved upper surface of each rocker, a central hole with a countersunk top end carrying the lubricant to the pivot bush. On the new 8-hp. Standard the whole rocker shaft is plugged with wick, and at its front end is a large oil cup, replenishment of which is said to suffice for 500 miles or so. In all cases mentioned, except the last, excess lubricant drains back into the crankcase, the overhead valve gear being inclosed by an aluminum cover plate.

#### Distribution Gear

In engines with the camshaft in the crankcase the silent chain has still further gained in popularity, being represented on 60 per cent of engines, but, strangely enough, the helical gear has receded in favor of straight-toothed form, which twelve months ago seemed likely to disappear entirely. To a certain extent this is due to the new two-cylinder engines. Overhead camshaft drives are found in half a dozen different forms. Wolseley retains the primary silent chain to transmit the drive to a vertical shaft with bevel gearing. Lanchester and Ensign have worm gearing at both ends of the vertical shaft, other makers utilize helical gearing, spiral





Front end of 7 hp. Wolseley horizontal twin engine, showing ignition unit and generator at rear end of fan shaft

bevels and a direct transmission by silent chains, while Leyland uses a triple-eccentric, connecting-rod device. The overhead camshaft, incidentally, is not confined to the largest and most expensive cars, for it appears on the new six-cylinder, 12-hp. A. C., 11-hp. Beardmore, 18-hp. Phoenix, two Wolseleys and a new 9-hp. light car which still has to make a name for itself.

#### Water Cooling Systems

The plan so greatly in evidence at the 1919 and 1920 shows of providing a belt transmission for the pump, or for what was merely a water accelerator in a thermosiphon system, has appreciably lost favor, and, instead of only 55 per cent of engines having a positive pump drive, some 80 per cent now have this arrangement. Cellular radiators have increased from 68 per cent to 76 per cent, and, of the tubular radiators making up the remainder, quite one-half are of the film variety, the tubes being flattened out so as to provide a water space of less than  $\frac{1}{8}$  in. width and 1 to 2 in. deep, the "pack" having radiating fins soldered on. Tubes of this type and also those of round section are invariably vertical.

A pressed steel radiator shell is used by only a single firm—Armstrong-Siddeley. Sheet brass, usually nickel-plated, is used in 63 per cent of radiators, though this represents an appreciable reduction since last year, for something like 30 firms are now using a white metal casing. The latter appeals to the owner when a polished radiator is provided, for although it tends to become dull more rapidly than nickel-plating, it can, like plain brass, always be brought back to something approaching its original appearance, even when neglected for comparatively long periods. Aluminum casings are in evidence, but only to the extent of 5 per cent.

Thermostatic control of water temperature is found only on the largest and high-grade chassis; Napier, Straker-Squire, Leyland and Rolls-Royce have it, the latter firm having adopted it only quite recently.

#### Engine Mountings

The great majority of British engines (75 per cent) are mounted directly in the main frame; four-point attachment is most in evidence, the three-point suspension in the main frame being found on only 27 per cent of chassis. Where subframes are used the engine rests upon the latter at three points. Subframes themselves have four points of support in 65 per cent of cases, three-point in 15 per cent, and are secured to the main frame at six and even eight points in isolated cases.

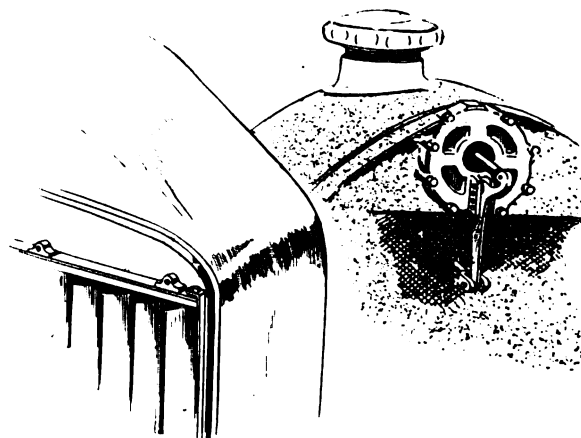
A greater number of British engines for 1922 have aluminum pistons, just a third of the total being so provided, as compared with 26 per cent last year. Cast-iron pistons make up most of the balance, though there are two examples of steel pistons and one a built-up type of cast iron and aluminum. The slipper type of piston and also the hour-glass pattern have made no headway, and 88 per cent of cast-iron and aluminum pistons are of the straight-sided variety. Most new engines have the piston pins floating in both rod and piston bosses, with aluminum or brass end plugs. At the present time the percentages of the various arrangements of the piston pins are: Fixed in rods, 23; floating, 32; fixed in bosses, 45.

Three compression rings are used in most cases, though in the smaller engines two are made to suffice, while in cars like the Lanchester, Napier and Sizaire-Berwick four rings are used above the piston pin. Rolls-Royce continues to use six. Fifty-six per cent of pistons have no special provision for preventing excess of oil from reaching the combustion chamber; 27 per cent use a scraper ring in the piston skirt; in 17 per cent the bottom compression ring is made to serve as a scraper by the usual means of a beveled lower edge to its groove with small holes drilled through to the interior.

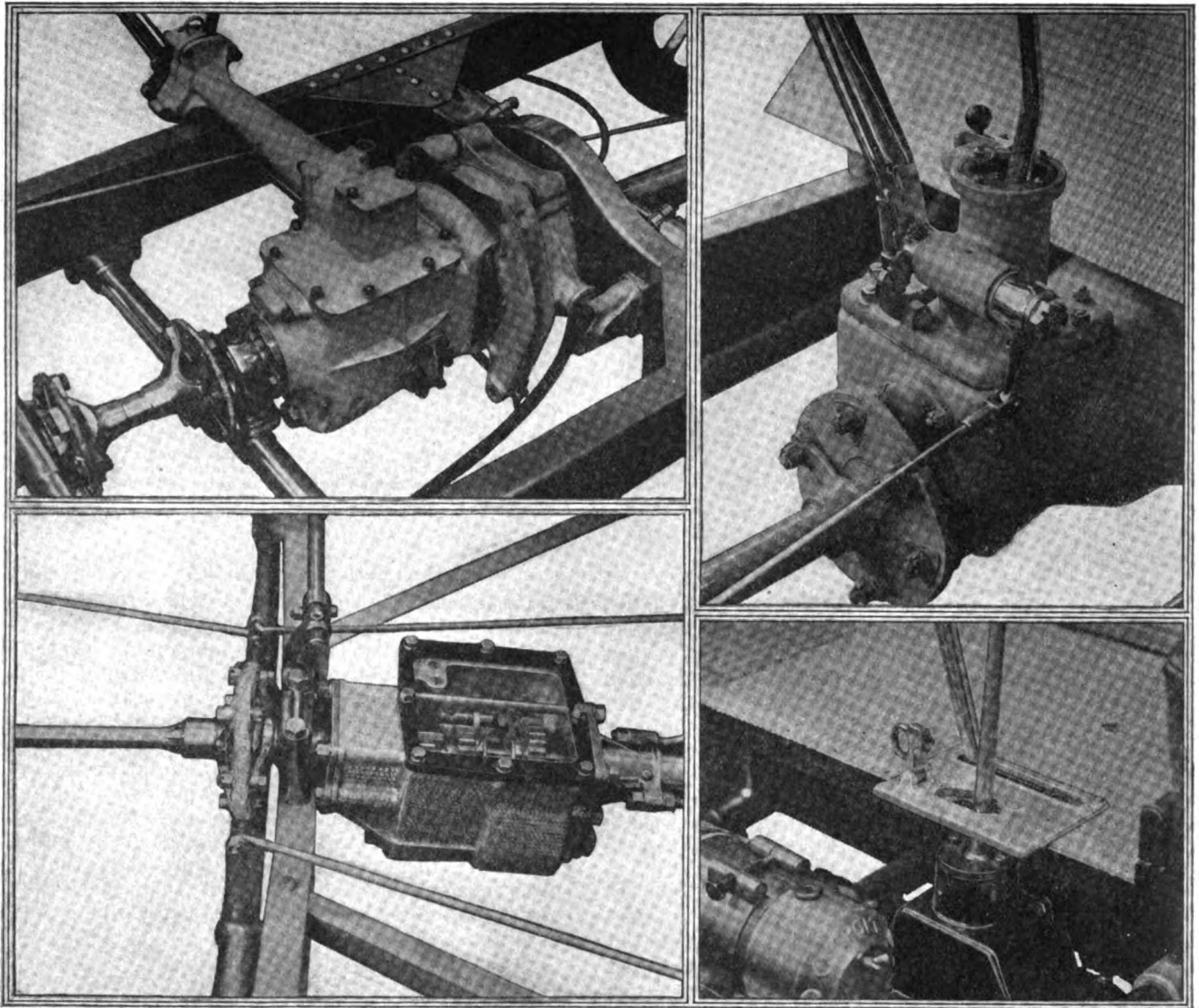
#### Engine Lubrication

There is a further increase this year in the number of engines having the hollow-shaft system of lubrication, for this appears with modifications in 57 per cent of engines as against 49 per cent last year; but only three makers use a full-pressure lubrication system by carrying leads from the big ends to the piston pins. The circulating splash arrangement has given way appreciably and at present is used on only 18 per cent of British cars. Twenty-two per cent have a combined trough and pressure system in which direct leads from the pump circuit are taken to the main shaft journals and frequently also to the camshaft bearings. In some of the miniature cars a simple splash system is depended upon, the supply of lubricant in the crankcase being replenished occasionally by means of a hand pump within reach of the driver.

Gear pumps are still by far the most popular, the plunger variety being found on only 24 per cent of engines, approximately the same as last year. The vane pump is used in four engines only. Standard, in the new 8-hp. model, has a sheet metal disk of approximately 12 in. in diameter attached to the rear flange of the crankshaft, within a narrow compartment at the rear of the crankcase. It has tongues cut at several points in its circumference, and in rotating it lifts the oil to



Thermostat on Straker-Squire operating radiator shutters is located within a casing projecting into the radiator top tank



(Upper left)—Enfield-Allday gearset with three-point trunnion support. Drum of external shoe brake is enclosed within casing extension for spherical housing of torque tube. (Upper right)—Three-speed gearset at front end of torque tube on new 8 hp. (67 cu. in.) four cylinder standard. Drive shaft passes through centre of spherical trunnion support. (Lower left)—Pedestal above gearset of Galloway chassis to form gate, with reverse stop, for spherically mounted gearshift lever. (Lower right)—Cast aluminum plate on Briton floorboard to carry hinged reverse stop for spherically jointed gearshift lever

inclined galleries, enabling the lubricant to run to troughs under the big ends. This, of course, is merely a variation of the flywheel system of lifting the oil, which system, by the way, appears for the first time in a British car of new make.

Last year approximately 40 per cent of British engines had the oil pump located either at the end or the side of the camshaft, but now 77 per cent have this unit submerged in the sump driven by vertical shaft and helical gearing from the camshaft.

Inaccessibility of the crankcase oil filter is a subject for frequent criticism by users; they are told by makers, especially those who use hollow crankshaft lubrication, to inspect and clean their filter gauzes frequently, and yet no attempt is made by the majority of designers to facilitate this operation, which usually means crawling under the car to remove the flange nuts holding the filter in place.

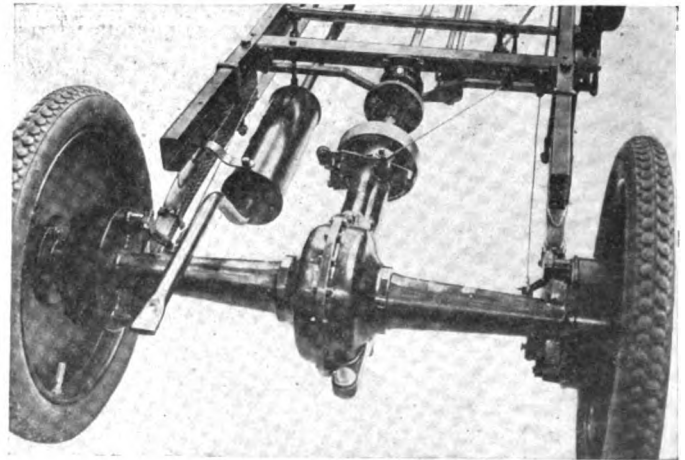
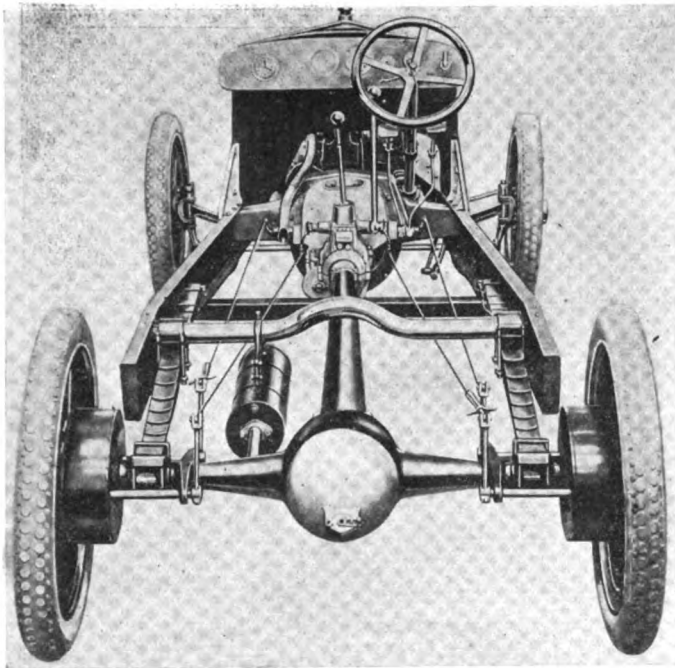
#### Carburetion

The Zenith carbureter is by far the most popular type, the horizontal pattern being used in most instances. In a few instances the new triple venturi model is adopted. Thirteen per cent of engines are fitted with

the car manufacturer's own carbureter. The Claudel is used on 9 per cent of engines as against the 58 per cent of the Zenith.

In two engines out of three the carbureter is on the right of the cylinder block, the valves being on the left in accordance with predominating European practice. Not always, however, does this arrangement imply an induction passage through the block, for only 40 per cent of the total number of engines have this feature. In some cases the inlet pipe passes either over the cylinder block or around the front of it, both of which are obviously undesirable arrangements.

Vaporization appears to have received rather more attention than hitherto, and the writer observed eleven different provisions to this end. The most favored plan is to depend solely upon heat absorption through the walls of the inlet passage through the cylinder block, but this provision is supplemented in 11 per cent of cases by an integral inlet and exhaust manifold, in 5 per cent by a water jacket, in an equal number of cases by a hot air supply and in one instance by a water jacket and an integral manifold. In the 16 per cent of engines having integral inlet and exhaust manifolds alone to assist vaporization, the attempts to embody a hot-spot



(Left)—Rear view of 18 hp. Phoenix. Production only now commencing, having been intentionally held up for 12 months owing to state of trade. (Above)—Semi-enclosed propeller shaft on new 9 hp. Beisize. Coupling shaft has rear bearing on crossmember

are distinctly crude in the eyes of those who realize the potential benefits of such an arrangement properly carried out.

The vacuum system of fuel feed has increased from 30 to 39 per cent since last year, gravity feed has fallen from 56 to 54 per cent and pressure systems have dropped from 14 to 7 per cent. It will be realized from the foregoing that the gravity system is still the most popular. Generally speaking, complaints as to the derangement of the vacuum tank have been infrequent, and the additional expense of installation is the chief obstacle to the more extended use of vacuum feed.

#### Electrical Equipment

The magneto retains its predominance among British cars appearing, as last year, on nearly 90 per cent. On Rolls-Royce, Napier, Lanchester and one or two other top-grade cars both magneto and battery are still supplied, but the battery system alone is found on less than half a dozen of new cars, including the little Standard, the 14-hp. Sunbeam and one of the Talbots. Wolseleys have battery ignition on three models, but in the case of the two post-war types which were introduced at the show of 1919 magnetos appeared in the production models only quite recently.

The battery system used by Wolseley is made by a subsidiary company which was formed during the war to take over the Bosch stock and good will in England, and unless it may be assumed that Wolseleys imagined that the British public was not sufficiently educated up to a battery ignition until recently, it must be inferred that the equipment it was proposed to use has not been sufficiently tried out.

Two-unit equipment for lighting and starting is found on 91 per cent of British cars. The single-unit motor generators are almost invariably made by Lucas and driven by silent chain from the distribution gearing. The 12-volt system is the most popular in the proportion of 2 to 1, and the majority of the 6-volt sets are fitted to small cars without electric starter. Ground return wiring is rare.

In three or four of the miniature cars a hand-operated mechanical starting device is fitted, this addition to the usual starting crank allowing the crankshaft to be rotated half a revolution at a time from the driving seat,

a third lever on the right being provided for the purpose. The new 8-hp. Standard has an arrangement of this kind, which consists of a rack and pinion located near the front of the crankshaft, the pinion being cut on an over-running clutch for the starting crank. The rack has a gap at the end of its range of teeth, this gap lying under the pinion when the engine is running normally, so that the clutch is only in operation during the process of starting. Something of this kind is found also on the Armstrong-Siddeley sixes, though in these an electric starter is used. The latter drives the front end of the crankshaft through chain and sprockets, the driven sprocket moving axially when it commences to turn, causing clutch teeth to be engaged before the crankshaft is rotated.

Last year 80 per cent of British cars had a belt drive for the generator, a feature which the writer criticized severely at the time. It is worthy of note, therefore, that this percentage has now decreased to 62. Quite an appreciable number of entirely new models, however, have belt-driven generators.

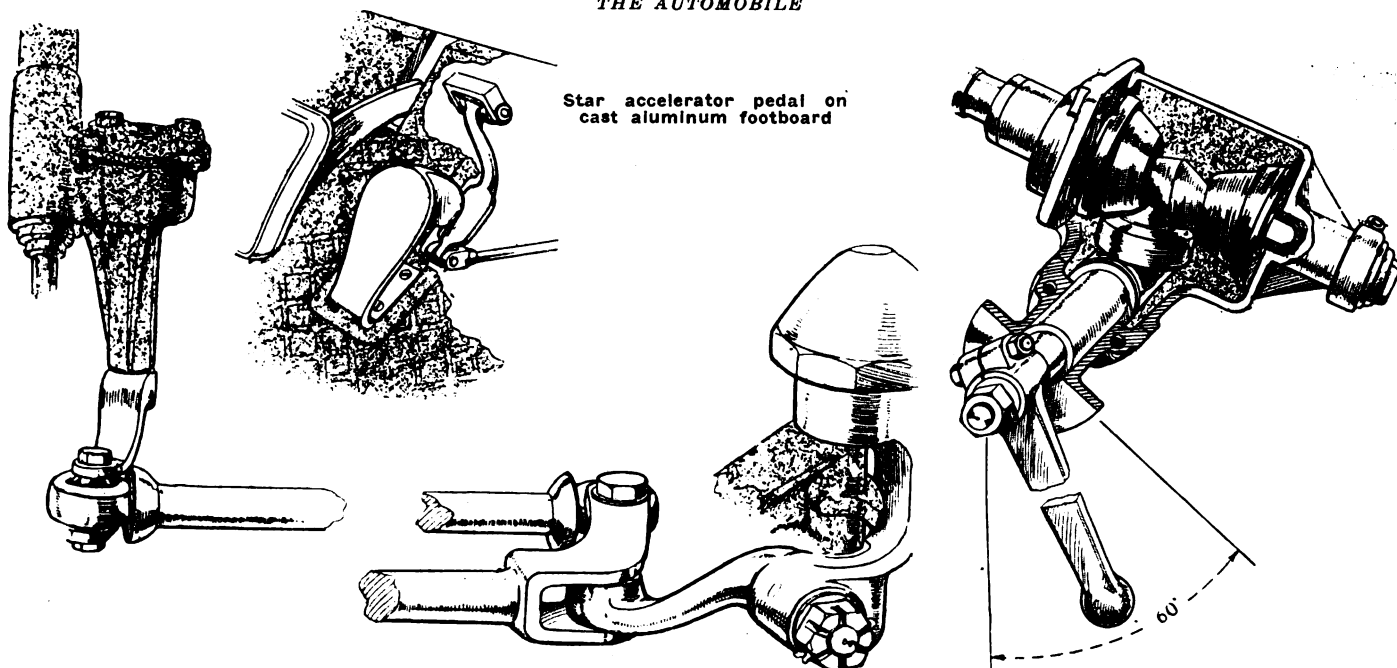
#### Engine Bearings

For six-cylinder engines the seven-bearing crankshaft is in the majority; 18 per cent have three journals only and 35 per cent four. Engine dimensions have seemingly no influence on the number of bearings except in the largest motors, for while the new A. C. and Singer sixes, with 2 9/16 x 3 15/16-in. cylinders, have four journals each, the 18- and 30-hp. Armstrong-Siddeleys have only three apiece.

In four-cylinder engines three crankshaft bearings are most common, appearing in 60 per cent of cases. Two only are next in favor, while five journals are used in 10 per cent; the smallest engine having five bearings is the new 12-hp. Austin, a similar number being used in the 20-hp. model.

Plain journal bearings are almost universal, ball bearings being used in only 6 per cent of engines, ball and roller in 5 per cent and roller in 1 per cent. The majority of these diversions from standard practice are met with in engines of from 70 to 100 cu. in. displacement.

Three is the usual number of bearings for the camshaft, though 29 per cent of engines have only two,



Enfield-Allday steering; has vertical shaft for worm wheel with transverse rod to left hand swivel

New type of Marles steering gear

while 21 per cent have four. In three engines five camshaft bearings are used and in four engines seven, all the latter being six-cylinder jobs.

Camshaft bushes are of phosphor bronze in approximately half the total number of engines and white metal in a third. There are 9 per cent of cast iron, 6 per cent of ball and 3 per cent of ball and phosphor bronze bearings combined. One engine has a ball bearing in the front cover of the cam gear housing and three plain bushes spaced along the crankcase.

Comparatively few gearsets have other than ball bearings for the mainshaft and layshaft; only one has plain bushes for both shafts, though 14 per cent of layshafts have phosphor bronze bushes at both ends. Roller bearings are fitted on only 9 per cent of mainshafts and 6 per cent of layshafts, though one maker uses for the latter a ball bearing at one end and a roller bearing at the other. Plain bushes are, however, preferred to ball bearings for the pilot bearing, though in half a dozen cases these are of the floating bush type. Lubrication of this bush is generally provided for by a hole drilled through the constant mesh pinion at a point between two of the teeth, so that the engagement of the gears in rotating provides a pumping effect, driving the oil into the pilot bearing.

But, despite the predominance of plain bushes for the pilot, the use of ball bearings is increasing; they are now found in 30 per cent and roller bearings in 8 per cent of gearsets.

When roller bearings are used in gearsets they are usually of the cylindrical type and usually supplemented by a ball journal at the front of the constant mesh wheel on the main shaft. As regards prevention of oil leakage from transmission cases, the popular method is a felt gland at each end of the main shaft, though this in a few instances is supplemented by the familiar thrower ring type of oil guard outside the gland.

### Wheel and Axle Bearings

Ball bearings are again the most popular in both front and rear wheels, and the combined radial and thrust type is almost universal. Roller bearings, usually the Timken variety, are fitted, however, in 27 per cent of front wheels and in 17 per cent of rear wheels. One

ball and one roller bearing, the latter of the cylindrical type, are fitted in 9 per cent of front wheels and in 6 per cent of rear wheels, full floating rear axles invariably accompanying this combination.

At each side of the differential casing ball bearings also predominate; Timken rollers form the majority of the exceptions, which aggregate 15 per cent. Only 7 per cent of rear axles are of the non-floating type and these are mostly on quite small cars; of the remainder, 51 per cent are full floating.

### Clutches

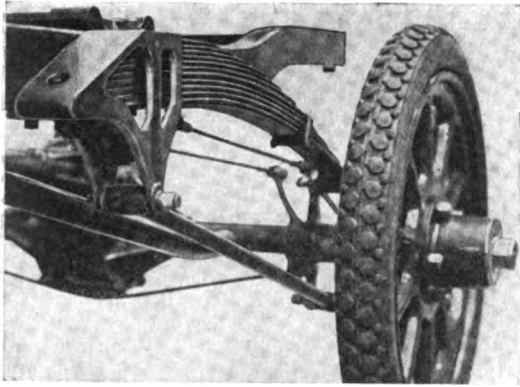
While the cone type of clutch in its several variations constitutes 52 per cent of the total number, this represents a small decrease as compared with last year. The majority of the loss has gone toward the single dry plate type, though there are 14 per cent of multiplate clutches as compared with 12 per cent last year. Three of the cone clutches have metal-to-metal friction surfaces, aluminum to cast iron, running in oil. Phoenix has been a continuous user of the latter arrangement for ten years or more, and embodies it in the new 18 hp. model.

Rover is still the only maker using single plate clutches running in oil and even in this case a dry fabric friction surface is used in the 8 hp. chassis.

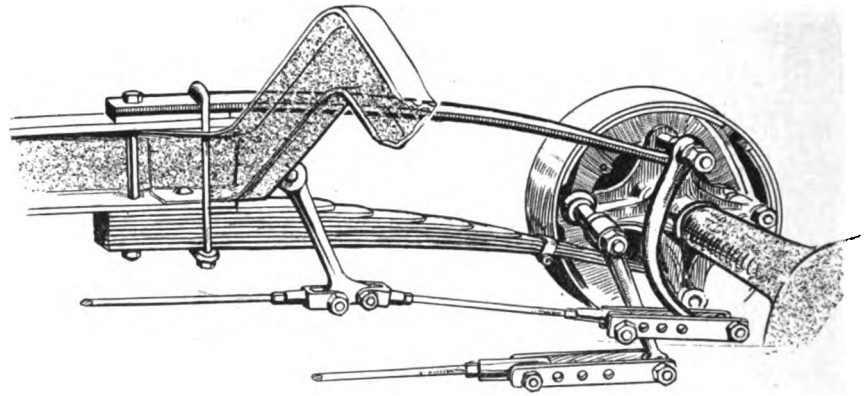
Wolseley for many years past has used nothing except the multiplate in oil type of clutch and still retains it on three models, though the new two-cylinder chassis has an inverted cone with a fabric lining. Vauxhall has adopted a dry plate pattern for the new 14 hp., retaining the multiplate in oil type for the larger models. Belsize in a new 9 hp. chassis with the Bradshaw air-and-oil-cooled engine has adopted a multiplate in oil clutch. Armstrong Siddeley continues a dry multi-plate clutch on the new and smaller model (18 hp.), but has a dry single plate in the new Stoneleigh light car. In this case, the driven disk is of fabric and merely has a steel boss floating on the front end of the splined coupling shaft, for which it forms the front flexible joint.

From the foregoing it will be gathered that the dry single plate clutch is making most headway, though in a good many quarters the objection is still raised against it that the thin metal disk is liable to warp and cause





Peculiar mounting of rear quarter elliptic spring on new 14 hp. Turner with parallel radius rod



Rear springing of 7 hp. two-cylinder Wolseley. Single upper blade assists in taking torque and drive

fierceness and chattering if it should be slipped much.

The cone clutch has the merit of simplicity and when fabric covered can stand an indefinite amount of slipping. Gear shifting is no more difficult with the best examples of cone clutches than it is with the best of the single plate type. This is possibly due to the extensive use of aluminum for the driven cone, although in quite a number of instances a pressed steel driven member is used.

#### Transmissions

Seventy-three per cent of all dry clutches, cone and plate, have fabric facings, but leather as a friction material is still in evidence in the cone type to the extent of 13 per cent. Cork inserts are used by one maker (Morris) in a double plate clutch and wood as a friction material has actually appeared in a new make of car.

Ball journals for the pilot bearings of clutches are still comparatively rare, the vast majority being plain bushes. Ball bearings for the clutch yoke are, however, universal.

The unit power plant construction has made no appreciable headway since last year, and only 27 per cent of British cars have it. The amidships location is still in the majority, but it has fallen from favor during the year as the present percentage being 56, as compared with 68 last year. Three additional makers have adopted the plan of forming the gearset as a unit with the front end of the propeller shaft and the unit gearset and rear axle construction appears on 10 per cent of cars, as compared with 6 per cent last year.

Selecting 24 new models shown at Olympia, it is found that 7 of them have an amidships gearset, 10 have a unit power plant, 5 have the gearset a unit with the propeller shaft, and 2 with the rear axle. Thus, of the two dozen, 17 avoided the unit power plant arrangement.

Last year the number of gearsets with three and four speeds respectively were exactly equal in number, but this year 58 per cent have three speeds. The favored position of the gear-shift lever remains on the right-hand side of the chassis, 70 per cent being so placed and 29 per cent central. One maker—Vulcan—on one model makes this item optional. Of 24 new cars, 13 have the gear-shift lever on the right.

Where the gearset is amidships, the coupling shaft from the clutch has a fabric disk joint at each end in 46 per cent of cases. Metal disks and leather disks are in evidence to the extent of 4 and 13 per cent respectively. All-metal joints (usually a pot joint at the front to allow for the sliding movement of the clutch and a star joint at the rear) occur on 20 per cent of coupling shafts, while 17 per cent have merely a sliding coupling at the front end and a Hooke's joint at the rear.

The steel worm and phosphor bronze complete worm wheel type of steering predominates, being found on just over half the total number of cars, the worm and segment on 26 per cent. The remainder are divided between screw and nut (8 per cent), epicyclic, rack and pinion and volute cam. The Marles, which is of the latter type, has been considerably altered since last year, now having only one ball bearing forming a roller mounted on a projecting boss of the lever shaft, instead of two ball bearing rollers as last year actuated by the snail cams. This year's model has two volute cams with their small diameters united, and these take effect simultaneously on the ball bearing roller at diametrically opposite points of its circumference. This new model gives a quicker steering than the old, and, like the original, is reversible; but users find it quite as precise and controllable as the other, while it has the merit of being a far better manufacturing proposition according to the firm handling it.

Rack and pinion steering gears are used only on the smaller types of chassis, such as the 8 hp. Rover.

#### Propeller Shafts

The open propeller shaft with Hotchkiss drive has gained slightly during the year, being used now on 52 per cent of British cars. The enclosed pattern has receded slightly and the same applies to the semi-enclosed arrangement, in which a short open coupling shaft is interposed between the gearset and the enclosed propeller shaft proper. Wolseley is the main exponent of this latter system.

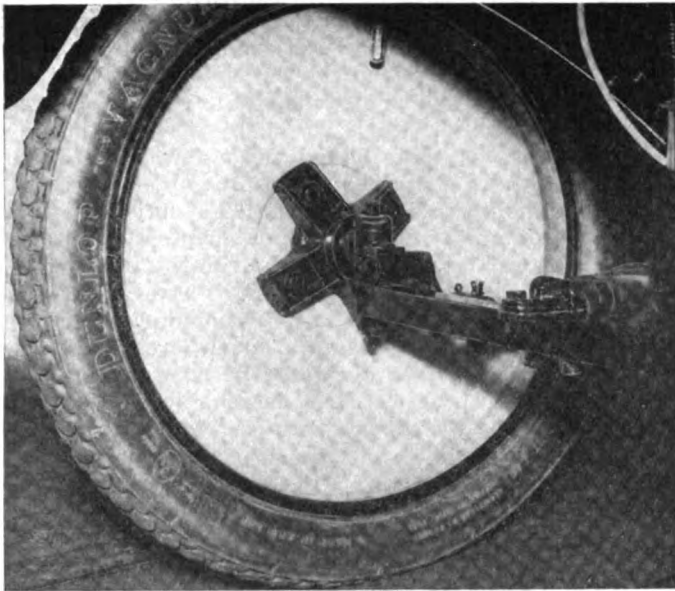
With enclosed and semi-enclosed shafts, the star (cross) type of universal joint is fitted at the front of the enclosed portion in 64 per cent of cases, a fabric disk in 23 per cent and a sliding pot joint in 3 per cent.

Open propeller shafts have a fabric disk joint at each end more often than last year, this arrangement having increased from 28 to 40 per cent. Next in favor (29 per cent) is a cross joint at the front and a sliding pot joint behind. Daimler is the only maker using cross joints with ball bearings, one at each end of an open shaft, and one firm, Enfield, uses roller bearings for this type of universal.

It may be mentioned incidentally that the use of fabric disk joints for propeller shafts is increasing mainly in connection with cars up to 12-15 hp. In some cases the flexibility of the disks is alone depended upon to take up variations in centers due to the flexing of the springs, though where the disks are not more than 48 in. apart the star piece of one of them is allowed to float on the end of the splined shaft.

As might be expected the spiral bevel has still further gained on the straight bevel for the final drive in





Cast cruciform hub flange of channel section on new Standard light car with disk wheels

the rear axle, occurring in 63 per cent of chassis as compared with 46 last year, while the straight bevel has receded from the 28 per cent in 1920 to 13 per cent now. Not much variation has occurred, however, in the number of worm drives; 12 per cent of chassis now have a top worm and an equal number a worm below the axle, this total of 24 per cent comparing with 26 per cent last year.

Where the drive and torque are not both taken by the springs with an open propeller shaft, the springs to take the drive and a torque arm are the usual combination; both radius rods and a torque arm are used in only one car. Vauxhall has the former arrangement in two models and Wolseley in the 20 hp. six-cylinder chassis. In the Napier Six, the new 14-hp. Vauxhall and the 10 and 15-hp. Wolseleys, having either an enclosed or a semi-enclosed propeller shaft, the springs are made to serve for transmitting the drive, the propeller shaft casing absorbing the torque only.

### Brakes

The percentage of chassis with both brakes on rear wheel drums has increased from 61 per cent to 68 per cent since last year, though there is only one car having internal shoes and contracting bands on the same drum. Transmission brakes, therefore, are found on 32 per cent of cars, these being mostly of the external shoe type, and only Daimler has an external band brake on the wheels accompanying an external shoe brake on the transmission.

The increase in the use of steel cables for brake operation, which was apparent last year and was regarded by many as a retrograde step, has continued, and this feature is now coming to be taken as a justifiable alternative to rods, if not actually preferable in certain respects. Usually the cable ends are adjustable without great difficulty, and in a few instances they are more or less permanently secured in the eye of a threaded solid extension to allow for a finger nut adjustment.

Only one British car is fitted with front wheel brakes—the Sheffield Simplex six-cylinder, introduced at last year's show. This car has not yet gone into production and has poor prospects of reaching that stage for awhile; yet it was again at Olympia this year—the selfsame chassis with front wheel brakes added!

Half-elliptic springs all around is a combination more

in use than any other, though it has decreased from 48 to 43 per cent since last year. Next in popularity is the combination consisting of half elliptics at the front and cantilevers at the rear, viz., 22 per cent, a gain of 1 per cent. Quarter-elliptics at both back and front have increased from 16 to 20 per cent, while half and three-quarter elliptics together have dropped from 15 to 12 per cent. There is only one British car with transverse inverted half elliptics; another rare combination is found on the new 9-hp. Vulcan, which has three half-elliptics on each side, the front two being inverted—each mounted like a cantilever on a central trunnion bearing—the inner ends of these two being coupled by the third similarly arranged.

Wrappings for springs—either leather “gaiters” shaped to fit or specially prepared tape wound on from end to end—are being widely used, being not only bought as accessories and fitted by owners to existing cars, but also supplied as standard by many makers of cars, large and small.

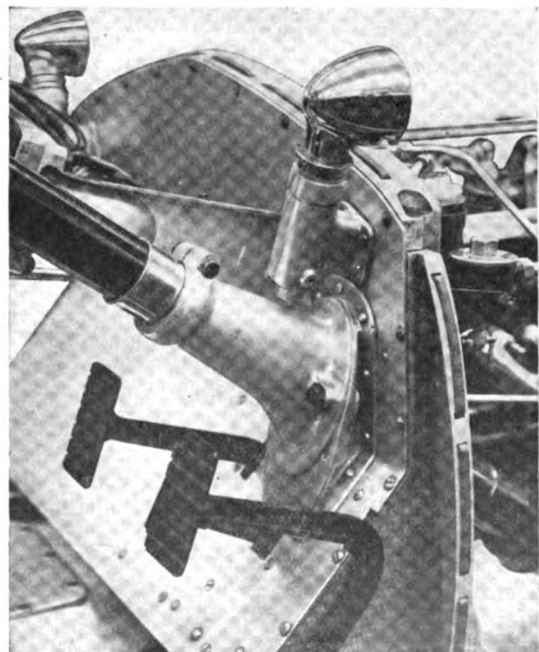
Some wrappings are fitted after the contact surfaces of the spring leaves have been polished but left dry, while others constitute grease bags to keep a supply of lubricant between the leaves. In the former case the gaiters merely serve to prevent the entry of water and the formation of rust on the contact surfaces and thus prevent deterioration in the suspension system. In the other case, they again exclude water, but also reduce the frictional effect and counteract the comparative harshness of somewhat inflexible springs.

### Wheels and Tires

The hollow pressed steel wheel again leads (48 per cent), but it has lost ground during the year to the disk type to the extent of 8 per cent. Disk wheels are used on 29 per cent, wire on 18 per cent and wood on 5 per cent.

Originally the only pressed steel wheel available was the Sankey, but now there are several other firms making this kind of wheel, including Dunlop and Goodyear (no connection with the tire company).

The Goodyear wheel is different from the Sankey in that it has a separate rolled steel rim which is welded



Lanchester aluminum dashboard with side lamps of ship's ventilator pattern normally projecting through cowl

into the halves of the main portion of the wheel. An advantage claimed for this arrangement is that air pressure within the tire does not impose an outward stress upon the welded joint, the tire and rim as a unit being self-contained in respect to inflation pressures. Until this year the writer viewed this claim as having no force in practice, whatever might be said of it in theory; but he has within the past six months experienced two cases of cracked wheels of the original type which had split around their circumference under the air tube. But the faults appear to be due to faulty welding rather than to the failure of a good joint, and they were brought to a head, no doubt, just as much by vibration and driving stresses as by inflation pressure.

With quieter final drives by reason of helical bevels taking the place of straight bevels, one hears less frequent complaints against the disk wheel on account of its resonant effect. But, nevertheless, it is open to that criticism when indirect drives are in use—which is the case a considerable portion of the time in the small-engined cars.

An unquestionable advantage of the disk type is the ease with which the designer of the car can provide central pivot steering, the dishing of the wheels allowing the swivel axle pivots to be arranged vertical and central over the point of tire contact with the ground. Quite a number of new cars have this arrangement, which is undeniably of assistance in securing ease and precision in steering control. In one or two cases, however, the front wheels are still splayed slightly, despite the central pivot, which is, nevertheless, still kept vertical. But, as a rule, the wheels also are vertical.

Wire wheels are most used at the extreme ends of the scale of car sizes; on the largest and on the smallest. They are almost invariably detachable and in this connection Dunlop and Rudge have introduced detachable wire wheels held in place by bolts the same as pressed steel and disk wheels.

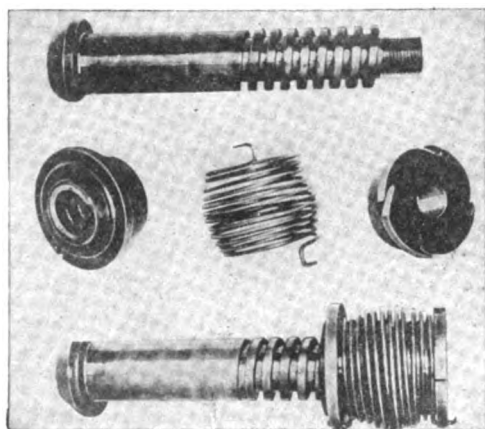
Despite the fact that Dunlop and a few other British tire makers have standardized a line of straight-side tires, the clincher pattern is still all but universal; only Beardmore on an 11-hp. chassis has adopted the alternative. This must be a disappointment to the importers of American straight-side tires, for they have made great efforts during the past 12 months to popularize this type by propaganda in the press and elsewhere. It follows from the foregoing that demountable rims are still foreign to British practice, the detachable wheel being used even on the Beardmore with the straight-side tires.

The cord tire is, however, assuming a certain degree of popularity, due mainly to its being supplied by Dunlop as an alternative to the fabric variety and to extensive propaganda and advertising of the Michelin "Cable" tires. Only few car makers have standardized it for next year, and those that have done so are using it instead of fitting a larger size of canvas tire to the wheels of chassis with sedan and other types of closed bodies. The 11.4-hp. Humber, for example, has 760 x 90 m.m. fabric tires on the open cars, and the same size in cords on the coupé and four-passenger sedan.

Dunlop having adopted the Schrader valve, the latter appeared on a large proportion of British cars for the first time—for Dunlop tires are standard with 90 per cent of British car makers.

## Self-Adjusting Connecting Rod Bolt

**A** CONNECTING rod bolt which automatically takes up wear in the bearing as fast as it occurs has been placed on the market by the V. & S. Automatic Bolt Co. The bolt is provided with an "Acme" left-hand thread for the revolving nut and a right-hand "V" thread on a smaller diameter at the end, for the spring-lock nut. The revolving



A self-adjusting connecting rod bolt

ing nut is provided with a chamfered face on the contact side (toward the cap of the connecting rod) and is sufficiently free on the bolt to offer slight resistance to rotation in taking up wear.

The force required for making the adjustment is derived from a spring, which is attached to the revolving nut and is of the barrel type. In a spring of this type the center coils are the weakest and do most of the work when only moderate tension is required. The revolving nut cannot back up.

The spring-lock nut is provided with four adjustment slots so that any desired spring tension may be obtained, and has a right-hand thread, which, with the spring tension pulling to the right, locks it on the bolt.

The installation is made by removing the engine underpan, exposing the connecting rod bearings and removing all caps and bolts. If shims are used they are removed; otherwise a space of at least 1/16 in. is provided between the cap and rod by filing that amount from the cap faces. This is necessary in order to permit the bolt to function properly.

The bolt holes in the cap are then reamed 0.005 in. larger than the bolt to be used, following which the underface of the lugs of the cap are end-milled sufficient to provide a space of 1/32 in. between the revolving nut and the spring lock nut. This prevents interference and undue splash and also provides a smooth surface for the revolving nut of the automatic bolt.

The preparations completed, the bolts are inserted in the rod, the caps placed in position, the revolving nuts attached by finger pressure only, and the spring lock nut is then placed on the end thread and tightened against the shoulder of the bolt by the small spanner wrench provided. The hook of the spring is then engaged in one of the four tightening or adjusting slots of the spring-lock nut by means of a small wire loop on the handle of the spanner wrench, and is brought to proper tension, which is determined by the "feel" as in fitting bearings by any of the other methods. It is said not to be necessary to burn or scrape in the bearing.

It is claimed that the use of these bolts insures better crank-pin bearing lubrication, as the space previously occupied by the shim now permits more oil to reach the bearing surfaces, and if the bearings are properly chamfered a valley is formed for the storage of oil.

# The Navy Racer Which Won the Pulitzer Trophy

Biplane which now holds the world's record for any closed course was designed and built complete, engine included, in the Curtiss plant. Many interesting engineering features incorporated in this all-American product.

By Herbert Chase

**T**HE Curtiss navy racer which recently won the Pulitzer Trophy at Omaha was designed and constructed complete in the plant of the Curtiss Engineering Corporation. We are informed that the machine was conceived about June 1, 1921, that one machine was completed and ready to fly about August 1, and a second on August 8. When it was finally decided that the navy would not enter a plane in the Pulitzer race the Curtiss company secured permission (about ten days before the race) to enter one of these machines. It was flown in the race by Bert Acosta and covered the 153.59-mile, five-lap triangular course, including 14 turns, in the time of 52 minutes 9 seconds, or at the rate of 176.7 m.p.h. This constitutes a world's record for competition over a closed course and is officially recognized as such by the Aero Club of America. The previous record for the same trophy was won by a Ver-ville-Packard about a year ago, when the course was covered at an average speed of 156.5 m.p.h.\* We are informed that the previous record for closed course competition was made in France in October of this year, when a Nieuport-Delage monoplane made an average speed of 173 m.p.h.

The Curtiss navy racer was designed primarily as a racing machine, to be used in part as a means of testing the new Curtiss C. D.-12 engine, but the design is such that the machine can, with slight modifications, be arranged for mounting a machine gun, and thus be suited for use as a high-speed pursuit plane.

There is nothing radically new in the design of the plane, but it incorporates a number of refinements and is, of course, arranged to minimize head resistance. The wires are all of streamline form and all exterior fittings have streamline coverings. This applies even to the radiator piping, which in the accompanying cut is shown exposed. The cockpit opening has also been made smaller

than shown in the cut. The Lamblin radiators shown are the only parts not made in this country, and these may later be abandoned in favor of a wing-type radiator now under development by the Curtiss company. All the major units of the plane, including the engine, are made in the Curtiss plant.

Most of the wing covering is of  $\frac{1}{8}$ -in., two-ply veneer, which is used as a structural member, though the trailing edge of the upper wing is covered with linen. The total wing area is 168 sq. ft. and the wing loading, based

on a gross weight of 2165 lb., is slightly under 13 lb. per square foot. A Sloane wing section is employed.

The plane weighs 1735 lb., light, and has a useful load of 430 lb. It is said to be capable of speeds in excess of 190 m.p.h. on a straightaway and to have a landing speed of about 70 m.p.h. The overall span is 22 ft. 8 in.; length, 21 ft.  $\frac{1}{2}$



The Curtiss Navy Racer which won the recent Pulitzer Trophy race at Omaha, covering the five laps of the 153.59 mile triangular course at an average speed of 176.7 m.p.h.

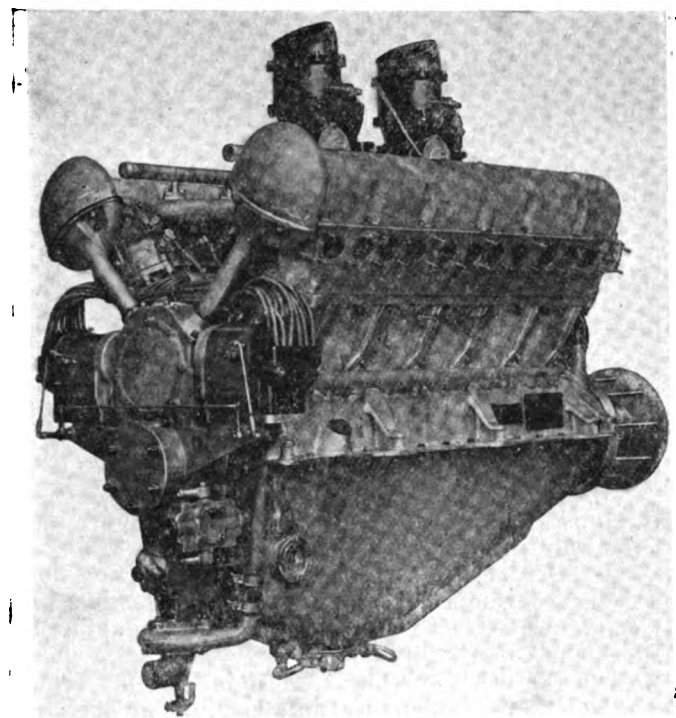
in.; height, 8 ft. 11 in.

The engine is of the twelve-cylinder, 60-deg. V-type,  $4\frac{1}{2} \times 6$  in. (1144.8 cu. in.), and is said to develop 405 b.h.p. at a normal speed of 2000 r.p.m. The propeller is mounted on the crankshaft. The engine cylinders are made as short as possible in order to facilitate good cowling. It will be noted that the fuselage has an excellent streamline form, in spite of the high-powered engine employed. The overall dimensions of the engine are: Width,  $28\frac{1}{4}$  in.; length,  $56\frac{1}{4}$  in.; height,  $34\frac{1}{2}$  in.

The engine is similar in general design to the Curtiss model K-12, described in AUTOMOTIVE INDUSTRIES for May 15, 1919, but incorporates the changes made in model C-6, described in the issue of July 29, 1920, and some additional changes. It will be recalled that the crankshaft is of the seven-bearing type, but the front bearing is made in two parts with provision for a large ball thrust bearing between the two, so that there are in reality eight main bearings. These are all 3 in. in diameter instead of  $2\frac{3}{4}$  in., as formerly. All bearings are now of the bronze-backed type.

The lubricating system remains unchanged in princi-

\*Last year's record was announced at the time as having been won at an average speed of 173 m.p.h. When the course was later surveyed it was found to be considerably shorter than originally figured, and the speeds announced correspondingly slower.



The Curtiss model C.D.-12, twelve-cylinder engine used in the Navy racer. It weighs 700 lb. dry, and develops 405 hp. at 2000 r.p.m.

ple. It is, of course, of the pressure type with direct feed to all main bearings. The crankshaft is bored out to make it light, but formerly the ends of the hollow main journals were left open and oil was conveyed to the crankpins by inserted pipes which registered with the oil duct in the main bearing at each revolution. The journal ends are now plugged and are run full of oil. Provision is now made for connecting an oil cooler when desired.

Ignition is furnished by two twelve-cylinder Berkshire

magnetos, each of which fires a separate set of A. C. plugs, there being two plugs for each engine cylinder.

The engine used in the race was fitted with two Ball & Ball duplex carbureters. These are located well down in the V, but with the air inlets carried outside the cowl above the engine. Fuel is fed to the carbureters by a two-cylinder opposed plunger pump driven from the distribution gearing. The plungers are operated by a cam and Scotch yoke inclosed in a case which is kept filled with lubricating oil under pressure. Since the oil pressure is always greater than that on the fuel, no leakage of gasoline into the oil can occur, but slight amounts of oil can mix with the fuel.

The engine has a 6.1 to 1 compression ratio and consequently requires special non-detonating fuel. The fuel used in the race was aviation gasoline and benzol mixed in equal proportions. The engine is said to consume 0.50 lb. fuel and 0.008 lb. oil per b.h.p.hr. and to weigh 700 lb. dry, or 1.73 lb. per b.h.p.

The general specifications of the Curtiss navy racer are as follows:

#### Areas (in sq. ft.)

Upper wing panel .....	88.0
Lower wing panels without ailerons.....	80.0
Total wing area .....	168.0
Ailerons .....	18.0
Horizontal stabilizer (2).....	12.6
Elevator (2).....	9.2
Tail fin (1).....	4.8
Rudder (1).....	4.8

#### Dimensions

Span (overall) .....	22 ft. 8 in.
Length .....	21 ft. ½ in.
Height .....	8 ft. 11 in.
Length upper panel .....	22 ft. 8 in.
Length each lower panel .....	10 ft. 2¼ in.
Chord (all wings) .....	48 in.
Angle of incidence .....	0 deg.
Gap .....	48 in.
Stagger .....	15 in.
Dihedral (lower only) .....	2 deg.
Sweepback .....	None
Tread of wheels .....	60 in.

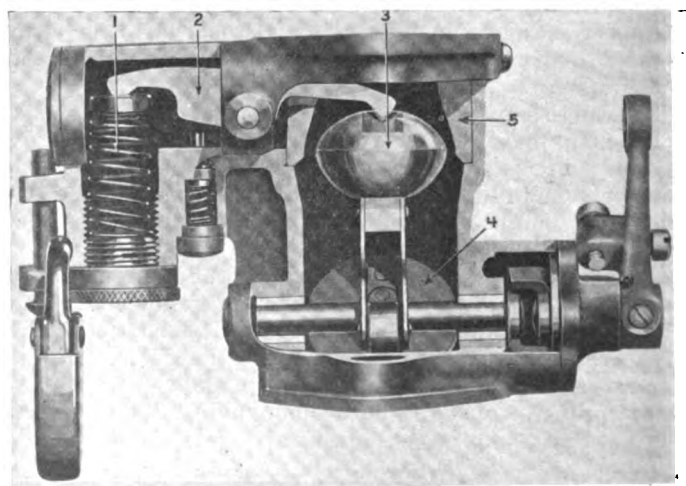
## A New Model Governor

A NEW model Monarch governor operating on the same principle as the previous model has been brought out by the Monarch Governor Co. The Monarch governor utilizes the kinetic energy of the moving gas in the intake manifold to operate the automatic throttling mechanism. It has only two moving parts and is completely automatic. Referring to the cross-section herewith, the governor comprises a coiled spring 1, with a rocker arm 2, and conoid 3, butterfly 4, and cone 5. The spring is so proportioned as to make possible a wide range of governed engine speeds. Adjustment is secured by removing the cap at the bottom of the spring housing and turning the slotted screw provided for this purpose. The rocker arm is provided at both ends with hardened ball point bearings that oscillate in hardened steel cups. It is fitted with an oil-and-wick lubricated bronze bushing.

The conoid or governing member 3, in conjunction with the cone 5, controls the governor action. Normally it is held wide open by the spring, the spring action on it being balanced by the pressure upon it due to the flow of charge from the carburetor to the engine. Any increase in velocity overcomes the resistance of the spring and causes the conoid to rise in the cone and close the butterfly.

While the principle is the same as that of the old model, there is no resemblance between the two in construction.

Probably the chief advantage of the new model as compared to the old is that the spring tension or opposing force is now applied through the conoid instead of through the butterfly. This reduces the stress on the bearing surfaces and should result in a correspondingly longer life.



Sectional view of new Monarch governor

# Some Unique Facilities for Crankcase Production

Continental Motors Corporation has recently retooled its plants with specially designed machines for the rapid and economical production of aluminum crankcases. One four-way multiple-spindle drill is arranged to bore 84 holes in a single operation requiring one minute to complete.

By J. Edward Schipper

**T**HE Continental Motors Corp. has extensively retooled both its Detroit and Muskegon factories.

This concern is now using some advanced special machinery for the manufacture of its line of engines, many of the tools and special machines being fixed-purpose types and non-adjustable to any degree, indicating the intention of the company to continue its present products on a quantity basis.

New buildings and improved machinery and tool equipment to the extent of several million dollars have been added to the Continental factories during the past several months, in spite of the general depression. The Muskegon plant, which is laid out to specialize in four-cylinder engines, has doubled in floor space, manufacturing equipment and capacity during this time. The new machinery and tools are intended to insure high standards of quality, uniformity and interchangeability. Perhaps no single department illustrates to better advantage the interesting possibilities of this new equipment than the crankcase division.

In this department there is equipment now being used which not more than 12 months ago manufacturing experts insisted could not be produced. This includes multiple-spindle tapping, automatic four-way drilling, rough and finish milling as many as twelve different surfaces at one time in the same continuously operating machine, and other equipment of equal interest.

The result of these improved practices is a marked advance in the possibilities of machining uniformity, high standards of accuracy and the maintenance of close manufacturing limits. For instance, one four-way, multiple-spindle drilling machine now does the same work as was done on five multiple-spindle machines. In fact, the railway type of installation perfected and used so successfully by Continental was described in *AUTOMOTIVE INDUSTRIES* at that time and was pointed out as being an extremely important development in crankcase manufacture. There were five machines along the line of railway and a jig traveled from one to the other on a track. This was a rotating, indexing type of jig, which permitted very rapid passing of the work from one multiple-spindle machine to the next. The new four-way, multiple-spindle machines perform 84 drilling operations at one time.

Another type of specialized equipment taps 56 holes simultaneously. Car and truck manufacturers who follow the progress of the industry will realize that this is a rather advanced step in aluminum crankcase manufacture. Two skilled operators can put a crankcase through the drilling operation along the railway system in three minutes, which is the actual capacity of the

system, as there is no lost motion in passing work from one machine to the next. With the 84-spindle machine, one crankcase is drilled each minute with practically no manual effort on the part of the operator.

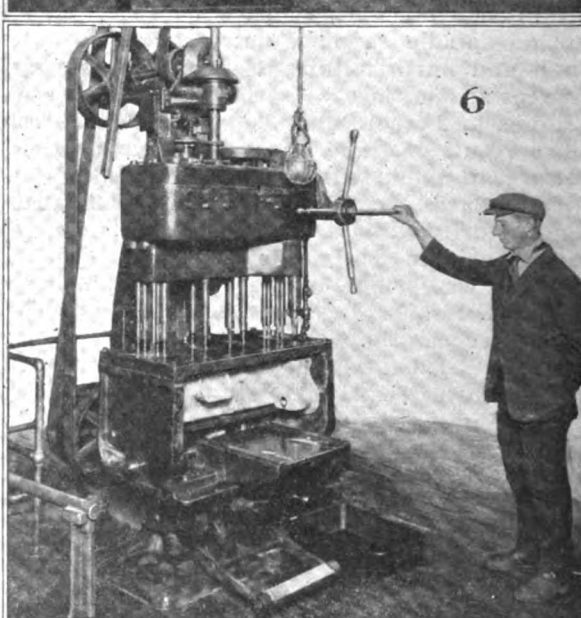
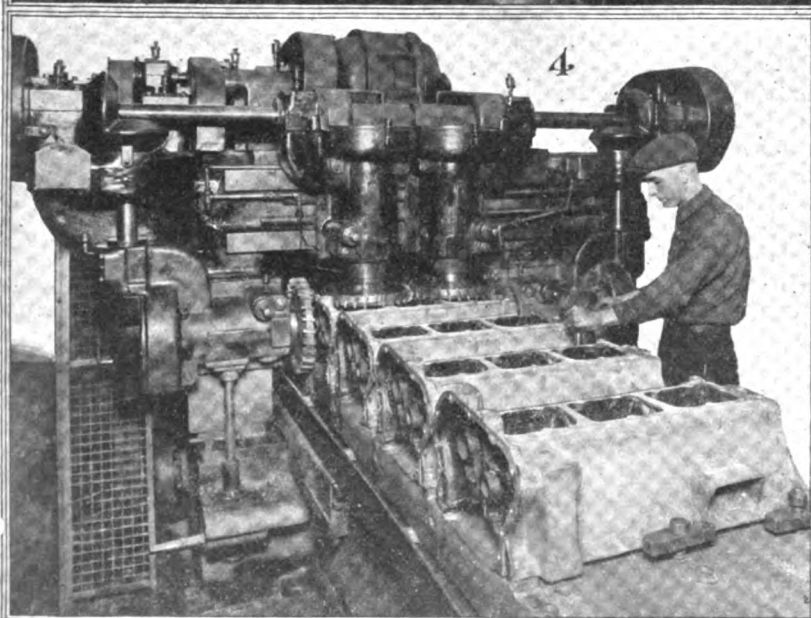
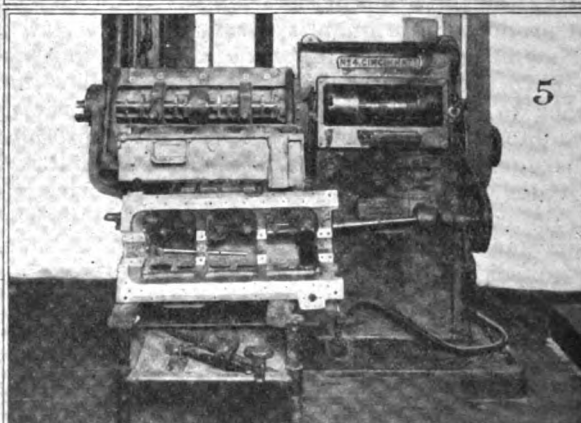
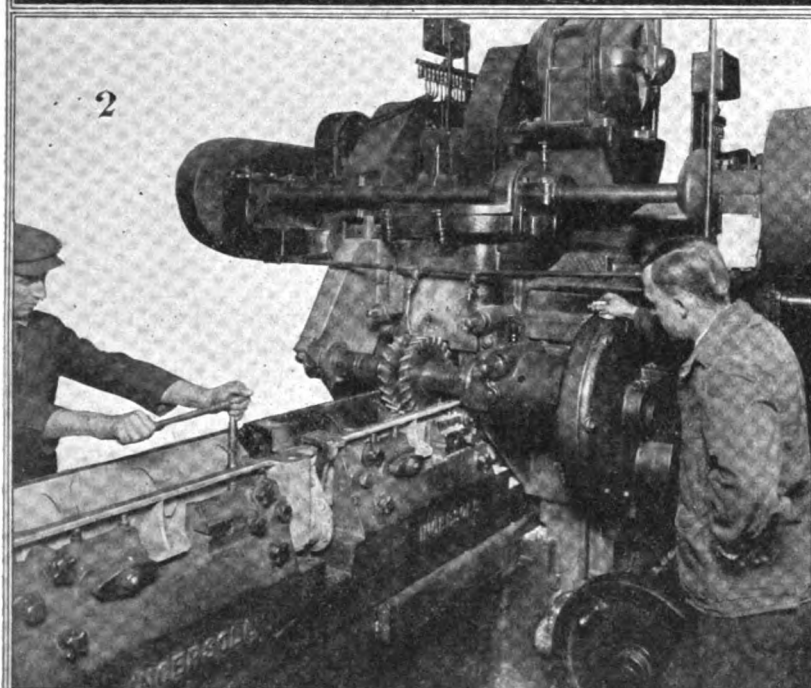
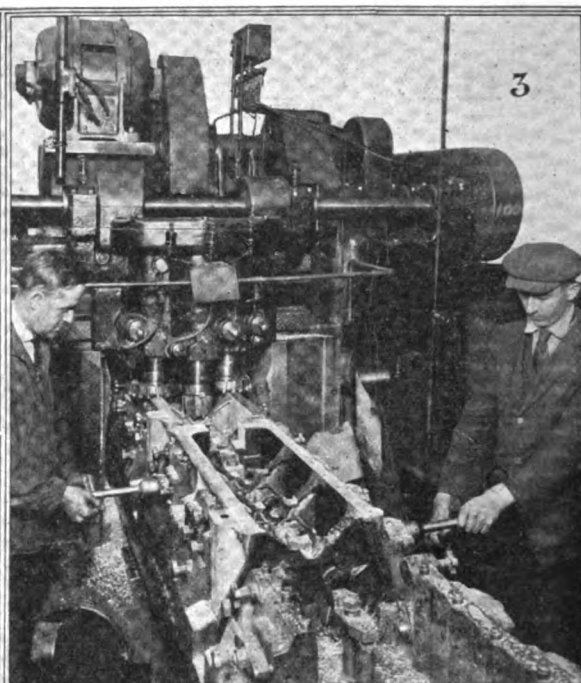
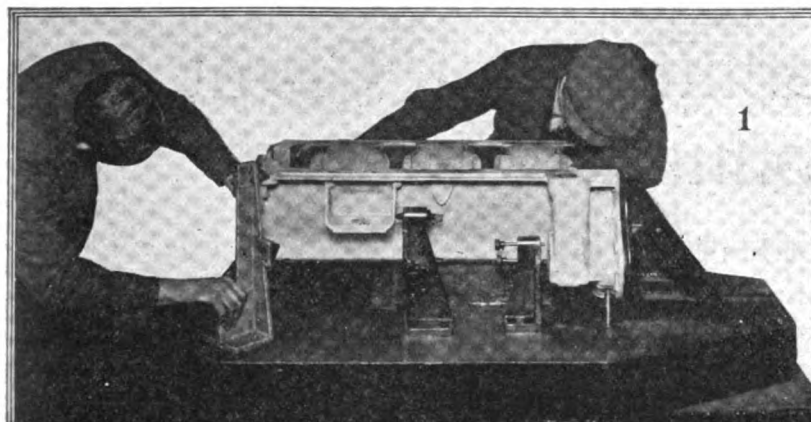
Crankcases are received in the form of aluminum castings with the steel oil tubes cast directly in the case. The steel oil tubes include a main oil lead and branch leads which run to each of the main bearings. This tube assembly or galley line is brazed together and then cast into the crankcase. The crankcase castings are, of course, sand castings, but are made from special metal patterns which are adapted to working with automatic molding machines and which insure castings having a uniform thickness of metal walls. The construction of the patterns, as well as the special molding machines, is such as to permit exceptionally close limits for foundry work. The cases are splendid examples of up-to-date foundry practice.

The crankcases are inspected on an inspection fixture, Fig. 1, to determine whether there is sufficient metal on all surfaces where machine work is to be done. One crankcase out of each foundry run is passed into a special inspection room, where it is carefully gone over and scribed off in detail to see that it accords with the dimensional limits established.

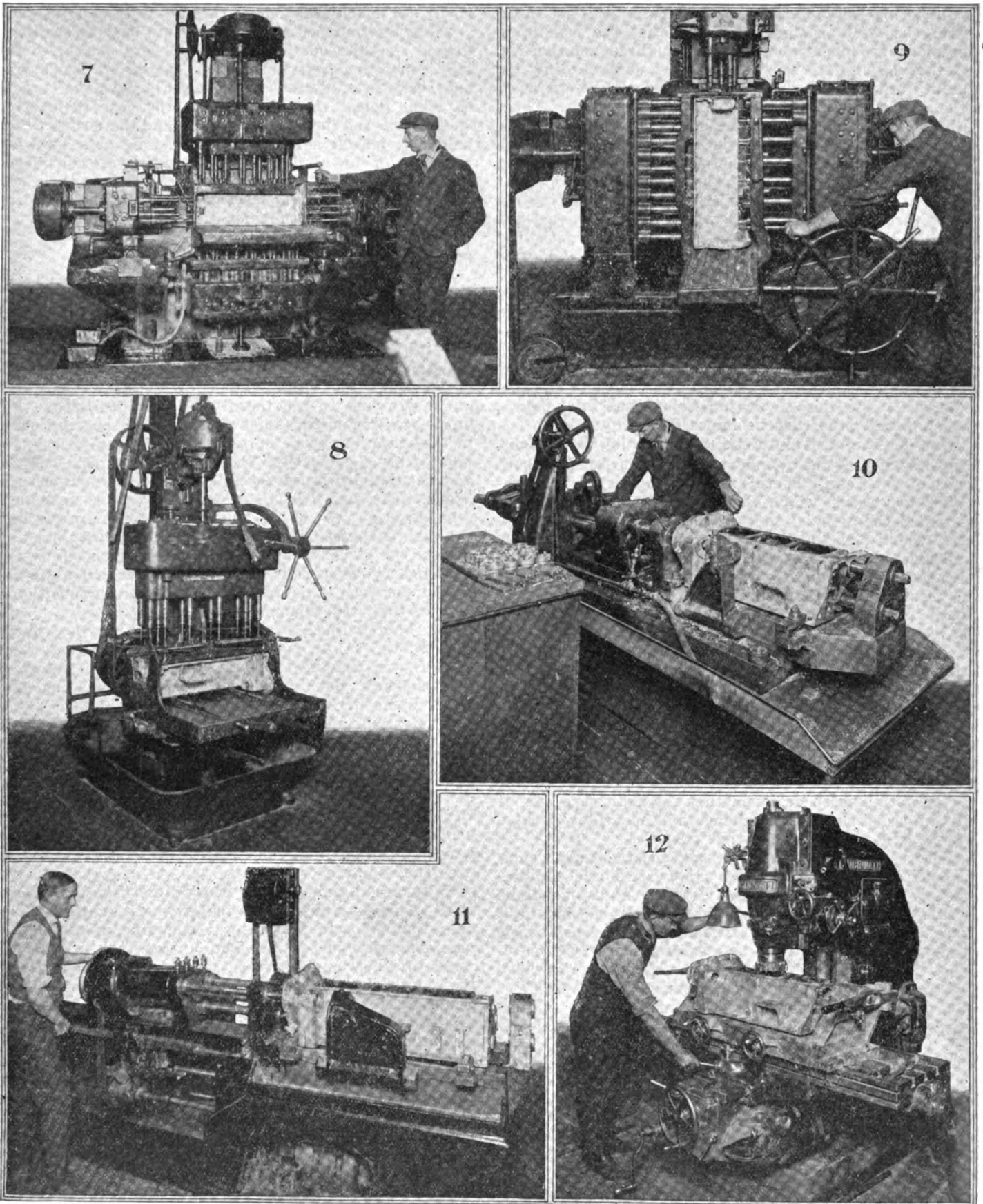
After inspection the crankcases are sprayed on the inside with a special solution known as enamel filler. This finely atomized spray thoroughly permeates the metal and takes on a sort of celluloid texture (after it hardens) which permanently seals the pores of the metal. The first actual machining operation is accomplished on a new type machine, Figs. 2 and 3, which is equipped with four roughing cutters and three finish cutters. Six cases are accommodated at one time on the reciprocating table, which has a quick return movement. The fixtures into which the crankcases are fitted are equipped with shims for leveling the case properly to take this initial cut. The machine rough and finish faces six different surfaces at one time.

The importance which Continental places upon the proper installation of the crankshaft is here plainly evident, as in this initial operation the first step is taken to assure the horizontal center line of the crankshaft being parallel with the upper and lower surfaces of the crankcase. An interesting feature in connection with the initial milling operation is that there are spring plungers beneath the projecting flanges of the case to stiffen them against the pressure of the cutters. As a result, smoother and more perfect machined surfaces are consistently maintained than would be possible with a less rigid support.





1—Gaging the raw crankcase casting for 7-R Continental engine before starting its manufacture. 2—Ingersoll continuous miller which takes four rough cuts and three finish cuts. This mills the main bearing surfaces and rough mills and finish mills the oil pan bolting flange which acts as a master locating surface in all subsequent operations. 3—Showing the finish cutting side of the same Ingersoll miller as illustrated in Fig. 2. 4—Milling the cylinder attaching surface on an Ingersoll miller and straddle milling endwise the 7-R Continental crankcase. 5—Straddle milling the main bearings on the 7-R crankcase in a No. 4 Cincinnati miller. The machine is shown above and a milled case below. 6—Drilling 15 holes for the crankshaft main bearing caps, distributor drive hole, oil slinger plate screws on a Foote-Burt multiple spindle drill



7—Four-way automatic Foote-Burt multiple spindle drill which drills eighty-four holes a minute in the 7-R crankcase. This is a non-adjustable tool solely designed for work on this case. It drills the four ways simultaneously. 8—A Foote-Burt multiple tapping machine which taps fourteen holes at once, taking care of the main bearing cap screw holes and others. 9—A three-way multiple tapper which taps fifty-six holes simultaneously. It was not long ago that a tool of this kind would have been considered an impossibility. 10—Cutting ten bearing surfaces for the crankshaft, camshaft, idler gears and water pump shaft simultaneously on a machine designed in the Continental plant. 11—Flycutting the bearing surfaces on the 7-R crankcase with a Continental designed machine. 12—Taking the light finish cut from the cylinder bolting surface of the 7-R crankcase. The location is by spindles which enter the end main bearings, giving proper distance from center line of crankshaft to finished middle surface

In noting the operation on crankcases it is an interesting as well as significant fact that the machining divisions are departmentized under three main heads, so that specialists are at all times safeguarding the quality of the finished product. There are the operators who actually supervise the machining operations. There are the expert machine setters who are held responsible for the accuracy of the work. They are the men who set up the machines for the work and who maintain their cutting accuracy. The operators do not do their own setting. They are only responsible for getting the work through the machines which have been set for them by the men who specialize in this important work. The third department is that of maintenance, which is solely concerned with the upkeep of the machinery.

The large output of the Continental plants makes it possible to especially design and adapt each machine to but one definite operation, and to maintain the functioning of each machine continuously day after day on the one kind of work. This permits of commercially maintaining exceptional machining accuracy and accounts for the close limits on Continental blue-prints, which would otherwise be impossible in quantity.

One of the next interesting machining operations, Fig. 4, is milling the cylinder attaching surface and both ends of the case. There are four cutters on this machine, two above, which take care of the upper surface to which the cylinder block attaches, and two side cutters, which straddle the entire length of the crankcase and machine it to its proper limits. The fact that the crankcases are handled in this way is very important in assuring interchangeability. The type of multiple-tooth cutters used and the cutting speed selected is such as to make possible true and uniformly machined surfaces. All cutters are designed and built by Continental.

Straddle milling is also used for the crankshaft main bearings. A miller adapted to this work, Fig. 5, with nine cutters takes care of all main bearings and also the oil slinger groove at the rear of the rear main bearing. Location is from the master locating surface and special locating gages. This method of location need not be repeated for each operation, as in every case the jig or fixture is so designed that the crankcase can be fitted against the master surface and accurately located by the gages provided for that purpose.

Fourteen holes for the crankshaft main bearing caps, as well as for the oil slinger plate, are bored simultaneously on a special non-adjustable, multiple-spindle drill, Fig. 6. The fixture used in this case is a box type. The simplicity of the fixture, the method of automatically locating the case against the master surface by a movement of the foot and the few seconds required to make the set-up are particularly interesting. The capacity of this machine drill is one case per minute.

#### Four-Way Multiple-Spindle Drilling

Following the crankshaft bearing cap seat drilling is the operation on the large, automatic, four-way drilling equipment which has been mentioned. These machines, operating with a closed box jig, drill four ways simultaneously, Fig. 7. The 84 holes are drilled in one minute. In the ordinary engine manufacturing shop anywhere from three to twelve multiple-spindle drills are required to perform the operation that this type of machine takes care of simultaneously.

It is equipment of this kind which can be used only where there is production of a standardized product in sufficient quantity necessary to warrant such an installation. It also is equipment of this kind which establishes accuracy and interchangeability. Each machine of this type is designed and built especially and exclu-

sively for machining one particular type of crankcase.

All of the fourteen holes in the main bearing seats are tapped simultaneously on machines very similar to the type which performs the drilling operation, Fig. 8, and another type of three-way tapper, Fig. 9, takes care of 56 other holes. In this machine the case is inserted sidewise on end into the box fixture and the device which holds the master surface against the jig acts sidewise. Machines of this kind until just recently were considered impossible, but the phenomenal progress made in the science of specialized machines for engine building easily takes care of 56 tapped holes per minute.

#### Ten Bearing Surfaces Bored Simultaneously

After the bearing caps are put into place the ten bearing surfaces for the crankshaft, camshaft, idler-shaft and water pump driveshaft are bored simultaneously on special machines designed and built by Continental, Fig. 10. These give a rough and finish cut to the bearing surfaces. After a thorough cleansing, followed by an inspection, the main oil header is tested under pressure to see that there are no oil leaks. A finish reaming operation is given all the bearing seats in the crankcase to be sure that the bronze back bushings will seat perfectly. The bushings are then inserted and secured by brass screw dowels with countersunk heads. The bushings are pressed into place on a new type machine which has but recently been perfected. In these machines the bushings are protected while being pressed in place. Such improved equipment lines the bushings up with their seats so that the bushings are seated perfectly, maintained in correct alignment and held to their true diameters.

The babbitt-lined, bronze-backed bushings are flycut to size, Fig. 11, on machines which not only take care of the main bearings, but also take the finish cut from the camshaft bushings, idler gearshaft bushing and water pump driveshaft bushing.

A very light finish cut is taken off the cylinder bolting surface of the crankcase. The machines on which this operation is performed, Fig. 12, are designed and equipped to assure the utmost accuracy in the location of this surface with respect to the crankshaft and particularly to insure its being parallel with the horizontal center line of the shaft. The cases are then washed and all bushings line-reamed, after which the crankcases are ready for the crankshaft.

To assure alignment there is an interesting final operation. This is a flycut on the flywheel housing. The operation is performed after the engine is completely assembled and belted in. The cutting tool is attached to the flywheel and is driven through the crankshaft of the engine. This trues up the transmission bolting flange so that it is perfect with respect to the center line of the crankshaft and so that its bolting surface is at a true right angle with the shaft. This is an important factor in securing good operation of clutches.

In following the work through and recording its progress a pad of tickets is attached to the case when it starts through the manufacturing processes. As each man finishes his work he tears off one of these tickets, which gives the part number and the division which is taking care of the work; that is, such as crankcase machining, crankcase assembly, etc. The operation number is then given, the name of the department and the number of the case. A glance at the ticket at any time gives the condition of the case as regards manufacture and shows the operations which are still necessary to complete the work. The last ticket is removed in the final inspection department, after the crankcase has undergone a detailed and thorough examination.



# Car Owner Is Boss of Automobile Industry

A candid critical analysis of the service problems of the industry is contained in the following statements of Norval A. Hawkins. This paper should have the careful attention of every executive in the industry. It is the most important service pronouncement that has yet been presented.

By Norval A. Hawkins\*

**I** THINK we would all do well right at this time to hark back to basic fundamentals, forgetting the frills, red tape and intricacies of our Twentieth Century organizations, and ask ourselves the question, "For whom do we really work?"

It is not the sales manager nor the general manager nor the board of directors nor even the stockholders. The man to whom we really owe our jobs, individually and collectively, figure it any way you like, is none other than Mr. Retail Customer—Mr. Car Owner—the ultimate consumer. It is none other than he who pays us our salaries and tells us whether we shall run full time, double time, half time, or not at all.

It is he who is meeting our annual payroll to the tune of one billion forty-two million dollars and it is upon him that we must depend for the future security of our entire industry.

The automobile business must be reduced to sound fundamentals. We are entering into a new era. We've got to forget some of our past tactics. As our Mr. Charles F. Kettering recently expressed it—"the whole scheme of things has been reversed. We are out trying to buy the customer's dollars—our currency is in the form of gears, cylinders, pistons and axles—the exchange must be mutually advantageous—both sides must benefit—honesty must be the basis of all transactions. If the customer tries to pass off a counterfeit dollar on us, we refuse to take it—and by the same token, if we attempt to give him a counterfeit gear, or a defective axle, he has an equal right to become incensed."

In the new scheme of things we must put up a stiff fight for every bit of the business that we get and service to this Mr. Consumer is the cornerstone upon which the future progress of our entire industry will rest.

When such a mechanical product as an automobile is sold, service is a necessary corollary to sales and advertising. One of the fundamental principles of management, therefore, is that service, sales and advertising are essentially interrelated and must be governed by the same general policy if perfect co-ordination is to be effected.

\*Advisory staff of General Motors Corporation. Abstract from a paper presented before N. A. C. C. Service Managers' Convention.

Service is not a matter of minor concern, to be considered after the purchase of a car, as a mere incident. It is of major importance. Properly co-ordinated with selling and advertising, the service policies of any company, when a system of service is made effective, will be the most powerful means of building up its business.

Service is a matter of major importance, deserving of the greatest executive consideration. All of us should be directly concerned with the establishment and use of basic principles of perfect service to every car user, irrespective of the make of car that he drives.

We must be unselfish about this thing. We can best help ourselves by helping one another. No one manufacturer can ever hope to have enough service stations to care for each and every one of his vehicles irrespective of where they may happen to be. The owner, at some time or another, is at the mercy of an independent garage or a dealer who has a competitive interest. It is only through co-

operation that we may adequately serve the owner.

Experience has developed all the right principles of service. It remains only for us to put these principles into effect by applying them to our own specific products and co-operating one with another.

There are five causes and only five causes of service cost to the producer, or the car owner, or both. They are as follows:

- 1st—Faulty engineering design.
- 2nd—Faulty production, including careless workmanship, faulty material, or both.
- 3rd—Incompetence on part of service repair men.
- 4th—Incompetence on the part of the user.
- 5th—The wear and tear of normal use.

The first, second and third causes for service expense are directly within the control of the manufacturer, and we as service managers should make it our business to take some interest in the fifth cause.

Service should properly begin with the design of the car—in fact it should begin with the very conception of a product and it should be projected through the engineering, manufacturing and marketing process, assum-

ing an ever increasing importance after the product is in the hands of the user and until the time that it is ready for the discard through legitimate and honest wear—after having given an adequate return on the customer's investment.

If the maximum value to the user with the minimum service cost to the manufacturer is to be attained, then the future changes in our products must be in the direction of eliminating needless varieties in design and toward the selection of the best types of construction.

The elimination of needless variety is necessary to reduction of both production costs and service costs for two reasons, to wit:

1st—Quality of workmanship and material are more easily maintained as the variations in mechanical practice are decreased, and

2nd—Because incompetence of the service workman can be more effectively reduced as the variations in mechanical practice decrease.

It necessarily follows that future changes in automotive products should not only lead toward the elimination of needless variety, but the maintenance of the needed variety and the correct use of these variances with respect to more intelligent marketing policies.

I wonder just how much thought your engineering departments are giving to this question of service. I'll tell you some of the things that we are beginning to do in the General Motors Corporation.

First of all, in the future, no new model will ever get into production until it has been subjected to the most gruelling scientific tests that we are able to devise. I don't refer to block tests and cross country advertising tours either. I mean that a proposed model must be subjected to service equivalent to what it would get from the most careless user during the normal life of the car, keeping an accurate "log" of wear, breakage, etc., in order that we may in our service manuals give the dealer and owner specific, accurate and dependable information regarding the upkeep, repairs and replacements. Also, that we may give the dealer, right from the start, accurate data regarding the replacement parts that he should carry in stock.

And this is not all. Before we go into production on any new model, such a model must be carefully analyzed from a mechanical service standpoint. The design will not stop with the completion of the layouts and detail drawings covering the parts of the car itself, nor even with the design of production tools for its manufacture. Before any such job goes into production in any of our factories in the future, no less than five sets of tools must be designed, as follows:

1st—Jigs and fixtures for factory production.

2nd—Repair tools and fixtures for service shops at branches and large distributors.

3rd—Repair tools and fixtures for large dealers.

4th—Repair tools and fixtures for small dealers and sub-dealers.

5th—Hand tools for the owner designed especially for the particular car and adequate for such minor repairs and adjustments as may be entrusted to him.

In other words, when the owner finds something wrong on his car and he has no tool for repairing it he knows that it is time for him to visit his dealer and when the dealer has a job of overhauling for which his class of equipment is inadequate, he will in turn refer such work to the nearest distributor or branch with whom he will have a standard working arrangement covered by the terms of his contract.

The same plan will apply to service manuals and each of the five groups will be supplied with accurate and specific detailed instructions for doing the work entrusted to it.

The service man is essentially a salesman—in fact he must be a super-salesman. The new car salesman, generally speaking, sells the customer only one time. The service salesman, on the other hand, must keep the man sold by reselling him time and time again throughout the life of the car.

And remember this—the customer is invariably in the best of spirits when he negotiates with the new car salesman, but his transactions with the service salesman are usually under the most exasperating conditions.

The success of a company is primarily dependent upon the adequacy of its sales and service. There must, in the future, be a more equitable working arrangement between these two most important phases of the industry.

The salesman must work in closer co-operation with the service department. When the owner has trouble he calls on the service man to remedy it—not the salesman. Therefore, the service department should have something to say regarding the claims and promises of the ultra-enthusiastic salesman.

When a salesman resorts to untruths or to promises which he knows cannot be fulfilled it is an admission that he is lacking in real sales ability.

Motor cars, in the future, are going to be sold from the back door rather than from the sales floors and across mahogany tables. Those of us who expect to survive keen competition in a permanent buyers' market must get our "house in order."

Inasmuch as we started this discussion from the consumer end, let us next consider the dealer and the garageman and in this connection let me say that we must stop trying to "pass the buck" to the retail service organization.

While it is generally conceded that such institutions are not efficiently operated, they are not so much to blame as are we who have failed to educate our retail representatives in the proper methods of doing business.

If the retail service station has been inefficient, it is we who are to blame. There is a total of 45,135 automobile repair shops in the United States. It stands to reason that the individuals operating these repair shops do not have the same opportunities to develop proper methods of servicing our products as do we with our elaborate organizations and service specialists.

We must begin to take greater advantage of our facilities and give our dealers the advantage of our best experience.

Let us remember that while these service and repair stations are for the most part operated by individuals not directly on our factory payrolls, they nevertheless work for the same boss that we do, namely—Mr. Car Owner. These independent garages and service shops are not independent after all—they are absolutely dependent upon our product and upon the good will of the public. Many of them are our own dealers operating under contracts which carry mutual advantages.

The most valuable asset of any automotive manufacturing organization is its territorial market. There is a limit to this territorial market. From a standpoint of area, it cannot be increased. A dealer's contract allows him to work a definite part of this territory.

Service, in terms of our industry, divides itself into three classifications:

- 1—Parts manufacture and distribution.
- 2—Mechanical repair work.
- 3—Moral or psychological service.



In all three classifications, we need greater efficiency. And when I say efficiency, I don't mean "red tape" and system for the sake of system. When you come right down to brass tacks, there is only one definition of this word "efficiency" and it may be expressed in these two words, "Responsibility Met." We who have to do with service must meet our responsibility by seeing to it that our dealers carry adequate parts to serve our customers.

We must also develop scientific methods for anticipating repair parts requirements—both between the dealer and the factory service department and between the factory service department and the production department.

Before we can get our dealers to follow our methods, we've got to actually show these dealers how they can make a profit.

The reason that many dealers have failed to make a profit on their parts business is because we fellows back at the factories have **guessed** at what they needed rather than making it our business to **know** what they were going to require. The result has been reflected in great volumes of telegraphic orders, express shipments and unnecessary expense to the car owner.

Within our own organization we found through a careful analysis that from 20 to 35 per cent of all repair parts orders during the first six months of 1921, were telegraphic and that almost 50 per cent of our parts shipments were going forward by express or parcel post as rush orders with a consequent high percentage of errors.

Nor is it sufficient that we merely get them there, we must get them there in a usable condition and see to it that the dealer keeps them in a usable condition.

Before we can instruct the dealer on this, we must begin practising it ourselves. I was in one of our largest factory service departments not long ago and the gaskets for the cylinder heads and crankcases looked as though they had been put in the bins with either a pitchfork or an air conveyor. I was in another plant where we found that the connecting rods after having been aligned and inspected were thrown in a big box with several thousand others, with the natural result that the rods in the bottom of the box were bent out of shape.

In still another factory, delicate electrical parts were being handled and stored as though they were made of pig iron.

Safeguarding the quality and condition of repair parts is of vital importance to our industry. Unnecessary handling is both wasteful and expensive. With the proper development of a unit system, for packing, the repeated handling, counting and checking of repair parts with the damage and waste incident thereto can be eliminated.

Scientific anticipation of repair parts requirements and the distribution of parts on a wholesale basis are necessarily the forerunners of an efficient unit package system and we've all got to come to it.

We have no right to penalize our customers for our own inefficiencies incident to the repeated physical handling of our repair parts. We have not discharged our obligations to the car owner. We have not met our responsibility until we get these parts to him in the right condition and at the right price.

Although the war is over and the price of materials and labor has settled down to a more or less stable level, we are still asking the owner to pay us exorbitant prices for parts necessary to the maintenance of his car.

The completed motor vehicle is designed and built to meet a certain market price, but repair parts for this same vehicle are manufactured on a cost plus basis and any loose ends of operating costs are thrown into the bargain.

We recently made an investigation on a number of cars of representative makes to determine the relation between aggregate repair parts prices and the list prices of the finished products. The ratio ran from one and one-half to two.

Why should it be necessary to get twice as much for a disassembled car as you get for an assembled car? The complete car has a great deal more mechanical labor chargeable to it. There is always an unavoidable breakage of material incidental to the assembly process. It is supposed to require a more expensive type of salesman to sell a finished car and it is usually necessary to demonstrate it before consummating the sale.

And again most of us are still adhering to the unbusinesslike wartime practice of omitting our repair parts prices from our parts catalog.

It surprises me to learn that a number of companies have even discontinued the practice of supplying owners with parts catalogs.

We of the automobile fraternity do not hesitate to spend \$7,500 in the big weekly to call our product to the attention of the buyer and if Mr. Buyer answers the ad we send him 18 form letters, six

folders, a dollar and a half catalog and a liveried chauffeur to take him for a ride in the park—then after he buys the car we refuse point blank to give him a parts catalog and some of us even go so far as to attempt to charge him for it.

The present day dealer, in striking contrast—submerged in a multiplicity of models conspicuously free from any and all interchangeability of parts—is in the predicament of having entirely too many parts catalogs. He finds it necessary to refer to a veritable "5-ft. shelf" of voluminous literature to ferret out the various serial numbers, parts numbers, pattern numbers, model numbers, car numbers, motor numbers, code designations, historical data references, alphabetical prefixes, differential discounts and war tax schedules, before he becomes a party to the secret of just how much **too much** he is going to have to pay for the blame thing!

And even this isn't the worst of it for the dealer immediately goes us one better and begins to tack on extra charges covering freight, express, telegrams, handling, overhead and wear and tear on his nervous system.

I am in favor of lower prices and uniform prices on repair parts, but please don't misunderstand me. I am not at all in sympathy with those of you who do not think that a service department should be conducted for a profit and if you want to earn the status with your respective organizations to which you are entitled, if you want to be looked upon as producers instead of parasites—if you want to be business executives instead of clerks—you've got to look at it just as I do. If you are ambitious for recognition in an executive way, you **MUST** be able to show your results on the right side of the ledger.

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**E**FFICIENT service is the most effective insurance to take out on the future prosperity of the automotive manufacturer. Service is being weighed in the balance and found wanting. Haphazard methods cannot survive and the manufacturer must teach the dealer how to conduct his service at a profit and at the same time reduce the costs to the car owner. The good will of the latter gentleman will insure profits.

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Of course there are two kinds of profits accruing from service: 1st, the direct dollars and cents profit as it appears on the balance sheet; 2nd, the indirect and intangible profit accruing from the good will of a customer properly served, which is in turn reflected in the sale of new cars.

It is my contention that these two profits are entirely compatible in any manufacturing institution which has an economic reason for its existence.

Do you issue regular reports covering such items in order that your organization may get a true reflection as to the quality of the product? Do you know how much such replacements are costing you per automobile?

What is being done about it? Is the cost decreasing or increasing? What department is being charged with these costs?

Unless you are thinking in terms of profits and disseminating data of this kind among the proper departments of your organization, you have not met your responsibility—you are not doing your duty as service managers.

If the production has too much material of a certain kind, they try to pass the buck by turning it over to you service men, whether you need it or not. Let me say right here, that if you thought more about profits and turnovers you would not stand for this sort of thing three seconds!

We have just inaugurated a policy within General Motors, handed down from the president through the executive committee, that provides for service parts requirements being given precedence over production requirements, first, last and always—irrespective of the new car orders on file—and without consideration for any temporary financial loss.

We have arrived at the very sound conclusion that keeping the old cars running is of far greater and more lasting importance than the matter of getting the new cars sold.

The old car owner must be given first consideration if we expect to get new car owners. The repair parts phase of the industry must be conducted for profits but these profits must come through greater efficiencies all along the line rather than by the maintenance of prohibitive repair parts prices.

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Efficient mechanical service on the part of the dealer is of prime importance. It is not enough that he be able to just "fix" a car so that it will run—he should possess the knowledge and facilities for turning out work that would pass the most rigid factory inspection. He should have equipment proportionate to his service requirements. He should have special tools for those operations peculiar to the particular car that he represents, unless he is a very small dealer, in which case he should have a working arrangement with his distributor on overhaul jobs which he is not prepared to handle.

Here again the responsibility rests with the manufacturer.

It is the business of the factory service manager to develop or to have developed special tools and service fixtures for the use of the dealer and distributor and to see to it that such equipment is properly used.

The dealer must be shown how to lay out his shop properly. The stationary equipment should be located with a view to increased efficiency and the hand tools should be kept in special tool racks where they may be readily located instead of thrown helter-skelter around the shop. The owner must not be penalized for inexcusable lack of efficiency.

If the service manager does his duty in this direction,

repair work will gravitate to our regular dealers instead of to the back alley garage.

It is my prediction that within three years every reputable repair shop in America will be operating on some form of flat rate system. Whether we like it or not, we've got to come to it and when we do come to it we'll be surprised at just how low our past efficiency has been.

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In our factories we know just how long it takes to do a specific operation, and the exact cost of the material and labor involved, whereas, on the other hand, our service stations refuse point blank to tell a man what a repair job is going to cost him; as a matter of fact, they seldom charge any two people the same amount for doing the same job.

To me the necessity for standardizing repair operations is so obvious and so simple of accomplishment that it makes me mad when I hear a service manager say that it is impractical in connection with his particular product.

I'd like someone here to tell me the difference between putting on a steering knuckle in a factory and in a service station in so far as the problem of cost analysis is concerned.

And next we come to our third classification of service, namely, **moral or psychological service.**

In the future, we are going to see this thing that I choose to call moral service assume an ever increasing importance.

It will project itself through every phase of our service activity. Our boss, the car owner, is already demanding it, he has been meek and long suffering but his patience is just about exhausted.

Take the matter of keeping cars clean in a repair shop. A man may bring his car into your service station ever so dirty but this does not license you to turn it back to him in a still more untidy condition.

If I sent a coat to a tailor shop to have a button put on or a rip sewed up and the tailor spilled a can of machine oil on it or let his dog use it for a bed I would raise the dickens and so would you and yet every day cars are being turned out of our "authorized service" stations so greasy and mussy that after you've ridden around the next block you're a fit candidate for a Turkish bath.

Even our finest closed jobs are not immune—in fact, the average mechanic seems to fairly revel in the joys of disseminating grease and oil on a broadcloth interior—he may miss the universal joints, the transmission and the differential but the front cushion and the steering wheel—**N-E-V-E-R!**

Sales psychology must be projected into service.

To be successful, a service station must be conducted with a proper observance of the fundamental rules of psychology, common sense and decent business practices.

A strict observance of office hours should be taboo in any automobile repair shop. The biggest volume of sales on minor repair parts and accessories is made and the greatest good will is built between 5.00 p. m. and 9.00 a. m., during the noon hour and on holidays.

I would also suggest that you check up the service departments of your own immediate organizations and when I say Service Departments, I mean far more than the routine activity between the four walls enclosing the employees for whom you are directly responsible.

You must consider every phase of activity connected with your institution before you can get a true perspective of the service end of your business.

The service manager should spend more time out in the territory studying the problems of the dealers and

assisting them in the development of more efficient and uniform methods.

Service is being weighed in the balance and it is found wanting. Haphazard methods cannot survive. Service will be reduced to a uniform science. We must teach the dealer how to conduct his service at a profit and at the same time reduce the costs to the car owner.

After we have developed the proper methods, it will then be our business to check up our dealers in order that the good will of the car owner and hence the future profits of the industry may be insured.

Generally speaking, service in the automotive industry has been handled in a careless and inefficient manner. In the majority of cases it has been looked upon as a necessary evil—a side issue, subordinate to the major activity of building and selling complete units. It has been developed—or rather it has “grown up” in a hit-and-miss sort of fashion and has never had a share of recognition and sympathy proportionate to its importance. Most of us have depended too much on the sales of new cars to new customers, through new and spectacular advertising schemes, with ever changing models marketed through a new crop of dealers each season.

As a product attains a wide distribution the prospective purchaser becomes more or less immune to our ad-

vertising and sales activity and more and more under the influence of his friends who have had experience with the product in question. Whether the product receives an endorsement or condemnation depends largely upon the efficiency of the service that has been and is being rendered.

Efficient service is the most effective insurance to take out on the future prosperity of the automotive manufacturer.

We must sell service first and motor vehicles second. No matter how perfect the design and workmanship of so intricate a product as a motor vehicle, it cannot and will not stand up and give a satisfactory account of itself unless it is kept in first class condition through systematic inspection, adjustment and parts replacements. And by the same token, even a second rate vehicle can be kept going beyond its normal life if it is properly serviced.

The automotive industry leads all others in the fields of scientific research, invention, engineering, processing and manufacturing. The efficiencies and economies exercised in our modern plants are the standards of the world, but the injection of similar standards and efficiencies into our marketing and servicing methods is yet to be accomplished—and remember that “He profits most who serves best.”

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## Electric Cars in Bulgaria

**P**OSSIBILITIES for the use of electric cars in the Balkan States are outlined in a communication recently received by AUTOMOTIVE INDUSTRIES from a correspondent in Bulgaria. He states that the present high price of gasoline, combined with various other conditions, makes the electric passenger car or truck practical in those countries, and believes a good market could be found for them there.

The gasoline car is being used considerably in the Balkan States, but thus far no possibility of using the electric has been mentioned there. There are certain conditions which do not speak well for the use of electrics, such as indifferent roads and the lack of electrical plants equipped for recharging the batteries of cars. Despite these drawbacks, the correspondent is convinced that the electric car would prove successful.

Gasoline has increased in price since the war until it is almost beyond the reach of the average purchaser, while the price of electric energy has risen but 50 per cent. The difference in prices is due to the fact that gasoline is imported and the price depends largely upon the rate of exchange. Electric power is supplied by plants having water power turbines or else generating their power with Bulgarian coal. The lack of technical education among drivers might also tend to make operation of the electric cars somewhat easier. The water power resources in Bulgaria are extensive, and the required current for operating electrics could be supplied readily, for in many spots electric plants have sprung up, and but a slight adjustment of their equipment would be necessary to equip them with charging apparatus.

A regular electric transport service might possibly be developed in Bulgaria in the districts where water power is most plentiful. It is interesting to note that a good many Bulgarian forest projects, mining ventures and other undertakings cannot be developed until the transportation question is satisfactorily solved. Motor

trucks have thus far proved unsatisfactory in solving this problem on account of the high price of gasoline.

The electric taxicab and bus is also mentioned as a possibility in Bulgarian cities.

The greatest obstacle, apparently, is the roughness of the roads, and electric cars for use in the Balkans would of necessity be compelled to have their batteries shock-proof as far as possible.

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## Several Changes Made in Cole Eight

(Continued from page 1004)

assembly is now mounted on a coil spring suspension to relieve the core of all strains and eliminate squeaks and rattles.

An adjustable tie-bar is now used between the radiator assembly and the dash of the body to keep these parts in line. This tie is an addition to the support formed by the center panel of the hood, which is bolted to the radiator shell and the body dash. The hood itself has been materially improved in that heavier gaged stock is now used and reinforcements have been made in the hinge construction. The hood fasteners are now adjustable as far as the spring tension is concerned.

The rear spare tire carrier has been provided with a bottom brace to add to its rigidity, and the windshield assembly on the open model now has stanchions supported in a bracket having a firm footing in the body structure. All of these changes increase the rigidity of the assembly and help do away with rattles.

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**B**ECAUSE gasoline is very dear in France, trolley-buses are taking the place of the vehicles at present in use. Reductions in fares will immediately follow this economy.

# Problems Frankly Analyzed at Service Managers Convention

Factory service managers believe that parts prices must be reduced, that methods of handling and ordering parts should be more efficient, and that the service manager should be consulted more fully in regard to car design. General sentiment seemed favorable to adoption of the flat rate system.

**M**R. Car Owner is the boss of every man in the automobile business. This thought, voiced by Norval A. Hawkins in the opening address, dominated the entire convention of N. A. C. C. Service Managers which took place in New York on Nov. 15 and 16. Both the scheduled speakers and those who discussed the various problems brought up agreed that the success of a service policy is determined in the final analysis by whether or not it satisfies the car owner.

Many practical service problems were frankly discussed and the fundamentals underlying proper service were outlined. It was the general sentiment that parts prices should and must come down. A majority of those present agreed that price reductions in cars have not been reflected sufficiently in parts prices. One speaker stated that an analysis of a number of makes of cars showed that the total selling price of all the parts of the car as compared with the price of the assembled vehicle ranged from 1½ to 2 times as great. Others voiced the opinion privately that these figures were very conservative. Certain causes for this discrepancy in price were advanced, but the sentiment prevailed that no just cause existed for the extreme difference noticed in most cases.

The importance of service as a factor in selling was strongly emphasized. It was pointed out that service is now a matter of major importance, and Hawkins even went so far as to state that it is more important to keep the old cars running than to build new cars. He stated that "we have inaugurated a policy within General Motors, handed down from the president through the executive committee, that provides for service parts requirements being given precedence over production requirements, first, last and always—irrespective of the new car orders on file—and without consideration for any temporary financial loss."

## Educating the Dealer

The need for education of the dealer played a prominent part in the discussions. The manufacturer must take the lead in starting progressive service methods and plans and in aiding the dealer to carry them out, according to Percy E. Chamberlain, who gave the principal address at the second day's session. Chamberlain discussed the problems of the dealer in connection with service and made a strong plea for the flat rate system of making service charges. In discussing the necessity for the manufacturer taking the lead in dealer education, he said that such leadership could not be accomplished by "jazz" methods. It is essential that the traveling man sent out by the manufacturer be a real business man with a thorough knowledge of the fundamentals upon which service problems rest.

The danger of being hampered by tradition was strongly presented by Chamberlain. "Many of our service problems are simply practice," he said, and pointed out the way in which progressive methods were often difficult to establish simply because the habit of the past had been to "do it a certain way."

"We are through with the war—between service stations and car owners—and the industry wants to know what the peace terms are." With this statement as a basis, Chamberlain discussed the interest which he found throughout the country in service problems and indicated that a real movement was on foot to analyze these problems carefully and to solve them along fundamentally sound lines.

## Service in Design

The engineering department came in for discussion. One speaker started the ball rolling by saying that "one thing that will help service problems, the used car problem, the public, the manufacturer and the dealer is to start building automobiles a darn sight better—and to begin to pay more attention to service problems when the car is being designed."

Many of the service managers cited instances in which the engineering department failed to consider service problems sufficiently. Some believed that the engineer often tends to be temperamental about his design; to consider only theory and laboratory results even in the face of practical difficulties developed in the average car on the road.

It was generally agreed that the service department should be consulted more fully in the matter of design and that the engineering department should utilize to better advantage the experience of the service manager.

Along this line the matter of constantly changing models was discussed. The great service difficulties involved in frequent changes were pointed out, and the service managers seemed to believe that manufacturers should consider this point more than in the past when discussing new models.

The discussion on "What can be done to reduce the cost of parts to the owner?" failed to develop the constructive plans that might have been desired. Many reasons for high prices were given and the responsibility for their continuance was placed in many quarters. As regards a real remedy for the situation, however, it cannot be said that a great deal of new data was developed. Possibilities for increased efficiency in the ordering and handling of parts were pointed out, however, and the necessity for eliminating from service department charges certain extraneous items was indicated.

The flat rate system was discussed at length following

Chamberlain's talk. The general opinion of the meeting was favorable to its adoption, although certain difficulties in its use were pointed out in special cases. Those who have had experience with it, however, were strongly convinced of its benefits, with one exception. These benefits extended, not only to the car owner, but to the dealer and manufacturer as well.

The part of the manufacturer in the establishment and development of the flat rate system brought out several practical suggestions. It was agreed that the manufacturer can do a great deal to help the dealer in analyzing his costs, both labor, material and overhead.

The necessity for finishing efforts begun along this line was long emphasized. There was some fear expressed that manufacturers might start detailed dealer education plans of this kind, send out one or two booklets, and let it go at that.

Taken as a whole, the meeting developed a great deal of interesting discussion. While conclusions were not reached definitely in regard to any of the questions presented, certain well-defined trends appeared as indi-

cated previously. The sentiments expressed served to visualize definitely the constantly growing importance of service in the scheme of automobile marketing and to bring into relief some of the chief problems common to all companies, together with constructive thoughts as regards their solution.

Norval A. Hawkins of the Advisory Staff of the General Motors Corporation, in his address, "For Whom Do You Work?" outlined the present status, past and present difficulties, the factors involved, and methods of possible solution in regard to almost every phase of the service problem. Speaking candidly and frankly, he discussed the causes of service, the factors involved and the responsibility of the manufacturer in regard to each of those factors. He came out definitely in favor of the flat rate system, stating that "it is my prediction that within three years every reputable repair shop in America will be operating on some form of flat rate system."

The entire address was distinctly refreshing in its frankness, vigor and scope. It is reprinted on other pages of this issue.

## East Africa as a Market for Motor Vehicles

**A** REPORT, written by Colonel Franklin, Trade Commissioner, has been published by the British Department of Overseas Trade on the trade and commercial prospects of East Africa. This area comprises Uganda, Kenya, Tanganyika, Zanzibar and Pemba, totaling 751,600 square miles, and is larger than the States of Texas, California, Montana, New Mexico, and Illinois put together. The whole area is one of great potentialities. Its mineral wealth is great, and its fertile, terraced lands permit most tropical and temperate products to grow profusely. It is lack of transport facilities that prevents their exploitation.

East Africa claims the highest proportion of motors per white population in the world. At the same time, Kenya and Tanganyika are practically destitute of good roads. Pemba, a huge clove plantation, is to be provided with roads, and this year \$400,000 will be put to this purpose. Uganda's roads, however, are good. It has 600 miles of all-weather motor roads, while a further 800 are passable for trucks in the dry season. Settlers in Uganda fully appreciate the advantages of good roads. Three-tonners are considered the most serviceable type here, but Ford and Chevrolet 1-ton trucks are very popular throughout the entire district.

This market has been quiet since the war, chiefly because the cessation of hostilities against German East Africa left a large number of surplus vehicles in the area. These, however, have now been absorbed, and the demand is steadily increasing. During the last quarter of 1920, for instance, Kenya alone took \$400,000 of motor vehicles, mostly from the United States. Utility is considered before appearance, and rough going makes high clearance essential. There should never be a dearth of good drivers in East Africa as the natives show a natural aptitude for managing motor vehicles. This is an important factor as the climate, though generally healthy, is not fitted for manual labor by whites.

Gasoline is expensive in East Africa. A 20 per cent import tax is made on it, and when in the country the effects of altitude cause a wastage of 25 per cent. Oil has been found in Uganda, but whether it will prove a paying proposition has not yet been ascertained. A factory has been erected near Nairobi for the production of natalite, considered the future automotive fuel for East Africa. Much depends, however, on whether enough sugar will be grown locally for its production.

With transportation vital to East Africa's development, and with the authorities striving to improve communications and find settlers, manufacturers would be well advised to establish agencies at Kilindini, Nairobi, Kampala, Tanga, Dares-Salaam, or Zanzibar. During the last decade America has practically monopolized automotive demands in East Africa, but an effort must be made if this position is to be maintained.

## Canadian Farmers and Automobiles

**C**ANADIAN registration figures published recently show that the farmers of Ontario own 36.8 per cent of all the automobiles in that province. And near Winnipeg there has been found a grain farm of 12,000 acres upon which not a single horse is used, nor a single head of livestock raised. All the work is done with trucks and tractors. It was figured that 400 horses would be necessary to do all the work on the farm, and grain from 2000 acres would be required to feed them.

The total number of cars owned by the Ontario farmers is something like 75,000. The tradesmen own 11.7 per cent of the cars in the province and business men 10.8 per cent. The balance is scattered among people in various walks of life.

The light car is still the most popular in Canada. The touring car is the model preferred by 89.1 per cent of passenger car owners, the roadster by 6.7 per cent, sedans 2.2 per cent and coupés 1.8 per cent. Taxis and buses number about .2 per cent of the total.

**T**HE following statement from the J. I. Case Threshing Machine Co. refers to the article published in AUTOMOTIVE INDUSTRIES of Oct. 27 concerning the recent British tractor tests:

"We note that on tractor No. 10, 46 horsepower Case, no belt tests are given because the tractor did not line up in the time allowed. This statement is misleading because it would appear that the engine could not be lined up to the brake within the time allowed. Our representative reports to us that there was no difficulty in lining up with the brake but that the brake was of too small capacity to measure the power which can be developed by this tractor."



# Marketing the Motorcycle

## Part I

Besides asking "Where is the motorcycle going?" it is pertinent to inquire "How is it going to get there?" This article and the one following attempt to outline the factors underlying an answer to this second question. The principles involved in determining the extent of the market are discussed.

By Norman G. Shidle

**A** FRANK consideration of fundamental factors is always essential to the building of permanent progress. In planning commercial growth, it is more important to discover true basic facts than to successfully defend unsound methods and practices. An analysis of such facts may show serious defects in an industry, but in doing so provide accurate data upon which to base plans for a successful future. Tradition is a strong master and sometimes a hard one. The overthrow of tradition does not necessarily mean progress, but it often does. Tradition, the lesson of the past, is valuable in planning future progress in so far as it is regarded as one of the factors to be considered in a broad analysis; it is detrimental, in so far as it tries to force all other facts and conditions to conform to its standards.

Merchandising the motorcycle constitutes, perhaps, the most intricate and complex commercial problem in the automotive industry. The automobile and the truck will have far to go as regards marketing methods, but their field is comparatively well defined and the general type of vehicle has been determined. Analysis of statistics and other data shows, moreover, a healthy and comparatively permanent growth in these lines. This is not true of the motorcycle. The apparent failure of the motorcycle industry to record normal progress during recent years was discussed in a series of articles in *AUTOMOTIVE INDUSTRIES* some months ago. The factors developed in these previous discussions have a direct bearing on the vital merchandising problems which confront the motorcycle industry at the present time. A survey of the motorcycle situation at this time brings to light this fact:

Upon the ability of the manufacturers and dealers to develop and operate an effective merchandising policy rests the future of the industry. The sales department and the work of sales research will be most important factors in answering the question "Where is the motorcycle going?" The time for "abiding faith" and general ideas as regards the field for the motorcycle appears to have passed. The accumulation of accurate facts and data and a thorough analysis and interpretation of such facts is the immediate task of the industry.

The problem divides logically into two parts which may be summarized briefly as follows:

1. To analyze the field so that a given territory, and finally the sum of all territories, can be appraised with something like accuracy; to determine as nearly as possible the potential field and the people comprising that field.
2. The development of a merchandising plan based upon the results of this analysis; a merchandising plan which will be progressive and comprehensive in a way which would be impossible without the analysis to define the field and point to the goal; a plan specially adapted to the type of machine manufactured.

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**"T**HERE is a big future for the motorcycle in the United States; there is a large potential market that has not yet been sold," said one prominent manufacturer.

"The field of the motorcycle is extremely limited; I see but little opportunity for it to develop in this country," said another.

The substitution of careful marketing research for general opinions based on general ideas and experience is one of the chief immediate needs of the motorcycle industry.

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The second of these phases has been frequently discussed, but there is still much to be said and much to be learned. Any discussion of the second phase, however, can be of only limited value unless it is based upon a rather thorough investigation of the first phase. Unless there is something like accurate knowledge as to markets—and there is no such knowledge at present—a discussion of actual merchandising methods can have only a general and somewhat

aimless direction. There are certain selling methods, of course, that would obviously be of equal advantage under any circumstances, but efficient selling must rest upon a thorough knowledge of who and what comprise the market.

If a large percentage of the potential motorcycle market, for instance, is comprised of those strongly interested in racing, the expenditure of a large proportion of the merchandising appropriation for racing purposes would be justified. So with the planning and operating of all other marketing plans. To direct and apportion them intelligently, something like accurate data is needed upon which to work. Such data can be obtained only by hard work, careful study, long periods of investigation and considerable experimentation.

It is always impossible, of course, to estimate a market exactly, because the appearance of a new product often creates new prospects in itself. The Ford automatically made prospects of many people who never before considered themselves automobile prospects. Consequently, any sort of estimate attempted must be empirical in nature. It is, however, none the less valuable as a basis for plans and operations.

Various men in the motorcycle industry have their own opinions as to where the motorcycle market lies, how broad is its extent, and what are the limits of its development. But little work has actually been done to collect statistics or develop fact-data upon which to base a sound decision. The very fact that several men, all of them long associated with the industry, have widely varying opinions on this point indicates the lack of real research and the absence of comprehensive data.

In attempting to analyze the motorcycle field in this way, the possible market may be divided for general purposes into three classes:

1. Those who are already motorcycle prospects; who ride or would like to ride a motorcycle as it is now built and merchandised, and ridden. How many and what type of machines do these prospects want?
2. Those who could advantageously use a motorcycle; whose life would be more pleasant and more efficient if they owned a motorcycle, but who at the present time have no desire for a motorcycle. How many and what type of machine can be sold to this class?
3. Those who, for various reasons, are not and never will be prospects for a motorcycle.

To have the data on these three points would make it possible to determine with some degree of accuracy what is the actual field of the motorcycle in the United States, what demand can be expected, what room there is for development, and in what parts of the field development is lacking. Briefly, it would permit the making of intelligent sales and production plans.

What are the factors to be considered in such an analysis and how can the analysis be made? In *AUTOMOTIVE INDUSTRIES* of July 7, this same problem was discussed as regards passenger cars. A part of that discussion will apply as well to motorcycles, but much of it will not. Nevertheless, an examination of that article will be of value in connection with the present discussion. Determination of motorcycle markets rests upon different bases than the making of similar studies for passenger cars. Certain variables appear in a motorcycle analysis not encountered in the former case.

A certain part of the potential motorcycle market, for instance, is continually changing, namely the young men who ride the machines simply for sport purposes; the class who ride for the thrills and the pleasure; with whom the motorcycle is a hobby—and like most hobbies a temporary proposition.

There is one chief difference between the market analysis for automobiles or for any given automobile and that for motorcycles. Almost every man or family with sufficient income is a prospect for an automobile. The size of his income is usually the determining factor in deciding the class of automobile for which he is a prospect. In other words, the financial status of a man largely is responsible for whether or not he is a prospect for some kind of automobile in the United States. This is not true as regards motorcycles.

While a man must have a certain amount of money to buy and operate a motorcycle, it cannot be said that all

those above that given amount are motorcycle prospects. Moreover, even if the financial upper and lower limits were determined for motorcycle ownership, it does not follow that the man with the larger income would necessarily be a prospect for the larger rather than the less expensive motorcycle. This is true because the factors of age, strength, safety and operating ability enter to so large an extent—all of which are almost entirely absent in making an automobile analysis.

A proper estimate of the motorcycle market cannot be made, however, without considering automobile statistics, even though sales work in the motorcycle field be based upon an entirely different approach and entirely different factors. The variable factors make territorial analysis for motorcycle sales extremely difficult, but none the less necessary to intelligent sales effort. Because of the great difficulty, however, it is probably best to begin with a small territory, since the analysis must be intensive and as accurate as possible if it is to be of value.

The results of intensive analysis of a given territory will not aid in planning production, of course, except in so far as the given territory is typical of the country. It will give facts as regards that territory, however,

which will enable the manufacturer to determine just how many motorcycles of each type may be absorbed in that territory, how many prospects there are in each of the various classes and how well the dealer is cultivating his territory. Moreover, if the territory analyzed is typical of other similar territories, the results obtained will be of wider value immediately.

Gradually, of course, the entire country must be so analyzed, the results of all the territories correlated, and production and sales plans based

upon the results so obtained. Intensive study in a given territory, however, would allow the working out of all the factors involved and their proper correlation. Enough benefit could be derived to pay for the effort expended and the results would aid in determining standards on the basis of which the sales studies could be extended as indicated.

In an attempt to bring this discussion into the realms of practical selling interest and to indicate in a more specific way the lines along which such analysis may be worked out, we may take up a particular case. It may be frankly stated at once that many defects may be found in the figures and the proportions contained in the following attempt at analysis. No extensive research or field work has been done to make the actual figures correct. Even the reasoning may be defective at certain points.

Nevertheless, the effort may achieve its purpose of showing the principles upon which such analysis may be based and of indicating in a general way the lines along which such analysis may be carried out. A following article will discuss the second phase of the merchandising problem indicated previously, on the basis of some of the more recent developments in the motorcycle industry. With these facts in mind we may proceed to the test case. An actual state territory may be taken as an example to illustrate the principle more clearly.

Among the important factors to be considered in selling or analyzing a motorcycle territory are:

1. Population.
  - a. Males between 15 and 21.
  - b. Working and factory population.
  - c. Merchant and professional population.
  - d. Office workers, male.
  - e. Number of merchants having a light delivery problem.
2. Motorcycle registration.
3. Number of Blank motorcycles already in territory.
4. Number of each of competitive makes in territory.
5. Automobile registration.
6. State police functions for which motorcycle might be used.
7. City police functions.
  - a. Speed violation squad.
  - b. Park patrols, etc.
8. Local traffic conditions (as detailed an analysis as can be made).
9. Local business.
10. Economic conditions.
  - a. Local.
  - b. Individual.
11. Human and psychological factors.
12. Garage and parking facilities.

The population of the given territory is 223,003. Counting 4.5 persons as the average family, there are in this territory 49,556 adult males. We may presume, for statistical purposes, that automobiles are owned only by adult males.

Registration statistics show us that there are about 15,000 passenger cars owned in the territory. It is logical to assume that none of these car owners are motorcycle prospects. Thus the total of 49,556 adult males is reduced to 34,556. The present motorcycle registration in this territory is about 500.

Census statistics show that in this territory there were approximately 24,744 male wage earners during 1919 in factories employing 100 or more men and women, while there were in these manufacturing establishments 3076 executives and office workers. The total of these two is 27,820 male workers in manufacturing industries.

Assuming 34,556 male wage earners in the entire territory, this leaves 6736 male workers as merchants, professional, and business men not directly connected with manufacturing plants. The number of boys between 15 and 20 might be estimated on this basis at about 12,000. This is a very rough estimate, but will serve for the sake of this example. Some boys of this age will be prohibited from operating a motor vehicle in certain states. This factor must be considered. Moreover, many boys between the ages of 15 and 20 will be included among factory workers. This 12,000 may be assumed to include only those boys between 15 and 20 who are not factory workers. (Final census figures, of course, will give such data as this accurately, such estimates as these being unnecessary.)

So far our figures line up as follows:

Total male wage earners (automobile owners excluded)	34,556
Factory workers	24,744
Factory office employees	3,076
Merchants, professional men, etc.	6,736
Motorcycle registration	500
Automobile registration	15,000
Boys	12,000

Next it should be possible to determine the present distribution of motorcycles according to the various classifications involved. This information is probably not available at the present time, but data of this kind should be built up by the various factories and later pooled for the benefit of all. For the sake of the example, however, let us suppose the distribution of the 500 now in use is as follows:

Factory wage earners	350
Boys	100
Merchants, etc.	25
Factory office employees	25
	<hr/> 500

Suppose the Ford to comprise 50 per cent of the total registration. This would give a total Ford registration of 7500. Adding to this the approximate number of other low-priced cars, the total would probably reach something like 10,000. (It should be remembered that such information as this is accurately available from registration records or from companies established to render just such service.)

This would leave a total of something like 5000 middle and high-priced cars. It may be assumed that these 5000 middle and high-priced cars and about 1500 Fords and low-priced cars are owned for the most part by 9812 persons comprised in the factory office employees and the merchant and professional class. This leaves 3312 persons in this class who are not car owners, but many of whom would be financially able to own and operate a motorcycle. We may subtract the 50 already owning machines and about 1000 for factory office clerks also unable to buy and operate a motorcycle, leaving 2262.

The remaining 8500 Fords and other low-priced cars, we may assume are operated chiefly by those classed as factory workers. This assumption is not accurate, of course, but may serve our present purpose. This would leave 16,149 men in this class who are not car owners. Not all of these, however, are motorcycle prospects from the financial point of view.

To determine how many of them are is an extremely difficult problem. Here enters the question of what kind of motorcycle the Blank is, how much it costs to own and operate this particular type of machine. This particular factor will require more careful analysis before it can be considered as anything like accurate.

For the purposes of this example, we may estimate that only 50 per cent of this group is financially able to buy a motorcycle. This percentage probably gives the benefit of the doubt to the motorcycle. Thus there would be about 8072 factory workers financially able to buy a motorcycle. Subtracting the 350 already owning machines, leaves 7722.

Now to consider the boys between the ages of 15 and 21, who may legitimately be considered motorcycle prospects. The workingman's son can hardly be considered financially a motorcycle prospect, since the motorcycle is too expensive a form of sport for the workingman to indulge his son in. Thus we may assume that the boy prospects come chiefly from fairly well-to-do families numbered among the factory office employees, and the merchant and professional classes. Since these classes are but 40 per cent of the factory worker group, the estimated 12,000 boy prospects may be immediately cut to 4800.

The factory office employees not numbered among executives and salaried officials are in no better position to give their sons a motorcycle than is the factory workman. On this score some 2000 more can be taken from this list, since the census statistics say there are 1388 clerks and other subordinate salaried employees in the various factories of this territory. That leaves the number of boys whose fathers are financially able to buy them a motorcycle for pleasure use at about 2500. Subtracting the 100 already owning machines leaves 2400.

There is not space here to discuss in detail the analysis of the police and municipal market for motorcycles, a distinct merchandising problem in itself. This field can, however, be analyzed and the potential market de-

terminated. Let us say in this case that there is found to be a market for 150 machines.

Those having hunting and fishing licenses, etc., will already have been included in one of the classes discussed.

Thus far we have done two things:

1. We have eliminated all those who for one reason or another are not to be considered as motorcycle prospects in any sense.
2. We have determined the total of those remaining after these eliminations, who are financially in such a position as to be motorcycle prospects.

And in the case given, assuming the figures to be accurate—which in several instances they obviously are not—we have the following:

Factory wage earners .....	7,722
Merchants, professional men and factory office employees .....	2,262
Boys (15 to 20) .....	2,400
Police, etc. ....	150
<b>Total .....</b>	<b>12,534</b>

Thus it would appear that there are 12,534 persons in this territory who do not own motorcycles, who are financially able to own and operate a motorcycle, and who are not disqualified as motorcycle prospects by reason of automobile ownership. This group of 12,534 comprises the potential motorcycle field in this given territory. It is to this group that the motorcycle may be sold.

There are, of course, numerous factors that operate to hinder the selling of this potential market 100 per cent. To sell all of them could hardly be expected even under the best conditions.

Certain factors of error are apparent, of course, immediately upon a careful examination of the foregoing analysis, while certain other factors have not been considered because the necessary data was not at hand. Such points as the following fall into that class:

1. The number of merchants having light delivery problems.
2. The number of boys between 16 and 21 included in the number of factory employees.
3. The attributing of the entire Ford ownership to factory employees.
4. The analysis of the police force market.
5. Human and psychological factors; these are fully discussed in the following article.
6. Local conditions of business; traffic.
7. Economic condition of the individual worker.

These and other factors have not been handled with the accuracy and thoroughness essential. Data must be developed for some of them, as it is not available at present in the form adapted to an analysis that is to form the basis of actual plans. The example may serve, however, to indicate the lines along which such analyses can be made. There is nothing specially novel in the methods outlined, but they have not been intensively applied to motorcycle merchandising.

Having collected such data, the next step is to use it properly. It is a waste of time to collect statistics as a matter of interest. The intelligent utilization of this data comprises a major part of the second phase of the entire merchandising problem defined near the beginning of this article. This second phase is discussed in a following article, which will appear in AUTOMOTIVE INDUSTRIES in the near future.

## A "Vacuum Piston" to Prevent Burning Crankcase Oil

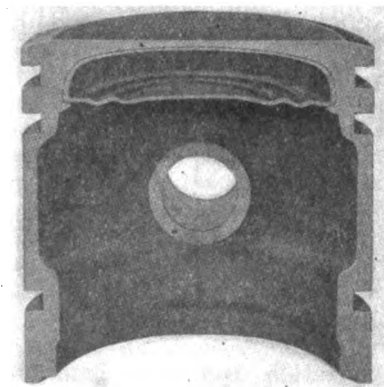
A NOVEL design of internal combustion engine piston, embodying features intended primarily to prevent the burning of the crankcase oil as it comes in contact with the lower side of the piston head, is being exploited by Hold-Mar Vacuum Piston, Reg. A pressed-steel, air-tight chamber from which some of the air has been exhausted is chill-cast into the upper part of the piston directly underneath the head. After the air chamber is in place in the piston a small hole is punched through the center of the lower face, some of the air is then forced out from the chamber by heating, and the punch hole is sealed up by soldering. In this manner a vacuum of about 8 in. mercury is obtained in the chamber, we are informed.

It is claimed that the use of this "vacuum" chamber prevents the "coking" of the oil on the piston and that no gritty matter can be found in the crankcase oil of an engine equipped with these pistons after it has been in service for a long time. The crankcase oil, it is claimed, remains at a lower temperature than in an engine with ordinary pistons, which seems quite logical.

We understand that several sets of these pistons are at present undergoing tests by the experimental departments of leading companies, and the outcome of these tests will be awaited with interest. Engineers will be especially curious regarding the effect of the vacuum chamber on the tendency of an engine to knock. It is evident that with a heat insulating chamber below the piston head the latter will reach a higher temperature than if it was subject to the cooling action of the oil spray, and with a higher piston head temperature it

would seem that the formation of carbon deposits on the upper side of the piston head would be promoted.

Another point to be considered is that the deterioration of crankcase lubricating oil is due to two causes, viz., dilution by the unburnt heavy ends of the fuel and the formation of solid carbon particles, which latter are apt to get into the bearings and wear them out.



Section of Hold-Mar vacuum piston

The question then arises whether the oil becomes unfit for lubrication first through dilution or through contamination with burnt oil. It is, of course, not impossible that the heat insulating qualities of the "vacuum" piston have some effect on the rapidity of dilution, though it is obvious that they cannot entirely prevent it.

# Increased Efficiency Through a Decentralization Process

Executives of dominating establishments in several lines of industry have admitted that they cannot compete with concerns of medium size in the same line. Mr. Tipper, in this article, shows that it is impossible to get the same returns from a group of vast size as from the medium sized unit.

By Harry Tipper

**D**ISCUSSIONS have been occurring for some time among business men of economic training concerning the group limitations in size and number of units necessary in order to secure the maximum of efficiency in the individual of the group.

It is important for the manufacturer to remember that no single element of the mechanical fabric of industry has justified by the past development, the tendency to increase the industrial group, because the past development has been almost entirely the building of the fabric and not the operation after it is fairly complete.

This mechanical system of industry has been building from the beginning of the nineteenth century until the World War. In the building of this fabric some groups have been enlarged by the natural centralizing of control and other groups have been separated by the natural decentralization process.

Human variation makes it impossible to secure the same maximum efficiency out of the individual with a group of 25,000 people working in one establishment as with a group of 500 working together. There is a law of diminishing returns in efficiency, in the human skill and activity itself, and this law makes it difficult to secure the same amount of co-operation, intelligent effort and relative co-ordinated skill in the large group.

**It is interesting to note that in some important lines of industry to-day the largest operators in those industries are unable to manufacture and sell a given quality and quantity of material at a price at which smaller units in the same field are able to deliver.**

Because the introduction of machinery and its increased use demanded the co-operation of larger groups of individuals in the same establishment, we have been led into the assumption that the larger the group, the greater the efficiency. In making this assumption, however, we forget that the new discoveries in productive appliances of a mechanical kind automatically increased the productivity of the individual without reference to his increased capacity.

As the improvement in mechanics slows up and the industrial fabric becomes integrated into a thorough skeleton of organization from a mechanical standpoint, the increase or decrease in the human efficiency becomes more important in its effect upon the economic position of the group.

In fact, this increase or decrease may make the difference in competitive strength in the near future because of its influence upon the cost. Signs are not wanting that there is a definite economic limit beyond which it is unwise to centralize organization, and at which point it

is necessary to begin the consideration of decentralization.

The elements of understanding, the freedom of action, the spirit of co-operation become more difficult to insure as the group becomes larger, the centralized system more complicated, and the motions require references to a larger number of supervisors in order to secure a decision. The rules and regulations become paramount when the centralized system governs so large a field and operates through many hundreds of supervisors and many thousands of subordinates. This danger increases much more rapidly as the organization grows from medium to great size than it does when the organization develops from small to medium size. The tendency for rules to grow more rapidly than the requirements of business is much more marked in the management of the larger groups.

In one of the important industries connected with the automotive field where a few of the larger companies represent groups five or eight times the size of any of the others, the amount of business they are securing from the field represents a very much smaller proportion of the total business than their percentage of investment would demand. They are unable to meet the stress of competition as successfully as the medium size concern, because of the many factors involved, the complicated system of operation demanded and the neutralization of their buying and capital advantages by the inefficiencies, lost motion and expense involved in these complicated systems that have grown up with the centralization of control.

Even the officers in such organization are restricted by the scattered ownership and the limitations imposed upon them because of the character of the financial control. While the medium size organization with its ownership centralized largely in its active officials can decide a policy at short notice and with no great discussion, the question of such a policy must roll through a larger organization from the local head to the general management, thence to the directors, and, frequently, thence to the officers and the financial committee, before any change can be made. This consumes an enormous amount of time, effort and expense. It reduces the flexibility of the organization. Even the officers must consult the traditions, the rules and the regulations of the concern before they can take any radical steps that may be required by the economic changes.

The rapidity of action decreases from top to bottom of the establishment. The flexibility of movement required for rapid progress is less possible and the initiative itself is decreased by the difficulty of seeing the



visible results of the suggestion or the improvement, upon which the individual supervisor or executive has put his energies.

The man who has been handling one factory as a production man is called upon through the exigencies of such organization to preside over the operations of twenty factories and enormous distributing and marketing problems. Nothing in his past experience has fitted him for this responsibility. As the general manager of one factory, he has been governed by the rules and regulations of the executive offices, and irritated by the length of time and red tape involved in the discussions of any new question. Faced with a new problem, he finds himself obliged to accede to the routine of decision, the centralized operations of the system as it is already established, and to depend upon traditional methods very largely for his own government of the matter.

Leadership is possible in a very definite sense in an organization of medium size. There is no training for leadership in the organization of vast size. The man who becomes the head of such organization arises from some specialized branch in the financial, production, or marketing organization. The interrelated economic problems, production necessities, sales operations require an understanding of fundamental business which he has had neither the opportunity nor the necessity to secure.

In a lesser degree this is true all through the executive organization of the dominating concern.

The present position of such organization is no justi-

fication of it as an economic unit and the tendency to decrease individual efficiency in all the elements of operation and management, is likely to change the economic position of such organizations in many lines of industry in the future.

Some lines of business require, because of their physical necessities, the co-ordination of large groups, but for the majority of businesses this co-ordination is not necessary and is economically unsound from a human standpoint, because of the diminishing returns in human efficiency.

The questions put to executives of dominating establishments in several lines of industry have brought the admittance that they cannot compete with medium size concerns in the same line. If the economic speed of development of the past twenty years were to be maintained, this would not be so important, but the evidence is that the economic development in the future will be more difficult, harder to realize and require a greater degree of efficiency in order to secure it.

The law of diminishing returns has its reflex in the grouping of individuals in production in just the same way as it operates to increase the cost of the marketing. This means that it becomes more and more difficult to secure a high efficiency in the individual as the number in the centralized system grows.

The industrial engineers who have begun to bend their energies to the work of decentralization are working along lines that suggest possibilities of improvement in connection with the deeper problems of industrial operation.

## Time Study Methods

“**T**IME Study and Job Analysis” is the title of a new book by William O. Lichtner, consulting engineer in management and construction. The book enters into a detailed study of production standardization and offers suggestions and results of actual experiences in this work.

The first chapters of the publication deal with the principles of job standardization and the author enters into the applications of these principles to methods of time study and job analysis. He also points out the necessity of securing the right man as an analyst in a plant and the various qualifications he must possess. This portion of the book, however, is mainly a review of what most men in industry know, and is used as a background for the other points brought out in the rest of the work.

Training the personnel of the department that makes time studies and works out methods for increasing production is a subject Mr. Lichtner places considerable emphasis upon. He points out that the work is somewhat in its embryonic stage, and comparatively few specialists have been developed along that line. The necessity for training men in the department is generally recognized, and a method for this sort of work is described in the book. Clerks and others are given an opportunity to develop into assistant analysts by this method, which he calls a “Non-Intensive Course in Training.” This training is accomplished while the employee is actually at work and is done under the direction of the man at the head of the department.

An intensive course, however, is recommended in plants of any considerable size. This course would be under the direction of an instructor, and while those enjoying its advantages would be employed in the department, the course would be a thing apart from their

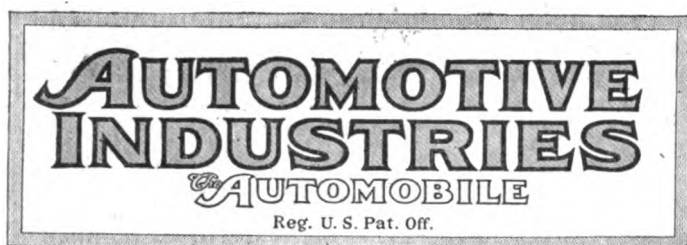
work. Time study is the thing upon which most stress is laid. Mr. Lichtner would base the course upon the four following principles:

1. Instruction in the use of the stop watch and time study sheets.
2. Instruction in the fundamentals and technique of time study by means of exercises in the office.
3. Practice in use of slide rule.
4. Practice in field work.

A detailed description of how this course should be given is contained in the book. Mr. Lichtner points out the necessity for cooperation between the analyst and the workmen in the factory and especially for establishing pleasant relationships with the various foremen with whom he comes in contact. Methods of making time analyses are fully described throughout the book and various examples are given to show the value of such procedures. A thorough study of practically every element that enters into the subject is undertaken. The question of bonuses to employees comes in for a good share of discussion and a number of methods that have been successfully employed are described in detail.

Perhaps the most striking feature of the book throughout is the emphasis placed upon the value of maintaining agreeable relationships among the employees of a factory. The human side of the factory is just as important as the mechanical part, the author contends, and in determining time standards as much consideration should be shown the employee as the machine at which he works.

The book is illustrated with charts and diagrams, showing both the methods and results of various time studies. It is published by the Ronald Press Company, New York.



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## Relations With the Dealer

IF manufacturers had long enough ears—the phrase is used figuratively and in no sense facetiously—to reach into the offices of their dealers they would hear these days many things about manufacturer-dealer relations which do not get to them through the reports of territorial travelers. They would hear dealers voice their opinions about contract relations, allotments and warehousing of cars, subjects which their travelers report with more or less regularity, but they would also hear the murmurings of a growing feeling among the merchants of the industry that manufacturers could do more, should do more, than they have in most cases to assist in the retailing of cars and in the maintaining of owner good will.

The manufacturers would find dealers battling with three major problems of their individual businesses—finance, sales and service. They would find a sentiment, while it upholds the independence of the dealer as an independent business man, that looks to the manufacturer for a broader co-operation in selling the car and keeping it sold.

The question of finance, vital as it is, has individual angles, as for instance such a situation as a well-to-do dealer handling the product of a manufacturer whose business is still in a stage of growth that limits his financial resources. But the fact remains that many dealers are going forward to-day because the manufacturer has intervened in one way or another to enable the dealer to obtain bank acceptance or corporation support for wholesale or retail financing.

The subjects of sales and service, on the other hand, are less involved, which accounts for the greater insistence on the part of dealers, hardly articulate yet, to be sure, that the manufacturer assume a larger burden of co-operation.

A dealer, with his manifold problems of management, sales and service, can hardly be expected to know the car and the reasons for its being built the way it is as well as the combined intelligences of his engineers and sales department know it. Catalogues and other descriptive literature have played their part in informing the dealer, but there can be, in many factory organizations, much more intensive study of retail selling problems than there has been and there should be a closer tie-up between the factory selling organization and the dealer sales staff, so that everybody will tell the same story about the car and tell it in the most effective way.

When we come to service we find a few brilliant examples of manufacturer-dealer co-operation in the preparation of service manuals, of records of time required for service operations and of flat rate guide books. But we find far more factories whose service literature is limited to instruction books for car users—and many of these are practically worthless. The factory has built a car and passed it on to the dealer to sell and service, but has told him nothing about how to service it. The doors are locked between the dealer and the wealth of information in the factory engineering department which ought to be adapted for use in the problem of making satisfied owners.

There has been some progress in factory recognition of the service problem, but it is far from being as rapid or as steady as it should be. There are still too many dealers experimenting on owners' cars to discover the best methods of performing certain repair operations and to learn what are fair prices for service work. And there are still too many factory service managers who do not enlighten the dealer on either of these problems.

Advantages of Light Alloy  
Pistons

LIGHT alloy pistons seem to have greater advantages for motor vehicle engines than has been imagined, if the tests recently conducted in Germany are a criterion. The advantages, moreover, do not seem to be limited to the field of high-speed passenger car engines, but to be particularly pronounced in the case of truck engines, which are governed to run at moderate speeds only. In the case of the truck engine on which the dynamometer tests were carried out, the maximum output was increased about 20 per cent without any increase in fuel consumption.

This increase in power and in fuel economy is evidently due to the use of a higher compression pressure which was found permissible with the alloy pistons. This is a factor which, so far as has come to our attention, has not been investigated in this country. We take it that in most cases in which alloy pistons have been substituted for gray iron pistons, the same compression ratio has been retained. With an engine otherwise well cooled, and especially one in which there are no valve plugs and in which the spark plug bosses are completely surrounded by water, the piston heads are undoubtedly the hottest points, which determine the limiting compression. The light alloys used for piston castings, such as aluminum and magnesium alloys, having a much higher heat conductivity than cast iron, the piston head does not get nearly as hot under otherwise similar conditions, and an increase in compression ratio is therefore permissible. It would probably not be safe to assume that the high compression ratio found the most advantageous by the German contest committee could be used with satisfaction in practice, as in the contest conditions were naturally the best; but the comparative results obtained with cast iron and alloy pistons are nevertheless suggestive.

It is also noteworthy that the best all-round results in the contest were obtained with a magnesium and not with an aluminum alloy. The earliest aluminum alloys used for piston castings had a small magnesium content and were known as magnalium alloys; but the alloys used in the prize-winning pistons in the contest consisted mainly of magnesium and did not contain any aluminum at all. Attempts have been made in this country to introduce magnesium alloys for piston use, but up to date no great amount of progress seems to have been made. It may be that engineers have been afraid of too rapid wear, as magnesium is a rather soft metal. It is, therefore, rather reassuring to learn that, according to the endurance tests made by the German contest committee, magnesium does not have to show a high scleroscope value to be satisfactory from the durability standpoint.

Heretofore manufacturers of light alloy pistons have regarded the high speed engine field as their best market, but these trials would seem to indicate that there is a large potential market for these pistons in the truck and tractor engine field.

## Practical Optimism

IT is worth while to investigate the optimistic reports concerning certain phases of automotive business, because behind those optimistic reports lie sales. The fact that someone else has actually been able to do some profitable business in lines and places frowned upon by the pessimist, indicates that others may be able to develop similar markets.

Some export agencies in great shipping centers are specially vehement, for example, in declaring how dead the export trade is in automotive lines. Yet one truck manufacturer has just sent in a report that he has sold ten trucks to the Gold Coast, Africa. Another truck manufacturer has interested large South Ameri-

can interests in the flanged-wheel railway bus developed by his company.

Much depends upon the care with which markets are investigated and the methods with which such business is handled once a lead has been developed. Optimistic reports are valuable for more than merely making someone smile. They indicate the possibility of actually doing business.

## Encouraging Kicks

MANY car owners have been dissatisfied with the service that has been rendered them on their cars. Manufacturers have only an indirect control over certain phases of this service, but exercise more direct influence on such factors as prices of parts, etc. The service departments of certain companies have come to see clearly the value of direct criticism and comment from owners of their cars. Engineering departments have gained information in this way; sales and service departments may be equally benefited.

The somewhat general dissatisfaction with service and parts prices is common knowledge, but the company which encourages direct criticism from its owners may be able to remedy faults in its own organization before they have hindered the sale of future vehicles. An owner wrote recently, for example, to a large car manufacturer, making the following statement:

"I have owned a Sennett car since 1917 and have derived considerable satisfaction from its use. However, when I have had occasion to replace parts, the charges made by your local parts department have been so exorbitant and outrageous in proportion to the obvious cost of the article delivered to me that I have determined as a matter of principle, if nothing else, never to buy another Sennett. . . . A canvass of the thoughts of various owners leads me to the conclusion that I am only one of the great army of car users who feel in this manner. . . ."

There was more to the letter, but the excerpt given presents the essential thought.

The manufacturer to whom this letter was written apparently was one of those who appreciate the value of such direct contacts with the user. The reply from the president of the company said in part: "I regret to note that the Sennett parts prices have not been satisfactory. . . . I have to agree with you that against present market costs many of the parts are a little out of line and you may rest assured that these matters will be adjusted as soon as possible. We are reorganizing many of our departments at the present time, and in a large plant such as ours it will require a few months still for us to arrive at safe new costs. . . . You need not hesitate to write us exactly what you think, for we are soliciting from our owners and dealers just such information as your letter gave. Thank you for the frank spirit of your letter."

The manufacturer who can sincerely thank an owner for a critical letter of this kind is well on the way to an analysis of his service problems which will ultimately lead to satisfied owners and resales.

# Third Quarter Output Surprises

## Compares Favorably with Period in 1920

Official Figures Show Aggregate  
of 511,510 Cars and  
Trucks Produced

NEW YORK, Nov. 22.—Official production figures showing a total output of 511,510 passenger cars and trucks for the third quarter of 1921 prove conclusively that the "slump" in the automotive industry has been more imaginary than real. This figure is only approximately 55,000 less than the production for the same period of last year which included two of the best months in 1920.

In July, August and September of this year there was a truck production of 57,322. This probably was about 7000 less than the output of commercial vehicles for the third quarter of 1920. While by far the greater portion of the trucks sold this year were light delivery vehicles, a comparison of the totals is impressive and demonstrates that a considerable number of trucks is going into service constantly.

It is perfectly safe to say that no commercial vehicles have been made for which there has not been an immediate market. The same is true, to a very large extent, of passenger cars. It is highly probable, however, that in the coming year the production of trucks will increase, proportionately, much more rapidly than that of motor cars.

While there are indications that there will be a considerable shrinkage in the number of individual manufacturers, the highway transportation industry is merely in its infancy and the next few years will witness a development which will parallel that of the passenger car. It will keep pace, in general, with improvement in general business conditions. Vocational selling will be intensified and it already is making rapid progress in many lines of industry.

The volume of sales has fallen off considerably since October in most sections of the country, although there are a few districts in which there has been little change. It is probable, however, that there will be a gradual decline until after the turn of the year.

The interest of the industry and of

prospective purchasers is centered more closely than in years on the approaching New York and Chicago shows. As a consequence there is a disposition on the part of the public to delay purchases, except of inclosed models, until after that time.

An extraordinarily large number of new models will be displayed at the shows this year and some unusually interesting announcements are being withheld until that time by manufacturers.

## Lang Body Co. Obtains Contract from Stutz

CLEVELAND, Nov. 21—The Stutz Motor Car Co. of Indianapolis has released its entire production of enclosed bodies to the Lang Body Co. of this city. Work on the job will extend over a period of months.

The Lang body is being used on a Stutz four passenger coupé. It is a semi-custom built body, all aluminum, with broadcloth trimmings throughout. The enclosed model has been added to the company's line because of the increasing demand for this type of car. Plans for the model were made last year but production was delayed.

Lafayette, Lincoln and King also have turned their enclosed body work over to the Lang company. Business during November is far ahead of the volume for the same period in 1920, it is announced at the Lang plant.

## Concordia Fire Insurance Drops Automobile Section

MILWAUKEE, Nov. 21—The action of the Concordia Fire Insurance Co. of Milwaukee, one of the largest stock companies in the Northwest, in discontinuing its automobile department has resulted in considerable agitation of conditions affecting all forms of insurance protection of motor vehicles. The only explanation of the Concordia's action is that "the unsatisfactory condition of the automobile business is responsible for the move."

## TRUCK SALES MANAGERS TO MEET

WASHINGTON, Nov. 21—Gordon Lee, chief of the automotive division, Bureau of Foreign and Domestic Commerce, Department of Commerce, will tell the National Association of Motor Truck Sales Managers in Detroit on Dec. 2 just what the Government is doing to promote interest in the automotive industry. He will appear as a special representative of Secretary of Commerce Hoover and will deliver an address at the cabinet officer's request.

## Collins Reorganizes Peerless Personnel

Anibal Succeeds Strickland as Engineer; Cunliffe, Schmunk  
as Sales Manager

CLEVELAND, Nov. 21—Reorganization of the personnel of the Peerless Motor Co. under the new management of R. H. Collins, president and general manager of the corporation, has been started with the appointment of B. H. Anibal as chief engineer to succeed W. R. Strickland, whose resignation has been accepted, and C. R. Cunliffe as general sales manager succeeding Robert J. Schmunk, also resigned.

For years Anibal has been with the General Motors Corp., resigning a short time ago to assist Collins in the development of his plans. He joined the Cadillac engineering staff in 1911 and assisted in designing in 1912 the 4-cylinder Cadillac which first used the electric self-starting system. He was also associated with the engineering department of the Oldsmobile. During the war he was connected in an engineering capacity with aircraft work for the Government.

Strickland, whom he succeeds, has been identified with Peerless for many years.

Cunliffe, who becomes general sales manager, has been regarded as one of the stars of the Cadillac distributing force. He was with the organization when Collins was president of the Cadillac Motor Car Co. and resigned as general manager of the Chicago Cadillac branch to come to Cleveland. Before going to Chicago he was manager of Cadillac in the Philadelphia district. In both cities he made fine records.

Schmunk resigns after a continuous service of 14 years with Peerless. He has not announced his plans for the future beyond a statement that he will take a much needed vacation, probably in California.

Ever since Collins took control of Peerless his engineers have been making an intensive study of conditions and an early announcement is expected of an aggressive campaign to increase sales and production.

## WILLYS PLANS 50,000 OUTPUT

TOLEDO, Nov. 22—John N. Willys has announced after an inspection of the Willys-Overland plant here that he believes the company will be able to furnish employment to 12,000 men next year and that more than 50,000 cars will be required to meet the needs of Willys-Overland dealers in 1922.

## Hanson Will Build New Car in Detroit

**Product Will Sell Under \$1,000  
—Financial Backing Se-  
cured in South**

DETROIT, Nov. 21.—Plans of the Hanson Motor Car Co. of Atlanta to manufacture in Detroit a new six cylinder car which will sell under \$1,000 have been disclosed by negotiations entered into by President George W. Hanson for a permanent plant site and for a supply of parts for the new car with leading parts makers of the district.

Under the plans, as outlined, the Hanson Motor Car Co. would be expanded into a company with a capital of from \$25,000,000 to \$50,000,000. The former Hanson line will be continued in addition to the new line, the name of which has not been determined definitely but the new models will be displayed at the New York and Chicago shows, it is stated.

It is asserted that production of the new car will not be less than 50 a day. The plan is to manufacture both in Detroit and Atlanta. It is proposed to absorb several parts plants in the Detroit district into the new company so that the car, with the exception of several important units, would be entirely of Hanson construction.

Specifications for the new car were prepared in the offices of the Hanson company in Atlanta. President Hanson and the chief purchasing agent of his company have been in Detroit for some time consulting with the leading unit makers on the possibility of getting the parts required at costs which would permit a low selling price for the new line. It is declared that they have been entirely successful in this effort and that the new car will be in production early next year.

Aside from fuel economies which are claimed for a new engine which will be used, the car will be strictly conventional in design and operation.

In connection with the news of the Hanson expansion, it is learned that the company is not in any way connected with the proposed merger of a score of companies in the Associated Motor Industries recently incorporated in Delaware. It is understood here that the Hanson enterprise has strong financial backing in the South but the source of it has not been disclosed.

## Receiver Is Appointed for Insurance Company

DES MOINES, Nov. 22.—A. C. Savage, commissioner of insurance, announced to-day that the Interstate Automobile Insurance Co. of Rock Rapids had gone into the hands of a receiver. E. H. Hoyt, former State treasurer and now president of the Solidarity Finance Co. of Des Moines, has been named receiver.

The Interstate's liabilities are given as \$930,000, including \$200,000 capital,

and its assets as \$681,000, making a deficit of \$249,000. The company has been in trouble for nearly a year. It wrote a very large volume of automobile fire and theft insurance in proportion to its resources and, according to its own statement as of Dec. 31, 1920, had less than \$21,000 net surplus left, though \$135,000 had been contributed to surplus during 1920.

It sought to reinsure all or part of its automobile business and go into the general fire business, but agents protested against conference companies helping a non-conference company out of its troubles by reinsuring its business.

## Lubrication Discussed by Metropolitan S. A. E.

NEW YORK, Nov. 21.—At the regular monthly meeting of the Metropolitan Section of the Society of Automotive Engineers held at the Automobile Club of America, Cornelius T. Myers presented a paper on the subject of "Chassis Lubrication." The author pointed out the need for more convenient and effective lubricating means than are usually employed, gave estimates of the great loss which results from failure to lubricate chassis parts properly, and described and compared various lubricating devices and systems now on the market, as well as certain types of spring shackles which require no lubricant.

H. L. Hoyt of the Belflex Corp. gave a detailed description of the fabric shackles developed by that company. An interesting discussion followed the meeting which was attended by 110 members and guests.

David Beecroft, president of the society, gave a brief informal talk on present business conditions in the industry, following the dinner which preceded the meeting. A straw vote on the most desirable place at which to hold the summer meeting of the society showed that a large majority of members present at the section meeting favored Lake Placid.

## RECEIVER FOR SEYMOUR

MILWAUKEE, Nov. 21.—The Seymour Laboratories Units, Inc., manufacturer of automotive parts, has been placed in the hands of a receiver on application of the Matthew Addy Co. of Cleveland. Julius J. Goetz has been appointed receiver. The Seymour company was organized about a year ago and opened a plant to manufacture piston rings, pistons, and similar specialties for the automotive industries. It is incorporated for \$300,000. W. E. Seymour was the founder and president.

## TALKS ON TRUCK SELLING

PHILADELPHIA, Nov. 20.—The importance of selling motor trucks on a clean, business-like basis was stressed at the November meeting of the Motor Truck Association of Philadelphia, by J. H. Feely, of the Autocar Co., who asserted that the tendency to do this has been notably increased on the part of manufacturer, distributor and salesman.

## Seiberling Charters \$55,000,000 Company

**Will Introduce New Cord Tire—  
Two Plants Will Be  
Operated**

AKRON, O., Nov. 19.—Frank A. Seiberling with his brother Charles W. Seiberling and other former Goodyear officials, has formed the Seiberling Rubber Co., chartered under the laws of the State of Delaware. Although the Delaware charter shows incorporation for \$55,000,000 the actual incorporation is for \$10,000.

The company, Seiberling announces will issue 50,000 shares of preferred stock at \$100 a share and 500,000 shares of common stock of a no par value. Under Delaware laws this common stock for incorporation purposes is given a valuation of \$100 a share. The common stock, however, will be issued on a valuation basis of \$10 a share.

## Offices in Akron

The new company, with general offices in Akron, will control and operate two tire building plants, the Lehigh plant at New Castle, Pa., with a capacity of 2,000 tires and 4,000 tubes a day, and the Portage plant at Barberton with a capacity of 3000 tires and 2000 tubes, giving Seiberling a production capacity of 5,000 tires and 6,000 tubes daily. The Portage plant, Seiberling has purchased for \$750,000.

Seiberling was also a bidder for the Republic Rubber Co., of Youngstown, which is in receivership, and although he has announced that he was no longer interested, it is still reported that he may obtain this plant.

Associated with Seiberling will be his brother Charles, former Goodyear vice-president; W. E. Palmer, former Goodyear secretary; I. R. Bailey, former Goodyear assistant sales manager; and W. A. M. Vaughn, until recently secretary and treasurer of the California Goodyear Co. Other Goodyear men also have joined the Seiberling organization. Roy Ellsworth will be Seiberling's secretary.

## To Market New Tire

Officers of the new company will be F. A. Seiberling, president; C. W. Seiberling, vice-president; W. E. Palmer, secretary; W. A. M. Vaughn, treasurer; I. R. Bailey, sales manager; William S. Wolfe, factory manager; Harold King, director of sales personnel; Karl Kilborn, manager of the development department; and W. P. Keith, in charge of laboratories.

The Seiberling company, it is announced, expects to introduce an entirely new cord tire which will be built along radically different basic principles and which can be produced at a lower manufacturing cost.

The company will manufacture automobile and motor truck tires of all sizes and types, specializing in cords for automobiles and pneumatics for trucks.



## Automotive Exports Continue Increase

Figures Indicate Decidedly Upward Trend of Business in Foreign Markets

WASHINGTON, Nov. 21—The October exports of automotive equipment showed a distinct gain in all major items over those of the preceding month, as announced to-day by the Bureau of Foreign and Domestic Commerce, thus testifying in official figures to the statement frequently made in the trade that foreign business is decidedly upward. Passenger cars, trucks and parts each figured in the gains and for the first time in many months each of these items was at a volume larger than during the preceding month.

### Price Cuts Affect Showing

The detailed figures published herewith show the comparison of the October shipments with those of the same month a year ago and with the totals for the ten-month period of each year. Exporters, however, are but little interested in such a comparison, their interest being of the more immediate rise or fall from month to month of the current business. The October figures, showing the improvement in business, should be received by them as an augury that future months hold more than the early part of the year. A comparison for the last three months follows:

Cars		Trucks		Parts
No.	Value	No.	Value	Value
Oct. 2,329	\$1,952,641	595	\$755,096	\$2,702,002
Sep. 2,197	1,870,770	472	481,664	2,570,860
Aug. 2,237	2,265,328	391	434,052	1,786,886

The total value of the automotive export trade, tires not included, reached in October a value of \$5,834,245, a gain of slightly less than three-quarters of a million over the month of September. Many price declines came into effect during the latter month and that served, of course, to reduce the actual valuation. This gain would have been more impressive, without doubt, if the cars, trucks and parts had been priced on the same levels during the two months.

### Motorcycles Decline

These totals include airplanes and parts, motorcycles, motor trucks, passenger cars, automotive parts and the engines that come under the categories of automobile, marine, stationary and tractor. Airplanes, motorcycles and engines in October were under those of the preceding month and consequently all of the gain was recorded in the three major classifications. Motorcycles dropped from 627 with a value of \$151,380 in September to 444 valued at \$115,271, engine shipments declined an approximate \$6,000 to \$296,814, and the airplane shipments were some \$22,000 under those of September.

The automotive exports for the first ten months of this year have reached

## Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for October and Nine Previous Months .

	Month of October				10 Months Ending Oct. 31			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes .....	10	\$147,600	1	\$8,000	56	\$546,174	44	\$279,940
Airplane parts.....		6,811		4,421		523,500		136,955
Commercial cars.....	2,345	4,025,161	595	755,096	24,549	38,618,018	6,540	9,469,719
Motorcycles .....	3,161	969,793	444	115,271	29,740	8,242,180	9,684	3,126,557
Passenger cars.....	11,562	14,699,402	2,329	1,952,641	121,788	139,098,944	26,229	28,331,253
Parts, not including engines and tires.....		6,910,538		2,702,002		69,337,409		33,828,455

### ENGINES

	Month of October				10 Months Ending Oct. 31			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas.....	496	\$128,158	424	\$92,553	30,026	\$4,904,539	7,001	\$1,482,701
Marine, gas.....	619	255,628	114	32,544	8,129	2,663,656	3,706	1,316,435
Stationary, gas.....	2,844	472,399	582	97,419	25,381	4,470,615	8,513	1,998,825
Tractor, gas.....	1,543	1,679,076	39	74,298	19,177	18,513,529	2,736	3,388,771
Total.....	5,502	\$2,536,261	1,159	\$296,814	82,713	\$30,552,339	21,956	\$8,186,732

### IMPORTS

	Month of October				10 Months Ending Oct. 31			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles (Imports)	41	\$63,487	62	\$75,074	787	\$858,397	461	\$773,845
Automobiles returning to point of manufacture (re-imports)....	459	522,089	130	237,187	4,849	7,718,372	3,312	5,258,944

the imposing total of \$83,359,611, which is approximately 34 per cent of the total shown for the corresponding period of last year. This figure will probably come as a surprise to many exporters, who have based their calculations on the existing markets solely in a comparison of the number of passenger cars sold. Cars, it is true, have declined materially but the shipments of parts have been at a higher level, giving a firmer tone to the market as a whole.

### Trucks Best Since March

The October shipments of cars, trucks and parts were the largest for many months. Truck shipments were the largest since April and March, although in those two months the figures were in each case only 14 and 11 higher. Consequently, we must go back to February and January to find appreciably higher truck exports than in October. The car sales were larger in May, April and February, but in each of these months the number was within 100 to 150 of the October shipments, and thus it is necessary to go back to January to find a much higher level. This also is practically true in regard to parts, although the actual value was slightly higher in May, April, March and February.

### SANFORD PRESIDENT DIES

SYRACUSE, Nov. 21—J. Frank Durston, president of the Sanford Motor Truck Co. and the Durston Gear Corp., died last week at his home here at the age of 79 years.

## Receiver Will Continue Southern Truck Business

GREENSBORO, N. C., Nov. 21—Judge James L. Webb in Superior Court here signed an order authorizing Garland Daniel, receiver, to continue operation of the Southern Truck & Car Corp. of this city until the January term of court convenes.

Since the appointment of the receiver the indebtedness has been decreased from \$61,269.04 to \$38,627.15. The assets of the company are given at \$53,871.07, leaving the net worth of the company at \$15,243.92. The receiver is authorized to settle with the creditors at 40 cents on the dollar at once if they are willing to accept this settlement, with the exception of a note for \$10,000 which would be paid in full, under arrangements which have been made.

### BOCK BEARING PLANT SOLD

TOLEDO, Nov. 22—The plant of the Bock Bearing Co. in this city has been purchased by H. W. Bigelow, Jr., from the Standard Parts Co. He is understood to have purchased it as an investment and negotiations are pending for the leasing of the property to some operating company. The plant formerly manufactured roller bearings for the Standard Parts Co. but has been idle for several months. It was one of the units which the Standard Parts Co. creditors and stockholders decided soon after the receivership to place on the market.

## Income Tax Relief Sought on Used Cars

### Indiana Trade Association Also Takes Action on Highway Program

INDIANAPOLIS, Nov. 21.—Federal action permitting automobile dealers to deduct from income taxables the depreciation on used cars was sought by a resolution adopted at the convention of the Indiana Automotive Trade Association convention which was held here. It was the first state convention to take action on the subject and a similar course was urged on other state and local associations. The present income tax law permits deduction of used car depreciation only when the car has actually been sold at a loss.

Another resolution adopted the report of the highway program committee to be presented to state authorities. Specific facts presented show the need of a more permanent road program and the abandonment of gravel for the main intercounty and market highways by Indiana. It calls for immediate action that \$4,500,000 of Federal aid funds still unused be saved for the state by getting all Federal aid projects under construction by next June after which money not so covered reverts to the government. Gravel construction costs \$15,000 per mile, for maintenance. If \$15,000 per mile is spent annually, in 10 years gravel road money would provide a Federal aid hard road to last 20 years.

Officers elected were: president, J. Cooper Props, Muncie; vice-president, M. Johnson, Vincennes; treasurer, R. V. Law, Indianapolis; secretary, Lynn M. Shaw, Indianapolis.

### Taking Steps to Organize Pacific Section of S. A. E.

SAN FRANCISCO, Nov. 19.—A meeting as part of a movement to form a Pacific section of the Society of Automotive Engineers was held here last night at which there were present automobile men, shop foremen, marine engineers, aeronautical engineers and others actively interested in automotive engineering problems. The principal address of the evening was made by F. E. Moskovics, vice-president of the Nordyke & Marmon Co. and a former officer of the society.

The prime movers in the organization of the section are Frank B. Drake of the Johnson Gear Works, A. H. Coates, president of the A. H. Coates Co., and A. H. MacCallum of the S. K. F. Industries.

### STUDENTS INSPECT PLANTS

DETROIT, Nov. 21.—Students of the Michigan State Auto School have been taking advantage of the opportunity to inspect Detroit's big automobile plants in connection with their course of advanced mechanical training here. This

week different contingents of the student body have visited the new Cadillac plant, the Studebaker plant No. 3, the Dodge and the Ford plants. These men have come to Detroit from all over the country and in fact from all over the world, to study automotive mechanics and the automobile business at the center of this great industry.

### Court of Appeals Denies Godsol Commission Claim

BALTIMORE, Nov. 21.—The Maryland Court of Appeals, in an opinion prepared by Judge Thomas, denied the claim of Frank J. Godsol for commissions amounting to \$5,590,970 in a suit brought against the Nash Motors Co. The claim was based on the sale of motor trucks to the United States Government during the war, many of which were used on the battlefields of France.

Godsol's case rested upon a contract entered into on Aug. 3, 1915, for sales made to the American Government. The defendant's claim was upheld in that the sales were not covered by the terms of the contract.

In its decision affirming the lower tribunal's decision, the Court of Appeals points to the fact that the trucks were sold by the manufacturer directly or indirectly to the United States Government, and not for resale in France, and that the several thousand or more trucks sent overseas were for the use of the American army during the war.

### Production by Hendee Continues to Increase

SPRINGFIELD, MASS., Nov. 21.—Hendee Mfg. Co. continues to increase production and is now operating with a force of more than 1000. Ole Bendixen, sales representative for Denmark, with headquarters in Copenhagen, has just paid a visit to the plant and has given a large order for motorcycles for early delivery.

B. R. Hunt, South African representative, arrived a few days ago from Johannesburg and reports good prospects for the coming spring. The two have sailed to attend the motorcycle show in London. Hendee production program calls for 20,000 cycles this season.

### Oregon New Car Trade Improves in October

PORTLAND, ORE., Nov. 21.—Business in the new car field was uniformly better throughout the State of Oregon during October than September. This rather surprising and encouraging situation is shown by the new car license figures for the month.

Further than this, October proved as good, and in some cases better, for new car business than did August. Thus far in November business has been as good as was the case during the first part of October, and indications point to a substantial and steady fall business.

## Metal Trades Show Greater Operations

### Secretary of Association Predicts Return to Normal by Middle of 1922

MILWAUKEE, Nov. 21.—An optimistic report on the business outlook of the metal trades in Milwaukee, among which the automotive industries are prominent, as this is one of the principal sources of parts and equipment in the United States, is given by W. J. Fairbairn, secretary and manager of the Milwaukee Metal Trades and Founders Association.

Within the last thirty days there has been an increase of more than 7 per cent in the number of man-hours worked in the 50 shops embraced by the association. About 11,000 men are employed, compared with 20,000 in normal times. The low point was passed during August when operations were on a basis of 38 per cent of capacity. Now the active ratio is from 45 to 47 per cent. Fairbairn looks for steady improvement, but says this will be more noticeable after Jan. 1 than between now and the end of 1921.

### Wages Decreased

Wages in the metal trades have decreased about 15 per cent. The wage problem, Fairbairn says, is complicated by the fact that the choicest workmen are now left in plants and their efficiency will be greater than the next 10,000 taken on for employment as the industry improves.

"Cycles of trade depression usually run from three to three and one-half years," said Fairbairn. "This was upset to some extent by the war, but this is the normal cycle of trade—about one and one-half years down and the same period needed to get back again. I look for a steady upward trend in activity for the next one and one-half years. The improvement will not be so noticeable before Jan. 1, but orders should increase so that there will be a much better showing by March and April, judging from experience in past years. By the middle of 1923 business should be back close to normal."

Automotive shops, as a rule, have been able to increase operations in November over October, which was slightly under September. December shipment orders are of such volume that the November schedules doubtless will experience a slight increase. In the parts industry the situation is regarded as more promising than it has been since early last spring.

### TO BUILD NEW ROADSTER

TOLEDO, Nov. 21.—The Automotive Corp. states that its new small model roadster will be in production about Jan. 1. The engine will be four-cylinder and air-cooled. The car will weigh 1000 pounds and will have a 48-inch tread and a 95-inch wheelbase. It will sell for \$475. The company was incorporated originally to manufacture tractors but has temporarily left that field.

## States Alter Trucks for Use on Highways

### Change Bodies of Surplus War Material Transferred to Meet New Needs

WASHINGTON, Nov. 23—Approximately 30,000 surplus motor vehicles, inclusive of trucks and automobiles, turned over to the Bureau of Public Roads from the War Department have been transferred to the various state highways. In addition the bureau has taken over from the department spare parts to the value of \$12,000,000.

In the dispute as to legislative action in disposing of this material, either by sales to the public or transfer to the Department of Agriculture for use on highways, the industry has generally taken the position that it would be best to have distribution made immediately. This attitude arose under the assumption that the quick absorption of the material by the state highway departments would hasten the demand for replacement and thus increase the sales of manufacturers and dealers.

#### 22,000 Transferred

In order to protect motor truck and automobile owners and dealers, the authorization for the transfer of this material is given in the Wadsworth-Kahn act which provides that the material shall be used only in the construction and maintenance of roads.

The motor trucks, of which over 22,000 have been transferred, are perhaps the most valuable equipment handed over to the states. As they were received from the Army they were not generally suitable for road construction purposes, on account of the shape and size of their bodies, which were designed especially for Army use. But the states have altered these bodies, in some cases in their own shops built for the purpose, thereby converting the trucks to a number of special uses.

#### Changes Made in Bodies

The majority of the trucks have been changed by substituting dump bodies and hoisting devices for the cargo and ammunition bodies with which they were equipped when received. In some cases new bodies have been built outright; in others the Army bodies have been converted. Idaho, for example, has altered the steel ammunition bodies into hopper bodies by installing false bottoms sloping from front and back to a pair of drop doors for bottom dumping which is controlled from the driver's seat. Maine has removed the cargo body from the chassis and by pivoting it near the rear end and adding a hoisting device has made the Army body into a dump body. The same State and also Vermont have altered the Army bodies by arranging the sides so that they can be dropped or raised, permitting the load to be dumped from the side of the truck.

Arizona sized up the trucks equipped

with steel ordnance bodies and decided that for road work they were too high and not wide enough. To make them suitable they cut the bottoms in half from front to back and then used the sides for a new bottom and the two halves of the bottom for the new sides, thus making the body about twice as wide and half as high. The change makes it easier to shovel into the truck when necessary and also permits the hauling of more bulky material. In addition the trucks have been equipped with hand hoists and offset bars on the rear end in order to pull blades and drags.

In addition to using the trucks for hauling road materials many of them have also been converted to other uses. Army ambulances have needed few alterations to make them admirable survey cars. Nearly all the states in which there is any snow problem at all have utilized a portion of their truck allotment in winter to push snow plows; and one of the other common conversions is that which results in a very serviceable sprinkler truck.

#### Storage Space Provided

Odd but ingenious use has been made by New Jersey of a truck originally intended as a water sprinkler and equipped with a centrifugal pump which was mounted beneath the tank and driven by the propeller shaft. This was changed to a machine for spraying whitewash on poles along the state highways.

Arizona has built a warehouse for the storage of its transferred equipment out of material also received from the Government. The sides of the 50 by 100 foot building are covered with corrugated iron, of which some 5,000 sheets have been distributed by the bureau.

In other states the problem of providing temporary storage space for transferred war material has been solved by the use of the canvas airplane hangars, several hundred of which have been distributed.

## Burt Single Sleeve Valve Engine Introduced Here

INDIANAPOLIS, Nov. 21—Wallace Glasgow, Ltd., the parent licensing company of the Burt (Argyll) single sleeve valve engine, has opened offices in this country with headquarters in Indianapolis. This concern is now endeavoring to interest American manufacturers in the single sleeve engine for motorcycles and other purposes. The preliminary work, however, is being done with motorcycle engines, and sample engines have been under observation by some of the largest motorcycle manufacturers.

The Burt (or Burt-McCullum as it was formerly known) was originally introduced in 1911 and became well known through its use on the Argyll British and the Pic-Pic Swiss cars. The single sleeve has both a reciprocating and an angular rocking motion, which is imparted to it by a small crank on what corresponds to the camshaft in the ordinary engine. The latest design of Burt engine was described in AUTOMOTIVE INDUSTRIES of Dec. 23, 1920.

## Willys Establishes New October Record

### Plan of Distribution Given Credit —400 Dealers Added to Organization

TOLEDO, Nov. 21—Four hundred dealers have recently been added to the Willys-Overland organization under the new plan of that organization practically eliminating distributors.

"Our dealers," John N. Willys, president of the company, says, "have given us concrete evidence of the wisdom of our new sales distribution policy by enabling us to show what appears to be the largest sales last month of any October in our fourteen years in business."

The demand for enclosed cars has been exceptionally good the last few weeks.

Some difficulty has been experienced at the plant, however, in the paint shop. Workmen were given a cut in wages which brought them practically to the pre-war basis of pay. Without any organization they refused to work at the new scale and for the last week the shop has been advertising for high-class painters and finish men.

It is understood that a considerable number of cars are being turned out and sold to dealers unfinished.

The painters objected to the cut largely on the ground that their work was intermittent and that much lost time developed during the month. This is because the factory has been operating close to the margin on orders and inventory.

## Government Will Sell Aeronautical Forgings

WASHINGTON, Nov. 21—Approximately 13,500,000 pounds of aeronautical motor forgings and castings will be sold by the Air Service within a few weeks. Informal bids will be received by the chief of the air service until Dec. 10. The forgings and castings will consist of ferrous and non-ferrous metals.

They are now located at the Long Island Air Reserve Depot, Long Island City, and are to be sold on the basis of scrap metals. The director of sales of the War Department announces that the quantities of metal being offered include 11,534,937 lb. of steel, 1,041,249 lb. of cast iron, 750,000 lb. of bronze, 189,000,022 lb. of aluminum, and 12,707 lb. of brass.

#### ALLEN CLAIMS FILED DEC. 8

COLUMBUS, Nov. 21—Notices have been issued by George A. Archer and William C. Willard, receivers for the Allen Motor Co., that all creditors having claims against the company or its receivers, or agents of either must file them with the receivers by Dec. 8, making proof under oath to the claim. This action is taken by order of the court preparatory to offering the plant and other assets of the company for sale at public auction.

## Ford Will Develop Water Power Plan

### Bids for Muscle Shoals Property Is Indicative of His Purpose

DETROIT, Nov. 21 — Statements made within the past few days by Henry Ford indicate his desire to develop hydro-electric power on a large scale in various sections of the country. This was his purpose when he filed with the Secretary of War his bid for the Muscle Shoals property and it is becoming apparent that it was what he had in mind chiefly when he put through successfully his plan for the development of power by damming the Hudson River at Green Island, near Troy, N. Y. While Ford contemplates the erection of a large plant at Green Island, work now is in progress only on the construction of the hydro-electric power plant.

#### Mississippi Surveyed

Ford has had engineers make a survey for the creation of a great lock system along the upper Mississippi which would provide an enormous amount of power. In this connection he said recently:

"The country is full of unused water power that should be harnessed and put to work. There is a fall of 400 feet in the Mississippi River between St. Louis and New Orleans and not a dam on the river."

He also asserted in a discussion of his plans for Muscle Shoals that:

"If the Government will let me go to work at Muscle Shoals I will establish a great aluminum plant in which aluminum will not only be extracted but manufactured into machinery parts. I will establish plants in which cotton will be spun and woven into cloth. I will put to work every horsepower that I can wring out of Muscle Shoals, no matter how many plants it will take to consume it."

#### Considers Packet Line

It is known that Ford's plans for the development of water power are bound up inextricably with his ideas of farm life in the future when all the arduous work shall be performed by machinery and when social life in the rural districts will be as pleasant and comfortable as in suburban communities.

Another ramification of his water power plan is the development of freight transport on inland waterways. He already is considering a plan to establish a packet line between Ironton, Ohio, and Paducah, Ky., in which a new type of river steamer will be used. These water lines would be operated in conjunction with his railroad properties.

#### WILLYS DEALERS MEET

ATLANTA, Nov. 21—Encouraging reports of Willys-Knight and Overland sales in the Southern field were made by prominent distributors who gathered in Atlanta for the first dealer meeting in

the newly created district of Willys-Overland, Inc., of which Atlanta is the central distributing point.

George DeMack, distributor for the past 10 years at New Orleans, and Gus Johnson, manager of the Jacksonville, Fla., branch, both stated at the meeting that October sales were the largest in their respective territories that they have ever been during this month.

## Utah Coal, Iron and Coke Companies Form Merger

SAN FRANCISCO, Nov. 21—An industrial combination which is of vital interest to the automotive industry, and especially to the automobile, motor truck and tractor manufacturing industry throughout the Pacific slope, has been accomplished here by the merger of the majority of the large coal, iron and coke companies of one entire section of Utah, with the iron and steel plants of California. Hitherto, the steel produced on the Pacific Coast had to be made from scrap iron, owing to the prohibitive rail rates on pig iron, coal and coke from the Pennsylvania production centers.

The new merger makes the Pacific Slope economically independent of these Eastern iron makers and should so cheapen the cost of steel on the Pacific Coast as to make much more attractive the manufacture of automotive vehicles either here or in southern California. The merger, which has been completed and officially announced, starts with a capitalization of \$25,000,000, all paid in, \$10,000,000 representing the value of the plants taken into the combination, and \$15,000,000 to be used for development and expansion.

## Bowlby Chosen to Head American Road Builders

NEW YORK, Nov. 21—The following officers were elected at the annual meeting of the American Road Builders Association held here: President, H. L. Bowlby, chief of the war materials division, U. S. Bureau of Public Roads; vice-presidents, Charles J. Bennett, State Highway Commissioner of Connecticut, New Haven, Conn.; Frank Page, chairman North Carolina State Highway Commission, Raleigh, N. C.; A. R. Hirst, State Highway Engineer of Wisconsin, Madison, Wis.; W. W. Crosby, National Park Service, Estes Park, Col.; secretary, E. L. Powers, editor, *Good Roads*, New York; treasurer, Senator James H. MacDonald, former State Highway Commissioner of Connecticut, New Haven, Conn.

#### BATTERY MEN TO MEET

DETROIT, Nov. 21—Storage battery men in the Detroit metropolitan district will hold an organization meeting on Dec. 8, for the purpose of forming a battery section of the Michigan Automotive Trade Association. A dinner will be tendered the battery men by the big distributors who are fostering the formation of the section to curb abuses which have beset the battery business.

## Success Attending Argentine Exhibit

### Points to Season Exceeding Expectations—American Lines Predominate at Show

BUENOS AIRES, ARGENTINA, Nov. 19 (By Cable)—The first week of the fourth annual Buenos Aires automobile show, which opened here on Nov. 12 and which will continue for another week, has been successful in every way. The local dealers and automotive representatives express themselves as being much encouraged by the success that has attended the showing thus far.

#### Show Unusually Important

Thirty-eight lines are represented in the show, which is held in the spacious Pavilion of the Roses, on one of the city's handsomest boulevards and near the beautiful Palermo Park. Twenty of these lines are American, eight are British and the remaining ten are French, Italian and German. Both 1921 and 1922 models are being shown. The domestic built custom and de luxe bodies are considered as one of the principal features and are attracting considerable attention.

This exhibition is held each year by the Automobile Club of Argentina, with which co-operates the Centro de Importadores de Automoviles y Anexos (Automobile and Accessory Importer's Association) and without doubt it is the largest automobile exhibition held in any part of Latin America. The current show is of more than unusual importance because of the business depression from which Argentina is now emerging and because of the general uncertainty concerning the course that the automotive trade would take for the remainder of this selling season. The success thus far encountered indicates that the season will be better than had been anticipated.

#### Sales Reported Brisk

Trucks, tractors and accessories, including tires, are well represented in the various exhibits in the halls and special exhibit rooms outside of the main floor. Although the show is primarily for the Buenos Aires public, many country dealers are reported to be present and interested in the cheaper models. The sales to the public are stated as being brisk, in some cases at increased prices due to exchange. Some lines have reduced their factory prices sufficiently to overcome the exchange handicap but others have been forced to increase prices.

NEW YORK, Nov. 21—According to the latest mail reports received from Buenos Aires, less than 1,000 cars were held in the custom house on Oct. 1 and more than 500 of these already had been paid for by the dealers. This supply, which consists of a few lines only, it was said then, would scarcely carry the dealers to the new year and that additional shipments probably would be required within a short time.

## Ford Shows Steady Export Improvement

### Better Sales Are Maintained in All Centers with Assembly Branches

DETROIT, Nov. 21—Steady improvement is being shown in the export business of the Ford Motor Co. and improved sales are reported from every center in which the company maintains foreign assembly branches. A statement on this point from the company shows that the export sales have reached an appreciable volume from the plants at Manchester, Copenhagen, Buenos Aires, and elsewhere. In addition, sales in Mexico are continuing on a level approximate with general business conditions in the United States and large shipments into that country are being made each month from the assembly plant at Houston, Texas.

#### Copenhagen at 100 Per Cent

In South America, the Buenos Aires assembly branch distributed 1650 cars in October in the Argentine, a number that will be equalled and probably exceeded in November. Sao Paulo, the assembly branch for Brazil, is operating on a smaller schedule than its southern neighbor but is showing steady improvement. This plant has about half the capacity of the Argentine branch. Other South American points are covered by direct shipment from New York and are steadily extending their demand for cars.

In Europe the Copenhagen plant which shipped about 700 cars in October is declared by Ford officials to be operating at almost 100 per cent. The output of the Copenhagen plant is absorbed in its entirety by the Scandinavian countries. These being neutral nations in the World War, their business is again close to normal proportions.

#### Continental Plants Gain

The Manchester, Eng., plant producing Ford cars, unlike the branches in other countries, is a manufacturing company, making approximately 80 per cent of the complete car. This business has shown large gains in recent months and is now on a basis of about 100 cars a day, these being sold in the British Isles exclusively. Continuation of increased buying in England, Ireland and Scotland is regarded as certain.

The Cadiz and Bordeaux assembly plants, which supply most of the other nations of Continental Europe, are operating on a reduced schedule, the company declining figures, but even here recent gains are reported. There is every intention on the part of the Ford company of locating a plant in Germany as soon as the situation is regarded as favorable. There is no direct business with Russia.

Ford Motor Co. of Canada, Ltd., which handles all Ford business in Canada and all British possessions aside from the British Isles, is operating on a

four-day week schedule, whereas the Detroit plant is maintaining five-day operation. Canadian business has fallen off considerably with the approach of winter and will be further reduced as the northern winter sets in.

Shipments to South Africa and Australia are increasing in comparison to recent months. No figures are obtainable on these, but officials are satisfied that the end of the depression in these countries is at hand and that business will make steady advances from this time on. Business in the Far East, which has been dormant for many months, continues slow, but favorable sales movement is reported.

## Pennsylvania Changes Truck Classification

HARRISBURG, Nov. 21—Changes in the classification of trucks with reference to chassis weights, fees, and maximum over-all weights allowed, are presented in the following table prepared by the automobile division of the State Highway Department:

Class	Chassis Weight	Pneumatic Tire Fee	Solid Tire Fee	Max. Cap.
AA	2,000-2,999	\$24	\$30	7,000
A	3,000-3,999	32	40	11,000
B	4,000-4,999	40	50	13,000
C	5,000-5,999	56	70	18,000
D	6,000-7,499	80	100	22,000
E	7,500-8,499	100	125	25,000
F	8,500 and over	140	200	26,000

Trucks having chassis weight of less than 2000 lb. are registered on the basis of horsepower rating, with minimum fee of \$15. A truck-tractor with semi-trailer attachment is registered as one vehicle with fee computed according to table of weight and the fees specified for trucks and upon the basis of the chassis weight of the tractor, plus the weight of the attachment. The fee for registration of any trailer with metal tires is double the regular fee for trailers.

## Olds Dealers Predict More Sales in South

MACON, GA., Nov. 27—A rapid return to normal financial conditions throughout the South with a steadily increasing volume of sales of passenger cars and trucks was predicted by Oldsmobile dealers of Georgia and other Southeastern States attending a special meeting here. A. B. C. Hardy, president of the Olds Motor Works, and Guy H. Peasley, general sales manager, attended the meeting explaining the company's business plans for the coming year and describing the 1922 models.

#### JERSEY CITY HOLDS SHOW

JERSEY CITY, Nov. 21—The second annual automobile show of the Hudson County Automotive Trade Association, which closed here to-day marks the opening of the 1921-1922 show season. A hearty reception was accorded it and the results obtained present a very optimistic outlook.

## Creditors Present Plan for Obenberger

### Bank Officers to Accept Second Mortgage Bonds to Settle Claims

MILWAUKEE, Nov. 21—The reorganization of the defunct John Obenberger Forge Co. of Milwaukee under the name of United States Forge Co., is set forth in a plan presented to the referee in bankruptcy by a committee of the principal creditors. The Obenberger company failed in December, 1920, with liabilities of \$858,972 and assets of \$1,778,329. The plant has been in operation for the last four months under the direction of the trustee, J. Frank Gerdis, previously secretary of the creditors' committee.

The reorganization plan is proposed by Walter Kasten, first vice-president of the First Wisconsin National Bank; Theodore Trecker, president of the Kearney & Trecker Corp., milling machines, and W. F. Kinsella, vice-president of the Worden-Allen Co., a large bridge and iron works concern of Milwaukee. It is proposed to issue \$350,000 of 10-year, 6 per cent first mortgage bonds; \$300,000 of 15-year, 6½ per cent second mortgage bonds; \$375,000 of 7 per cent cumulative preferred stock, and 500,500 shares of common stock without par value.

#### Referee Considers Proposition

The First Wisconsin National Bank offers to accept the second mortgage bonds in full settlement of claims. The preferred stock is to be given to unsecured creditors and holders of preferred stock of the Obenberger company. The common stock issue is designed as a bonus to purchasers of the first mortgage bonds and would be used to pay the expense of reorganization. Secured creditors would receive \$100,000 of first mortgage bonds, the remaining \$250,000 to be sold. Each purchaser of a \$100 bond would receive one share of common stock as a bonus. Owners of preferred stock would receive one share of preferred for each share, provided that they bought first mortgage bonds equivalent to the par value of their stock.

The proposal says that the net tangible assets of the United States Forge Co. would be \$1,170,000 and its net quick assets \$539,000.

The referee in bankruptcy has taken the proposition under consideration and expects to make a decision shortly.

#### RECEIVER FOR RUBBER PRODUCTS

NEW HAVEN, Nov. 21—Ernest J. Spitzer of Derby has been appointed temporary receiver of the Rubber Products Corporation upon application of the Ousatonic Water Power Co. by Judge Keeler of Supreme Court. His bond has been fixed at \$10,000. The receiver has been directed to continue the business for one month.



## Gordon Lee Visiting Automotive Centers

### Government Official Starts on Tour That Will Cover Country

NEW YORK, Nov. 22—Gordon Lee, chief of the automotive division of the Bureau of Foreign and Domestic Commerce, reached New York City to-day on the first leg of a tour that will take him to the principal automotive manufacturing centers of the United States and on which he will discuss with many executives of the industry the future of foreign sales.

Lee is getting under way the co-operative work that this new division of Secretary Hoover's department has outlined, and his trip is to further this work, explaining it to the industry so that the fullest measure of assistance may be accorded to passenger car, truck, equipment and airplane makers.

While in New York, in addition to meeting company executives, Lee will confer with representatives of the National Automobile Chamber of Commerce, the Motor and Accessory Manufacturers Association, the Society of Automotive Engineers and the Manufacturers Aircraft Association. The purpose of these meetings is to form contact with these associations and to formulate policies of work contemplated. For instance, it is hoped that the S. A. E. will see fit to work with the division regarding the standardization of spare parts so that the service effort in the foreign field will be reduced to a minimum.

Lee's program follows:

Nov. 25, Rochester; Nov. 26, Buffalo; Dec. 2, Detroit, addressing the Motor Truck Sales Managers Association at Hotel Statler before returning to Washington; Dec. 13, Toledo; Dec. 13-18, Detroit; Dec. 19, Flint; Dec. 20, Lansing; Dec. 21, South Bend, and Dec. 22, Indianapolis.

Lee will be joined on this trip by William Irvine, also of the automotive division, who will leave the United States early next year for a trip of investigation through the Far East.

## Efficiency and Economy Stressed in Bank Review

NEW YORK, Nov. 21—Business is better and sentiment throughout the country reflects courage, according to the review of business conditions for November issued by the National Bank of Commerce, one of the largest in New York. In discussing the business and credit situation the bank says:

"Such progress as has been made by the business community toward normal conditions results from a realization that artificial levels of activity will not again be reached in any period near enough to affect the problems of to-day, and from a determination to practice economies of operation more

rigid than heretofore thought possible. The need of personal effort and economy is also being increasingly recognized in giving a day's work for a day's pay and in care as to personal expenditure. Business men and executives now recognize that henceforth they must give the most thorough personal attention and application to their enterprises.

"Some part of the recent gain in business is unquestionably a result of seasonal demand. Permanent improvement depends to a large extent on foreign buying power, and even more on the adjustment of conditions under which the farmer operates. The last three years have clearly shown that the European situation can be stabilized only by the political and economic efforts of the countries concerned. Domestic conditions can be bettered by steady determination on the part of corporations and individuals to secure greater efficiency and to practice greater economy."

## Oakland Will Continue Present Line for 1922

NEW YORK, Nov. 21—A statement asserting that the present Oakland line, "with gradual improvements," will be continued for the 1922 selling season, has been issued by P. S. duPont, president of General Motors Corp. His statement follows:

"It is but natural that there should have been constant gossip during the past few weeks while automobile price revisions were under way. The policies of General Motors Corp. with respect to certain of its manufacturing divisions were not immune, the future of Oakland being the subject of persistent rumors.

"This division is in a healthy condition, with its business stabilized and sales increasing. The present line of passenger cars, with gradual improvements, will be continued for the 1922 selling season. Thereafter, new models as may be required by the trade may be introduced."

## Van Briggle Is Given Four Year Sentence

INDIANAPOLIS, Nov. 21—L. H. Van Briggle, former president of the Van Briggle Motor Devices Co., and Henry Rominger, former treasurer, were sentenced to Federal Prison for four years and for eighteen months respectively by Judge A. B. Anderson in the Federal Court. In addition, Van Briggle is to pay a fine of \$1,000 and Rominger \$500.

Both officials were indicted for the misuse of the mails and retracted their pleas of not guilty when the case was called for trial. Sentence was postponed at the time to permit Van Briggle to arrange his personal affairs.

## NEW YORK WANTS BUSES

NEW YORK, Nov. 22—Mayor Hylan announced at a conference of city department heads, called to consider amendments to existing laws to be presented at the next session of the State Legislature, that the city would ask the Legislature again for authority to operate buses. "We are prepared to spend \$10,000,000 in the purchase of well lighted, comfortable and well ventilated buses," he said.

## Vacates Injunction Against Adria Motors

### Trial Suggested by Court in Action Brought by Parenti Corporation

BATAVIA, N. Y., Nov. 21—Justice Harry L. Taylor of the New York State Supreme Court has handed down a decision vacating an injunction obtained by the Parenti Motors Corp. against the Adria Motor Car Corp. restraining the defendant from making automobiles which, it was alleged, imitated the Parenti car. The court holds that the merits of the case can soon be determined in a trial on its merits, "a method of quieting controversy far more satisfactory than that furnished by an order based on affidavits and pleadings."

In the argument on the injunction, Louis F. Vremsak, president of the Adria company, claimed that Parenti entered his employ in 1911 as a workman with no knowledge of automobile construction and that it "required painstaking effort to make of him a workman even of average ability."

### Some Ideas Similar

In his decision Justice Taylor stated that Parenti evidently had indulged in much experimentation in endeavoring to produce a more satisfactory automobile. In his discussion of the case he said:

"It is quite possible that some of the ideas of Parenti and some of those ideas which have controlled the defendants in their conception and construction of the Adria car have been similar. It is also quite possible that the defendants have received inspiration from their former association with Parenti and vice versa. However, the injunction order as it stands is prolix in preliminary recitals, some of which are unwarranted.

"It is conceded upon the argument, for example, that the defendants are not offending in respect to the steering gear. In fact, it is somewhat difficult to determine from the affidavits and an examination of the drawings just what features of the Parenti car, which are really novel, have been or are being copied or imitated by the defendants; nor is the mind of the court led at all satisfactorily to the conclusion that the defendants have been or are offending in any of the material respects claimed."

The Adria corporation asserts that two models, a five-passenger touring car and five-passenger sedan, selling at \$1,395 and \$1,995 respectively, are being produced. The car will be marketed in Ohio by the Ohio Adria Motor Car Co., which is headed by A. W. Green, president of the Supreme Motors Corp.

## DROPS MILEAGE GUARANTEE

CHICAGO, Nov. 21—The Mid-West Rubber Association, following the lead of the Rubber Association of America, at its last monthly meeting in Chicago decided to eliminate the tire mileage guarantee and to make all adjustments hereafter on the basis of defects in workmanship and material.

## California Builds Longest Test Road

### Thorough Experiments Are Made of Concrete Road Reinforced with Steel

SAN FRANCISCO, Nov. 21 — The longest and most expensive experiment in road building ever undertaken in the United States is now going on at Pittsburg, a few miles northeast of this city, under the auspices of the California State Automobile Association, with highway engineers from 17 States, nearly a score of army engineers, and road-building experts from all sections of the Pacific Slope on the ground to watch the tests and note the results.

#### Steel Company Interested

A test highway, oval and one-quarter of a mile in length, has been constructed by the Columbia Steel Co. of Pittsburg, Cal. This highway, which is 18 feet wide, is all concrete, but of 13 sections of widely varying types of construction, the thickness of the slabs varying from five to eight inches. The basis of the entire track, however, is adobe, that yellow mud which rivals southern gumbo in offering obstacles to the road-builder, yet the most common of all the basic materials encountered by the road builder in California.

Under each section of this highway, which is announced as costing approximately \$50,000, observation tunnels have been constructed, and alongside are ditches which can be filled with water, so that the foundation of the road can be soaked to varying degrees in the different sections of the various materials. Instruments to record flexure caused by the loads on the top of the pavement have been installed in each of these tunnels.

#### Government Lends Trucks

The Federal Government has loaned 40 motor trucks ranging from 1½ to 5 tons, which are being driven constantly, night and day, around this track, all loaded to capacity, some in one direction and some in the other. This driving will be continued until the road has been destroyed. Records are being kept of the wear, resistance and endurance of each section, and, as soon as a section gives away, it will be repaired, so that the most enduring of all the sections may have full share of the wear and tear, the same as the weakest section, and the entire road remain usable until the last unit gives way. It is estimated that each section will bear the passage of 3000 to 4000 heavily loaded trucks every day, and the test, in addition to proving the various forms of concrete construction, will demonstrate the best method of repairing concrete roads for heavy traffic.

In case any section fails to yield to the truck traffic, the War Department has agreed to put heavy tractors, motor gun carriages and the new army tractor,

weighing 28 tons and running at 25 miles an hour, over the road until it gives way under the strain. Close records are being kept, and the result should be a volume of invaluable data to all builders of concrete roads. The surface of the highway has been marked off into six-foot squares, and a separate record of each square, all of which are numbered, is kept so that the progress of cracks may be recorded, the spreading of small holes ascertained and all such detailed data kept in complete form.

#### Engineers Consulted

Before building this highway a questionnaire was sent to the highway engineer of each State, asking his views as to what forms of concrete highway construction should be included in the test. Federal engineers also were consulted, and the thirteen types of highway were selected for sectional demonstration.

Though the experimental track was constructed and the main burden of costs borne by the steel company, the road was laid under the complete supervision of engineers from the State Highway Department, and from the California State Automobile Association. The object of the Columbia Steel Co. in making this costly experiment is the demonstration, as one of the sections, of a reinforced concrete form of highway, devised by its engineers. One-quarter and three-eighths inch steel is used in this reinforcing, which makes of the highway virtually one side of a skyscraper, laid on the ground.

## Uniform Car Taxes Probable for Philippines

LOS ANGELES, Nov. 21 — Indications are that the fight that has long been waged by the automobile interests in the Philippine Islands for a uniform tax throughout the islands on motor vehicles will be crowned with success at an early date when the legislature tackles the tax question.

The newspapers in the islands have taken up the cry of the dealers that the automobile is an absolute necessity for the Philippines and that there is no use taking chances of injuring the industry by leaving the taxation question at the mercy of every municipal council.

The danger is illustrated by the trouble encountered in Manila where the municipal board has been determined to pass a heavy automobile tax ordinance irrespective of the insular tax.

"Some people argue that the automobile owner is more able to pay taxes than are other persons, as a general rule, and that therefore it is fitting and proper to go at it with vim and vigor," says an editorial in the *Manila Bulletin*.

"It should be remembered that the automobile owner already is paying the bulk of the taxes and there is a limit to jabbing him even though he does arouse the envy of some who are not able to ride in attractive cars. Let the tax be reasonable and uniform; let the automobile pay only its share of the taxes; let the motor industry be recognized as a vital part of our commercial life."

## Exhibit at Olympia Is Dealer Success

### Optimism Spreads to Makers and Public—Proves Popular Price Show

LONDON, Nov. 11 (*By Mail*)—The result of the 1921 automobile show, now nearing its close, has been as successful as it was unexpected. A fortnight ago manufacturers and dealers alike were discussing in dismal tones the prospects of the show and the 1922 season. Some firms would have welcomed a cancellation of the event until the declared restoration of other industries on which the car trade depends. The only factor favorable to the situation was the comparatively mild weather and the consequent prolongation of the touring season.

#### Public Cautious

Contrary to all expectations, however, the tone early became buoyant and orders began to be offered by the dealers. Their optimism spread to the makers. The formal opening day found the public interested but cautious. Even now it would be too much to say that the public or private buyer has bought freely. It is true, rather, that the dealers have filled the void and correspondingly both ensured a success to the show and the handling of next season's business through their class. The show is essentially a dealer's success and reflects more the unexpected optimism of dealers than the attractive program of the makers.

Moreover, it has been a popular-price show; cars of £300 to £450 having vastly the monopoly of interest to the public as buyers. The interest of both dealers and public centers in the small new-comers or runabouts.

#### Will Reduce Capital

There remains, however, the problem of the ways and means of the industry during the coming season or until production has well begun. The industry suffers from a legacy of the after-war boom months, 1919, to the early months of 1920. There is scarcely a company that has not to regret having greatly increased its capital, and to-day this item is reckoned in millions of dollars when before the war it seldom exceeded a million.

It is likely that this excessive capital will be reduced, because of the need to get prices back to something like the pre-war level, if only to re-establish the export trade. Allied with this aspect is the all-important factor of financing production to cope with the orders placed at the show.

#### MILBURN TO MAKE NEW TRUCK

TOLEDO, Nov. 22 — The Milburn Wagon Co. has announced that it soon will place on the market a new model electric truck. More men are being added to the working force.

## S. A. E. Will Launch Aviation Campaign

Existing False Impressions Will  
Be Dissipated at Country  
Wide Meetings

NEW YORK, Nov. 21—The Society of Automotive Engineers will open a campaign the first of December and continue it through the month with the aim of showing to the public the truth about commercial aviation and dissipating many of the false impressions now existing. The plans of the society include meetings at nearly a dozen cities in widely separated sections of the country.

### Will Review Situation

The speakers will include Admiral Moffett, head of the Navy Air Service; J. G. Vincent, vice-president in charge of engineering of the Packard Motor Car Co. and a past president of the Society; Glenn L. Martin, one of the pioneers in aviation and manufacturer in Cleveland of the Martin bombs; Ralph Upson, balloon expert, and Assistant Postmaster General Shaughnessy, who has charge of the air mail service for the Government.

These speakers will tell what has actually been done both in this country and in Europe in the way of commercial aviation, citing authoritative figures to show the number of planes now in operation, the number of miles flown during the past year, the percentage of successful flights and the number of accidents to planes attending to business, as contrasted with the much greater losses caused by spectacular flights or through the use of imperfectly designed machines or the operation of planes by insufficiently trained pilots.

The cost of aerial transport per passenger-mile and per ton-mile will be given, the figures being obtained from flights that have been actually made on regular schedules.

### Free Discussions at Meetings

A number of the problems still to be solved will also be discussed freely at the meetings. Subjects that will receive attention in this connection are airways, landing fields, ground organization, legal aspects, radio and meteorological service and the relation of civil aviation to national defense. Moving pictures will be shown of the recent aerial bombing operations against the surrendered German battleships.

All meetings will be thrown open to the public, which includes laymen interested in aircraft.

The first meeting will be held Dec. 1 at St. Louis when Vincent will be the principal speaker. Indianapolis follows on Dec. 5 and Worcester on Dec. 9. Admiral Moffett has been invited to address the New York City meeting on Dec. 15. Martin will speak at Cleveland on Dec. 16, and Upson and Shaughnessy at Philadelphia on Dec. 22. Other meet-

## EXPRESS EXECUTIVE LAUDS MOTOR TRUCKS

NEW YORK, Nov. 18 — The following statement in reference to the value of the motor truck in commerce has been made by R. E. M. Cowie, vice-president of the American Railway Express Co.:

"The value of the motor vehicle as a means of transportation cannot be overestimated; the things that it has accomplished even thus far are marvelous in the extreme. From an experience of a great many years, with all types of transportation, I have come to the conclusion that there is very much of a distinct place for the motor vehicle, propelled by either electricity or gasoline.

"Until a few years ago the express traffic of the country was conducted very largely by horses and wagons, which are in these days regarded as a slow and tedious means of transport. It is very unfortunate that horse-drawn vehicles and motor vehicles have to operate on the same highways, because the horse-drawn vehicle is very apt to keep the speed of the traffic strained back, recognizing the theory that the speed of your fleet is the speed of the slowest collier in your fleet."

ings, for which definite dates have not been fixed, will be held during the month at Cincinnati, San Francisco, Buffalo and Detroit.

## Farm Lighting Discussed by New England S. A. E.

SPRINGFIELD, MASS., Nov. 21—During the meeting here of the New England section of the Society of Automotive Engineers an inspection of the American Bosch Magneto Corp.'s plant was made.

Following a banquet at Hotel Kimball in the evening, E. B. Newill, engineer in charge of the isolated electric lighting plant section of the Westinghouse company in Pittsburgh, read a paper dealing with farm lighting plants. He described the improvements made in the construction of such plants and their increased importance in the economy of farm management.

### TO CHANGE OHIO THEFT LAW

COLUMBUS, Nov. 21—Steps are being taken by officials of Franklin County and the Ohio Automobile Association to make necessary changes to the Atwood anti-theft law which, it is hoped, will still further reduce the thefts of cars. It is suggested that bills of sale should contain the names of the seller and buyer as well as make of cars and the engine numbers. At present only the name of the buyer appears.

## Townsend to Renew Excise Tax Efforts

Will Carry Fight for Its Removal  
into Next Session of  
Congress

WASHINGTON, Nov. 23 — Senator Townsend of Michigan told AUTOMOTIVE INDUSTRIES to-day that he intended to carry the fight for the removal of the excise tax on automobiles into the next session. The passage of the tax measure retaining the excise tax on automobiles and trucks was a keen disappointment to the Michigan Senator, who had waged an aggressive, though unsuccessful battle against it. He is firmly convinced that it will be necessary within the next year to revise the tax bill as it passed the Congress, because of its inequities.

With price reductions common throughout the industry on practically all makes of cars and trucks, the tax item is an important factor in the situation. Senator Townsend feels that the conference on the limitation of armaments will have much to do with the removal of the excise tax. This belief is founded upon the fact that the larger proportion of the annual Federal appropriations are used in the maintenance of the military and naval establishment. The reduction of naval forces and the suspension of battleship construction would effect an enormous saving in expenditures, and, as a consequence, would reduce the need for taxes.

Senator Townsend is of the opinion that the economies resulting from this international action will lessen the opposition to the removal of excise tax. In his efforts to have the tax removed at the special session, he found that the principal opposition was to the elimination of this revenue.

## University Inaugurates Tractor Repair Schools

BERKELEY, Nov. 21—The University of California has inaugurated tractor repair schools throughout the State, to be maintained in operation every day in the year except Sundays and national holidays, under the direction of the College of Agriculture. Actual repair work is done by the students, and there are no fixed hours for attendance, so as not to prevent men at work in the fields and especially farmers owning tractors, or their sons, from attending whenever it is most convenient for them.

Each school will have a competent repair man in charge, and three tractor experts from the agricultural engineering division of the University of California will spend their time from now on traveling from school to school, installing the repair plants and getting the teachers started. A nominal enrollment fee, to cover costs, is the only charge connected with these schools, and the students may remain enrolled as long as he likes.

## Fisk Reduces Prices on Tires and Tubes

### Other Companies Revise Lists, Goodyear Including All Lines for Trucks

CHICOPEE FALLS, Nov. 21—The Fisk Rubber Co. has reduced its prices of tires and tubes 10 per cent. to \$3 1/3 per cent under previous schedules. A 30 x 3 1/2 fabric casing now lists at \$10.85, as compared with the previous price of \$14.50, and \$18.50 in November, 1920. The 34x4 cord casing at \$32.50 compares with \$48.95 previously, and \$55.30 a year ago.

### Truck Tire Prices Cut

AKRON, Nov. 21—The Goodyear Tire & Rubber Co. has cut motor truck tire prices, following the company's recent slash of automobile tire prices. The reductions average 15 per cent on all diamond tread solid tires, 10 per cent on pneumatic truck tires, 10 and 15 per cent on pneumatic truck tubes, 6 per cent on smooth solid tires and 10 per cent on cushion truck tires.

### Michelin Reduces Prices

MILLTOWN, N. J., Nov. 21—The Michelin Tire Co. has reduced the price of its oversize cord tires up to 4 1/2 in. sizes about 10 per cent. and its regular cords of all sizes between 6 and 12 per cent. A reduction has also been made of between 2 and 7 per cent on all fabrics.

### New Prices for McGraw

CLEVELAND, Nov. 21—The McGraw Tire & Rubber Co. following the action of other manufacturers has made a reduction of from 6 to 14 per cent on its fabric tires and from 12 to 28 per cent on its cords.

### Republic Revises Lists

NEW YORK, Nov. 21—Republic Rubber Co. announces that it has revised its price lists to be in accord practically with the general revisions in pneumatics now being put into effect by other tire manufacturers.

### Mohawk Tires Lower

AKRON, Nov. 21—The Mohawk Rubber Co. has announced a reduction of between 17 and 24 per cent on its cord tires; 10 and 20 per cent on its fabric tires and about 13 per cent on its tubes.

### American Tire Reduced

NILES, OHIO, Nov. 21—Effective immediately, the American Tire Corp. has made a downward revision of its prices as follows: On fabrics, 14 to 19 per cent; cords, 15 to 32 per cent; tubes, 12 to 18 per cent.

### NEW DIXIE FLYER PRICES

LOUISVILLE, KY., Nov. 21—Kentucky Wagon Mfg. Co. has made a down-

ward revision in the prices of the Dixie Flyer as follows:

	Old Price	New Price
Touring Car.....	\$1,345	\$1,195
Roadster .....	1,345	1,195
Speedster .....	1,545	1,395
Sport Touring.....	1,545	1,395
Sedan .....	1,995	1,895
Coupe .....	1,995	1,895

### ROMER DOWN

BOSTON, Nov. 22—The Romer Motors Corp. has announced a reduction in price on its models as follows:

	Old Price	New Price
Roadster .....	\$2,000	\$1,975
5 passenger touring..	2,000	1,975
7 passenger touring..	2,100	2,060
Coupe .....	2,450	2,400
Sedan .....	2,750	2,700

### CASE REDUCED

RACINE, WIS., Nov. 21—The J. I. Case Threshing Machine Co., announces a price reduction on its four and seven passenger cars from \$2,250 to \$1,935 and on its sedan from \$3,285 to \$2,970.

### VICTOR PRICES REVISED

SPRINGFIELD, OHIO, Nov. 23—The Victor Rubber Co. has reduced its prices on cord tires 30 per cent and on fabric, 22 per cent. Prices have been reduced from 3 to 10 per cent on tubes.

## Republic Arranges for Note Extensions

NEW YORK, Nov. 23—The Republic Motor Truck Co. has completed arrangements for the deposit and extension of \$2,500,000 7 per cent mortgage notes outstanding by which the corporation would increase the rate to 8 per cent and agree to redeem \$300,000 worth of the notes annually, beginning Nov. 1, 1923. The plan contemplates a five-year extension of the notes, \$500,000 of which was due on Nov. 1. The remainder mature serially during the next two years.

## Durant Motors of Indiana Completes Organization

NEW YORK, Nov. 23—The organization of the Durant Motor Car Co. of Indiana has been completed by the election of Hal W. Alger of Chicago as first vice-president in charge of sales and A. Henniger, who has been a member of the T. W. Warner organization, as second vice-president in charge of production. The other officers are: President, W. R. Willett; secretary, H. M. Herbermann; treasurer, C. F. Daly. Besides the officers the directors include T. W. Warner as chairman of the board, W. C. Durant and C. O. Miniger.

### QUALITY STILL DOWN

ANDERSON, IND., Nov. 21—The Quality Tire Mfg. Co., a \$200,000 corporation that went into the hands of a receiver three weeks ago, is still inactive. Present indications are that it will be the middle of winter at least before definite action can be taken by the receiver.

## Lincoln Receiver Resumes Operations

### Question of Taxation Figures in Reorganization Plans of Company

DETROIT, Nov. 22—Manufacture of cars has been resumed at the plant of the Lincoln Motor Co. by the Detroit Trust Co., the receiver, upon completion of the physical inventory. Shipments for the month of November are expected to run about 100 cars and operations, pending final reorganization, will be conducted strictly on a sales basis. Details of the inventory are not available. The work of pricing the equipment and material at figures which the receiver considers fair is now in progress. An announcement on this subject is expected within a week.

There are several important points upon which reorganization plans hinge. One of them is a question of taxation which the receiver and attorneys for the company have taken up with the Federal Government at Washington and which is now under consideration.

Operations at the plant for the present will consist mainly of completion of cars which were in process at the time the receivership action was taken and which were held up pending the inventory. Dealers and distributors are placing orders, and the receiver reports approximately 100 since the court action was taken.

A stockholders' protective committee has been formed by the owners of Class A stock and steps are now being taken for the organization of a merchandise creditors' committee.

There has been much speculation as to the nature of the reorganization which is contemplated, but definite information on this subject is lacking. It is considered possible that the assets will be offered for sale and bid in by the interests now in control of the company.

### SUIT RESULTS FROM FIRE

EDGERTON, WIS., Nov. 21—The Highway Trailer Co. has brought suit against the Janesville Electric Co., Janesville, Wis., to recover \$250,000 damages growing out of the destruction of the main factory building on the night of July 4. It alleges that the electric company hampered the fire department by shutting off the power operating an electric pump, thus permitting the loss to grow beyond reasonable proportions. The loss was \$360,000, with insurance of \$100,000.

### RAILWAY ORDERS TRUCKS

ROCKFORD, ILL., Nov. 21—Orders have been placed by the Rockford City Traction Co. for six White motor truck chassis, which will be equipped with bus bodies, delivery to be made on Jan. 15. The cost will be \$42,000. These buses will be operated by the street car company as feeders to the trolley lines.

## Reduced Car Taxes Sought by Japanese

### Use of Automobiles Curtailed as Protest Against Existing High Rates

LOS ANGELES, Nov. 21—A determined fight has been launched by automobile dealers and automobile owners in Japan under the leadership of Toshio Fujiwara, president of the Naigai Kogyo Kaisha, Ltd., one of the foremost figures in automotive circles there, to obtain a reduction of the automobile tax now in force in Tokio, which is regarded as the highest tax of its kind in the world. The automobile taxes of other Japanese cities were also increased some time ago and are about as heavy as those imposed in Tokio.

#### Trade Is at Standstill

Information received here is to the effect that a few weeks ago the leading automobile dealers of Tokio presented a petition to the governor of Tokio, the mayor of Tokio, the prefectural assembly of Tokio and the municipal council of Tokio, in which relief from the prohibitive taxes was demanded. The petitioners asked the authorities for a reduction of the present tax to less than one-fifth, and further reductions on the rates on trucks and cars for hire to less than one-half of the rates reduced as recommended first.

Indications are that the campaign launched by the dealers and owners will bear fruit, as the automobile situation in Tokio, the automotive center of the Nipponese Empire, has been at a virtual standstill since the high taxes were levied some months ago.

#### Automobile Use Discontinued

When the automobile tax was first established in Tokio some years ago, it was 20 yen per car or truck, without regard to its horse power. Since then the rates have been revised several times, and last year they were raised so high that the tax on an automobile of 20 horsepower or more, including additional taxes, is 843 yen a year, and that on an automobile of 15 horsepower more than 590 yen a year. Such high rates of taxation put Japanese people connected with the automobile business in a very difficult position, and the users of automobiles are disgruntled at the attitude of the authorities concerned. Many of them have discontinued using automobiles to voice their protest.

As a matter of fact, at the time the new rates of taxation were put into effect last April, the owners of 507 automobiles in Tokio discontinued their use and since then 300 more have followed their example, according to figures compiled by Fujiwara. Over 25 per cent of the total number of taxable automobiles and trucks have disappeared from the streets in this way during the year.

"If the object of the authorities concerned is to prohibit the use of automobiles by

imposing high rates of taxation it has been partially accomplished," Fujiwara is quoted as stating. "In other countries the number of automobiles in use is regarded as a barometer of the standard of that country's civilization. It is to be sincerely regretted that the use of automobiles is discouraged in Tokio by this heavy tax.

"Supposing that a healthy man weighs about 125 pounds in average, and that his weight has suddenly decreased by 25 pounds, he must be regarded as in an unhealthy condition, and even may be on his deathbed. The same may be said of the condition of automobile utility in Tokio, where about 25 per cent of the automobiles operating have disappeared in a few months on account of the ridiculous tax. The automobile business in Tokio is, so to speak, in an unhealthy condition.

"The present movement, started by the automobile dealers, is to cure this unhealthy situation."

## Gasoline Consumption Declines in September

WASHINGTON, Nov. 21—The domestic consumption of gasoline fell off by 65,000,000 gal. for September and production declined by approximately 25,000 gal. a day, as compared with August. Stocks of gasoline on hand at refineries on Sept. 30 decreased by 52,000,000 gal. Exports also fell in line and decreased by nearly 13,000,000 gal., as compared with those of the preceding month. Shipments of gasoline to insular possessions, however, more than doubled. According to the statistics prepared by the Bureau of Mines, the production of gasoline for the first nine months of 1921 increased by 10 per cent over the production for the same period in 1920; imports of gasoline were decreased 17 per cent, exports decreased 15 per cent, shipments to the insular possessions gained 33 per cent, while the domestic consumption increased 6 per cent.

The daily average production of lubricating oils for September was 157,000 gal. larger than the production for the month of August. Stocks were decreased 12,300,000 gal. during the month. For the first nine months of 1921, the production of lubricating oils shows a decrease of 17 per cent; exports a loss of 35 per cent; shipments to insular possessions a decrease of 1 per cent, and domestic consumption a decrease of 21 per cent.

## California Governor Upholds Road Methods

SAN FRANCISCO, Nov. 21—Governor William D. Stephens has taken a firm, and apparently immovable, stand back of the California State Highway Commission, in the controversy which the California State Automobile Association and the Southern California Automobile Club raised by their criticism of methods of road construction and use of State funds in that work.

Responsibility for the alleged inadequate road building policy of the State was placed on Governor Stephens by the California State Automobile Association.

## METAL MARKETS

While the market for automotive steels is seasonably quiet, sufficient activity is in evidence, either by way of actual buying or tentative inquiries, to raise high steel producers' hopes for a steadily growing volume of business from the automotive industries, once the preliminaries for the season of 1922 get under way. In connection with these expectations the trade considers it as a good omen that stress is laid upon the relatively large amount of steel entering into garage construction at this time.

The alloy steel market, following a period of protracted idleness, seems to have taken on a new lease of life as the result of orders for a few hundred tons placed by passenger car builders and automotive specialty manufacturers. Quotations named by alloy steel specialists denote somewhat higher asking levels, but a survey of that branch of the steel industry shows that anxiety of producers to get really worth while orders on their books is sufficiently to the front to warrant confidence on the part of purchasing agents in their ability to secure all possible concessions within reason through individual negotiations.

Of course, the markets for nickel, chromium, vanadium and the other alloys, for many months in the doldrums, are certain to respond sooner or later to what increased demand will make itself felt as the result of a broadened demand for alloy steels from the automotive industries. In the sheet market, there have been rumors of quotations of as low as 4.00¢ for 22-gage full finished body sheets. Undoubtedly there have been attempts here and there to find out whether a concession of \$5 to \$7 a ton from the 4.35¢ price that has heretofore prevailed would bring out a worth while quota of orders.

The bulk of the ordinary sheets now being rolled applies to orders which were placed before the last advance or which are for account of buyers whom the mills agreed to protect against any price advances over the remainder of the year. Cleveland reports state that considerable tonnages of steel bars are being sought by manufacturers of automobile bumpers.

**Pig Iron.**—Automotive foundries are placing more orders. Most of this iron, however, is for early delivery. The first quarter 1922 market is still on a nominal basis, expectation of a downward revision of freight rates casting a haze over the situation and acting as a restraining factor.

**Steel.**—Strip steel producers are working at a relatively satisfactory rate, exceeding in the case of some mills 50 per cent of capacity. Most of the output, however, applies to specifications furnished on contracts carrying the 2.00¢ price on the hot-rolled and 2.75¢ on the cold-rolled. In the semi-finished market one still hears of sales of sheet bars at \$30, Pittsburgh.

**Aluminum.**—There is a decided lessening in pressure on the market by German bargain offers. The lowest price for foreign ingots is now 18¢, duty paid. The sheet market is firmer. Considerable tonnages of foreign aluminum will arrive in the next few months but practically all of this metal is for account of consuming buyers and will in no wise increase the floating supply.

**Copper.**—The copper market is once more in the midst of one of its balloon ascensions. Part of the advance scored will undoubtedly stick, but, as usual, in such upward movements, there is a tendency to overstrain the market.



## INDUSTRIAL NOTES

**Leach Biltwell Motor Car Co.** of Los Angeles, with the opening of its new foundry and casting department at the factory, is manufacturing the Leach car in its entirety in its own plant, with the exception of axles, starter and carbureter. The new department where aluminum, brass and other castings are made occupies a large building in the rear of the engine plant. New equipment is arriving daily for the foundry and other departments which will add greatly to efficiency and capacity. A schedule calling for 1200 cars in 1922 has been settled upon, although officials expect this program to be exceeded.

**Winther Motors, Inc.**, recent consolidation of the Winther Motor Truck Co., Marwin Truck Corp. and Kenosha Wheel & Axle Co., all of Kenosha, Wis., has taken steps to provide more adequate facilities to accommodate development of all departments, including passenger and commercial cars, axles and wheels. There is now nearing completion a one-story factory addition, 62 x 386 ft., and it is said that further extensions are planned immediately after Jan. 1.

**Steel Wheel Co.** has been formed to handle the distribution of Gier Tuarc steel wheels, manufactured by the Motor Wheel Corp. of Lansing, in Greater New York, Newark, Jersey City and surrounding territory. The company is headed by Thomas J. Wetzel, who will also continue to represent the Motor Wheel Corp. in the East.

**Marvel Battery Co.** of Chaska, Minn., has moved to the St. Paul Midway, where greater facilities are offered for its increasing business. The company will produce from 200 to 500 batteries a day.

**Huron Truck Co.**, Bad Axe, Mich., has been merged with the Ruggles Motor Truck Co. Saginaw.

Constantinople Tractor  
Trials Probably in May

WASHINGTON, Nov. 23—Postponement of tractor trials which were to be held at Constantinople in September, owing to military activities in the neighborhood and general economic conditions, brings the hope among foreign trade promoters that American tractor manufacturers will manifest more interest in these markets next spring, when it is proposed to hold the exhibition.

The assistant trade commissioner, Julian E. Gillespie, reported to the Department of Commerce that only three American companies were entered in the tractor trials scheduled for this fall. He believes that the date will be set in May and the Department of Commerce has notified tractor manufacturers and other exporters of this opportunity.

Sales Meetings Urged  
at Milwaukee Convention

MILWAUKEE, Nov. 21—Ludington Patton, head of the Patton-Pitcairn division of the Pittsburgh Plate Glass Co., a consolidation of the former Patton Paint Co. and Pitcairn Varnish Co., both of Milwaukee, discouraged the cancellation of sales conventions in an address at the annual fall sales conference of the

sales managers and paint and varnish salesmen held in this city.

"America's business problem is no longer production, but selling," he said in the principal keynote address to the sales staff. "While economies are paramount under judicious business administration, they should not be achieved at any curtailment of effective selling effort, or at the cost of quality standards in commodities.

"The frequent cancellation of sales conventions by manufacturers as a means of economy is a big mistake. Now is the time for sales conventions. Now is the time when the salesman and his house must be in close contact; when the salesmen need to be energized by house recognition; when he must be familiarized to the finest degree with his product, his house policies, and have the opportunity to learn of successful methods employed by fellow salesmen in other territories.

"The general retrenchment of national advertising is a considerable reflection on the advertisers concerned. Either they have not been buying advertising on the sound basis that it is an active selling power, or they are conspicuously unwise in retrenching now, when advertising is most needed to stimulate the buying idea. In our case we believe we are keeping faith with the dealers when we increase our advertising at a time when the dealers most need support."

British Committee Makes  
Anti-Dazzle Suggestions

LONDON, Nov. 7 (*By Mail*)—The third interim report of the Maybury Committee of the Ministry of Transport on dazzling headlights covers the following points by way of recommendation and comment:

(1) A reduction of the height of motor headlight beam is recommended so that the glare shall not come within the vision of cyclists and pedestrians, to which end it is suggested that the specification of a standard headlight should have a maximum height of 4 feet from the ground at 150 feet from the lamp, the lower edge impinging on the road not more than 50 feet from the face of the headlight.

(2) A minimum illumination for all vehicles is declared impracticable, and, in the event of a prosecution for driving to the danger of the public at night, it is recommended that the adequacy of the lights should be an element to be taken into consideration by the court.

(3) Swivelling or tilting headlights are dismissed as useful but too dependent on the courtesy of drivers.

(4) The use of an additional lamp fixed in a low position is suggested for use in fog, provided that its light projects downward and forward.

These recommendations though not to be taken as final, are likely to be embodied in the new Government legislation concerning automobiles and automobile traffic.

## NO NEW CEYLON TARIFF

LONDON, Nov. 14 (*By Mail*)—The effort to control the Ceylon automobile market by a preferential tariff in favor of British cars has been abandoned because of the opposition evoked. Therefore all automobiles will continue to pay the same rate, 7½ per cent ad valorem, irrespective of their place of origin.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

The district easing of money rates as evidenced in the quotations of the past week was a reflection in part of the gradual liquidation of frozen loans which has been going on for the last few months. Call money ranged from 4 per cent to 5½ per cent as compared with 5 per cent to 6 per cent in the previous week. Time money also showed an easier undertone, with quotations at 5 per cent to 5½ per cent for all maturities from 60 days to 6 months as against 5 per cent to 5½ per cent for 60 and 90-day paper, and 5¼ per cent to 5½ per cent for the longer maturities in the previous week. Prime commercial paper remained at 5 per cent to 5¼ per cent. Although funds were more freely available, no large loans were negotiated.

In the Federal Reserve statement as of November 16, the total reserve ratio showed a further increase for the week from 71.4 per cent to 71.8 per cent. Total reserves increased \$8,685,000, which was accounted for by a gain of \$7,602,000 in gold holdings and an increase of \$1,083,000 in other cash reserves. The total deposits increased \$10,851,000, while reserve notes in circulation decreased \$22,607,000.

The total reserves of the New York institution increased \$30,905,000, but there was a decline of \$87,958,000 in total earning assets.

## Sterling Reaches High Point

During the past week, sterling exchange rose above \$4.00 to the pound, the highest point of the year. Several reasons are assigned to this rise, among which are included the betterment of Great Britain's export trade, and the improved internal economic condition following the adjustment of the difficulties with the coal miners. Last week also marked the seventh anniversary of the inauguration of the Federal Reserve System. On November 15, the New York Telephone Company offered \$50,000,000 of 6 per cent Bonds at 97. This offering was oversubscribed nearly ten times, a fact which is significant not only of the demand of the investing public for sound securities but of the accumulation of funds seeking investment.

## MAY BUY ALLEN PLANT

BUCYRUS, OHIO, Nov. 23—L. A. Sommer, designer of the motor for the Allen car, is understood to be negotiating with the receiver for the Allen Motor Car Co. with a view to purchasing the plant and using it to manufacture motors.

## WILL SELL BETHLEHEM

ALLENTOWN, PA., Nov. 23—Calvin E. Woods, receiver for the Bethlehem Motors Corp., will apply to the United States district court at Philadelphia Nov. 28 for permission to sell the plant.

## MEN OF THE INDUSTRY

Edward H. Fitch has been appointed manager and J. H. Connors, manager of mechanical sales of the Republic Rubber Corp. Fitch served as district manager of the Philadelphia division of the Diamond Rubber Co. for fourteen years and upon the consolidation of the Goodrich and Diamond divisions in that city was placed in charge. For the past three years he has been manager of sales to automobile manufacturers for the Diamond division with headquarters at Akron. In June, 1920, he was appointed director of sales of the Diamond company covering tires and mechanical goods. Connors had been in charge of the mechanical sales in the Boston district for the B. F. Goodrich Co. for fifteen years. Subsequently he became manager of mechanical sales in the Philadelphia district and manager of mechanical sales of the Diamond division of the Goodrich company for the central district.

W. B. Mowbray, assistant purchasing agent of the Amalgamated Sugar Co., has been appointed general manager of the Aero Cushion Tire Co. He succeeds general manager W. E. Spencer who is planning to take care of his Wyoming interests, but will remain at the factory for several weeks. Major W. C. White becomes salesmanager and will be closely associated with Mowbray in furthering the company's business. The new management is planning important changes which will include the opening of a number of branches in the Intermountain West. Plans are under way for amending the articles of incorporation and re-financing the company.

William R. Petze has been appointed sales manager of the American Metal Parts Co. of Boston which manufactures piston rings. Petze has a record of 17 years in the automotive industry, the greater part of which has been spent with automotive and hardware jobbers in this country and in Canada. He is credited with having had much to do with working out the present jobber policy of distributing piston rings. Until recently he was sales manager for branches of the Splitdorf Electrical Co. of Newark.

J. H. Willson, former managing director of General Motors, Ltd., of London, England, has become president and general manager of the Maxwell-Chalmers Sales Co. of Chicago. Before going to London for General Motors he was manager of the New York, Brooklyn and Long Island territory for the Chevrolet Motor Co.

Arthur G. Hertzler, who has been sales manager of the Bearings Co. of America, Lancaster Pa., and connected with that firm in various capacities for eighteen years, has severed his connection with the company and will make his home in Salt Lake City. He has not announced his business plans for the future.

A. F. Pond, chief chemist for The Good-year Tire & Rubber Co. of Canada, Ltd., has been transferred to Los Angeles to succeed Burgess Darrow in similar work at the Goodyear's coast plant. Darrow returns to Akron as development manager of the parent company.

Claude C. Ostrom, formerly purchasing agent of the Locomobile and later general manager of the Washington Steel & Ordnance Co., has become associated with the Pennsylvania Forge Co. as vice-president, and in charge of sales.

Verne G. Orr, secretary and general manager of the Waterloo-Overland Co. of Water-

loo, Iowa, has been appointed manager of the Willys-Overland branch at Indianapolis. The territory under his control consists of Indiana, Kentucky and a part of Illinois.

D. J. Maloney, who for the past three years has been connected with the Carroll Engineering Co., as assistant general manager is now associated with the Columbia Engineering Co., Dayton, Ohio as president and general manager.

F. J. Jackson has been appointed manager of the Barley Motor Car Co.'s factory branch at San Francisco. George Clark, former manager, has been made sales manager of all territory west of Denver.

Rudolph Miller, who has been advertising manager of the National Motor Car & Vehicle Corp. of Indianapolis, has been made assistant sales manager.

W. A. Henderson, manager of the Dort Auto Body Works, Kalamazoo, since its purchase from the Lull Buggy Co., has resigned.

C. E. Sorenson and C. Burbaker, directors of the Ford Motor Co., are leaving for a tour of inspection of the Ford plants abroad.

Thomas Brooks, Inc., has been appointed Elgin distributor in Detroit and four surrounding counties.

## FINANCIAL NOTES

Ajax Rubber Co., it is understood, is planning to fund that portion of its bank loans falling due next month, approximating \$5,000,000, through the sale of notes or bonds. At present there is outstanding \$10,000,000 of an authorized issue of \$20,000,000 (\$50) capital stock. The company has no funded debt. The new financing, Ajax interests say, is not a matter of necessity but through the belief that bank loans can be eliminated on a favorable basis.

Stoughton Wagon Co., Stoughton, Wis., is starting work on a new group of buildings for its motor truck division to replace those recently destroyed by fire. The company announces that all orders will be delivered according to schedule, having made arrangements to care for production and prompt shipments.

Franklin Automobile Co., during the first ten months of this year, shipped 3,256 sedans which represents an increase of 16 per cent over the same period last year.

Kelsey Wheel Co. has declared an initial dividend of \$1.50 a share on the common stock, payable Jan. 2 to stockholders of record Dec. 20.

## Chevrolet Opens New Plant in Indianapolis

INDIANAPOLIS, Nov. 23—Chevrolet Bros. Mfg. Co. of this city is now located in its new factory here. Arthur Chevrolet is president; Louis Chevrolet, treasurer, and Arthur H. Serr, sales manager. The chief product will be Frontenac cylinders for Fords. The company will also build the Fronty-Ford racing cars.

Louis Chevrolet, designer and builder of Frontenac racing cars, will also have factory space in the new building, as will Arthur Chevrolet, Inc., manufacturer of steel gear rings for stripped fly-wheels.

## G. M. Contemplates No Radical Changes

## Gradual Improvements Will Be Made in Lines for 1922 Selling Season

NEW YORK, Nov. 23—General Motors Corp. has in prospect no radical or sensational plans, notwithstanding sundry reports to the contrary. The corporation will move along in the next year much as it has in the past, making gradual improvements in its lines and fully prepared for the era of keen competition upon which the industry has entered.

It can be stated positively that none of the divisions of the corporation will be discontinued in 1922 with the exception of Scripps-Booth. Notice of the dissolution of this company has been filed at Albany but it is understood the factory will not be sold. Announcement as to the uses to which it will be put is expected within 30 days.

## Era of Easy Sales Gone

The air-cooled development will be continued but showing or marketing at an early date is not to be expected as the work is still in the experimental stage and the General Motors Corp. policy is against production until exhaustive tests have been made and the corporation is assured that the product for which it must necessarily stand sponsor is everything that might be desired.

The General Motors Corp. realizes fully that the era of "easy sales" has gone, probably never to return. They are urging constantly the necessity of intensive and intelligent selling efforts. They insist that the salesman must go to the prospect and not wait for the potential purchaser to come to him.

## Efficient Servicing Necessary

As a corollary of successful salesmanship, they contend there must be efficient servicing so that a motor car user who once buys a General Motors product never will stray from the field. Hooked up closely with sales and service is a determination to give full value for every dollar paid for any of the General Motors models. The prices of the corporation's lines have followed closely the downward trend of materials, taking into consideration also the lower cost and greater efficiency of labor.

## Mooney Is Transferred from Remy to G. M. Export

NEW YORK, Nov. 23—Announcement was made to-day by President duPont of General Motors Corp. that J. D. Mooney, who is now general manager of the Remy Electric division at Anderson, Ind., will be transferred to the General Motors Export Co. as operating vice-president. I. J. Reuter, who is now general superintendent of the Remy Electric division will succeed Mooney as general manager.

# Calendar

## SHOWS

- Nov. 27-Dec. 2—New York, Automobile Salon, Hotel Commodore.
- Jan. 28-Feb. 4—Chicago, Automobile Salon, Hotel Drake.
- Jan. 7-13—New York, National Automobile Show, Madison Central Palace, Auspices of N.A.C.C.
- Jan. 28-Feb. 4—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.
- Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.
- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

## FOREIGN SHOWS

- Nov. 12-27—Buenos Aires, Annual Motor Show, La Pabellon de las Sosas, Automovil Club Argentino.
- Nov. 26-Dec. 3—Shanghai, China, Automobile Show.
- Nov. 28-Dec. 3—London, Motorcycle Show.
- Dec. 3-14—Brussels, Belgian International Automobile Show.
- March, 1922—Santiago, Chili, Annual Automobile Show.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922—Rio de Janeiro, Brasil, Automobile exhibit in connection with the Brazilian Centenary Associao Automobilista Brasileira.

## CONVENTIONS

- Dec. 6-8—Chicago, Second Annual Meeting of American Petroleum Institute.
- Dec. 10—New York, American Institute of Mining and Metallurgical Engineers.
- Dec. 20—Philadelphia, American Society of Mechanical Engineers.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.
- Jan. 17-20, 1922—Chicago, American Road Builders Association.

Jan. 30-31—Chicago, Fifth Annual Convention, N. A. D. A., La Salle Hotel.

Jan. 30-Feb. 2—Boston, Sixth Annual Conference of the International Delivery Association, Copley Plaza Hotel.

June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

Detroit, Dec. 23, Feb. 24, Mar. 24, April 28, May 26.

New York, Jan. 11-14, 1922—Annual Meeting.

Chicago, Feb. 1  
Minneapolis, Feb. 8—Tractor Meeting.

## Harding Commended for Good Roads Aid

### A. A. A. Resolution Praises President and Townsend—Insurance Discussed

DETROIT, Nov. 23—Resolutions commending President Harding and Senator Townsend for their activity in behalf of Federal road legislation, were adopted following a two-day conference of the Automobile Association of America executives at the Hotel Tuller this week. The resolutions will be forwarded to the executive committee of the association at Washington for immediate action and it is further urged that these Federal officers and others be asked to continue their efforts looking for further Federal cooperation.

Other resolutions important to the American motoring fraternity which were adopted at the convention epoused the financing of the association on the basis of 25 cents a member of each affiliated club; that the present road marking system be replaced by a comprehensive system installed in each state under the approval of the Federal government; that the present basis of motor vehicle taxation is unfair in some cases, and that an investigation be undertaken to bring about a more equitable adjustment.

The conference went on record through resolution as considering the matter of motor vehicle insurance a local rather than a national concern. It was recommended, however, that this subject be carefully investigated by national headquarters and all affiliated clubs of the association be advised as to the best methods employed by the most successful local clubs in the handling of insurance matters.

The insurance study was one of the red hot features of the convention and the possibility of the formation of a national insurance bureau under the auspices of the A. A. A. was frankly discussed. Opposition on the part of J. L.

Haskin of the Omaha Automobile Club, who favored the local handling of the problem rather than through national action, decided the convention toward favoring the resolution finally adopted.

A study of standardized traffic regulations was also recommended by resolution to the executive committee and to make and carry out plans through its affiliated clubs and general membership calculated to secure the adoption of such regulations by states and cities.

## Jobbers Buy Heavily at Chicago Meeting

CHICAGO, Nov. 19—The Automotive Equipment Association's business exhibit came to a close here today with strong evidences of an upturn in business, in contrast to the feeling the first day or two, when buying was light. By the middle of the week the jobbers had passed their buying record for the entire show a year ago and when the doors were closed it was generally agreed among manufacturers that business on the exhibit floor had been the best since the association started this feature of its activities three years ago.

Statements of jobbers from various sections of the United States and Canada indicated that tonnage turnover of the average jobber in 1921 would be about 85 per cent of last year and dollars and cents volume about 70 per cent, the difference being due to price reductions.

Jobbers have had heavier retail buying since October 1 than before then, which is just the opposite of the usual condition. Reequipment lines naturally have run heaviest, but sales of car accessories, shop equipment and tools have been fair during the past six weeks.

## BRITISH PRICES TOO HIGH

LONDON, Nov. 14 (By Mail)—Sir Raymond Dennis, managing director of Dennis Bros., Inc., Guildford, back from a twenty months' world tour, says in effect that there is a call for British motor goods but that present prices are too high.

## Trade in Britain Declines in October

### Gross Decrease for Year Will Be Within 40 to 50 Per Cent of 1920

LONDON, Nov. 11 (By Mail)—Britain's imports of cars, trucks and chassis, tires, motorcycles, and parts of cars, trucks and motorcycles in October had a gross value of \$4,085,425 (at par).

Numerically their values were: Cars 126 (2150), trucks 67 (450), chassis 344 (698), and motorcycles 39 (212). The value of the parts imported were: Vehicle, \$1,327,760 (\$3,796,380); motorcycle, \$11,265 (\$132,030); tires, \$1,836,635 (\$2,442,900). The figures in brackets are the corresponding returns for 1920.

The month's exports of British automobiles and parts had a gross value of \$1,565,675 (\$6,514,115), and of tires \$857,380 (\$2,520,265). The numerical values and the destinations were: Cars 128, of which 42 (233) went to British India, 14 (74) to New Zealand, and 72 (334) to countries not specified; trucks, 5 (25) to British India, New Zealand none (31), and 18 (74) to countries not specified, making a gross total of cars and trucks of 151 (771). Chassis exports were 55 (385) to countries not specified, whereas in October, 1920, there were 8 specially scheduled for British South Africa. The month's motorcycle exports were 430 (2333), destination not given.

There has been a marked decrease compared with October, 1920, and the ten months comparative figures go to show that the gross reduction will be within 40-50 per cent of the January-October period of 1920.

## TOWER RECEIVER NAMED

GREENVILLE, MICH., Nov. 21—The Grand Rapids Trust Co. has been appointed receiver for the Tower Motor Truck Co.



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# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

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No. 22

## Prices Must Be Governed by Costs

Price may vary temporarily without relation to costs, but must be in proportion to costs in general. Industry is entering period of declining costs. Marketing costs, especially, must be reduced. A striking analysis of present economic status of industry.

By Harry Tipper

**I**T has been customary to talk about cyclical business changes as though the cycle were a necessary consideration governed by absolute laws.

There is, of course, a law of action and reaction which governs all activities and there is a direct relation between the volume and the price cycles in non-economic products. The products of the farm and the forest vary in volume from year to year and these variations show a cycle change in their action and reaction, which has its effect almost immediately upon the price.

It is probable that there exists some relation between the action and the reaction and the volume of business at any particular moment, and several of the economists who have studied this matter expect to establish a relation between the volume of non-economic products and the volume of total business.

The action and reaction over the whole industrial fabric are subject to so many variable factors in connection with any particular line of business in its relation to the rest, that the prices obtained do not bear any visible relation to the cycle of change discovered in connection with non-economic products. Curves of wholesale prices, therefore, over a period of years are a record of past events only and do not indicate that the future will follow the past conditions.

The chart shown with this article indicates the

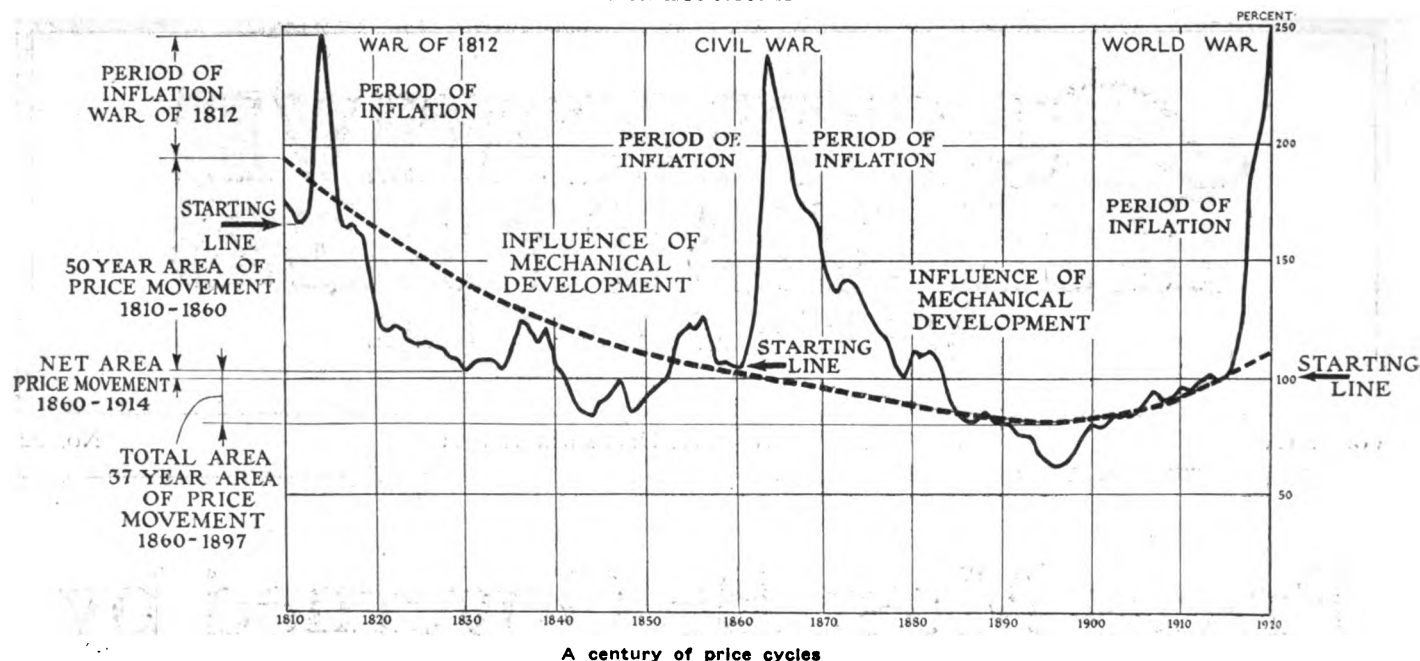
variance of wholesale prices in the United States from the War of 1812 to the World War, and it is to be observed that these wholesale prices show in cycles of change of approximately fifty years' duration each.

However, it is absurd to regard a war as a necessary part of a business cycle. If the Civil War had not occurred, the whole trend of this cycle would have been entirely different.

As a record of past events, this curve is very illuminating; as a forecast for the future, it is worth nothing, because the problems facing us are entirely different from the problems faced either at the end of the Civil War or the War of 1812.

When, therefore, the economist talks about our entering an era of declining prices, he simply means that our prosperity depends upon our ability to decrease prices without decreasing wages, because the surplus between prices and purchasing power builds up our wealth. There is no evidence as yet to indicate an era of declining prices.

While prices may vary through a short period without respect to costs, prices over a long period average themselves in proportion to the costs. Unless, therefore, we can reduce costs, we cannot reduce prices over any long period. The short fluctuations will indicate the proportionate amount we must receive to cover the costs.



If the periods of inflation and deflation due to wars are eliminated from consideration, an examination of the curve will show that the introduction of the mechanical system of industry, its growth and development have led to a long period of declining prices during which period wages were being increased constantly and the wealth was being increased.

This was the period when the introduction of mechanical means of production exercised the greatest influence upon the increasing productivity of the worker.

It will be observed that before the War of 1812 there was no period of rising cost for several years and that the rising cost immediately before the Civil War was not marked and was very short in duration. On the contrary, for fourteen years before the World War, the general costs had been rising steadily, so that they had reached the plane established in 1880 and in the period of 1840 to 1850. This rise was very steady showing very minor fluctuations and rising sharply from the minimum price area of 1897. It is obvious, therefore, that the factors operating on prices before the World War were entirely different from the factors operating before the Civil War or the War of 1812.

Further examination into the matter and research developed from all the fragmentary data available show that during the development of the mechanical system of industry the cost of those items devoted to distribution and marketing a product had been steadily increasing.

For the greater portion of that period the increased economies of manufacturing made it possible to absorb the increased cost of the distribution and marketing and still effect a decrease in the price.

The proportion of the sales price required to cover the cost of distribution and marketing, however, increased steadily as the system developed, consolidating the manufacturing in larger units and demanding markets spread over larger areas and developed with greater intensity.

At the period of the War of 1812 the amount involved in the labor, raw materials and capital of production was approximately 90 per cent of the sales price, leaving 10 per cent for distribution and marketing.

In 1900 the labor, raw materials and capital involved in production approximated nearly 50 per cent of the sales price, showing a constant increase in the proportion of the sales price devoted to the motions and costs

of distribution and marketing the goods.

Since 1900 this cost has been steadily increasing.

For a century, therefore, the cost of distribution and marketing has been increasing. For eighty years of that time the growth of the mechanical system permitted this increased cost to be absorbed and still provided cheaper goods. For the last twenty years the cost of distribution and marketing has been too great to be absorbed entirely by the increased economies in manufacturing and has obliged the manufacturer to secure increased prices in order to meet his costs.

The importance of the era from 1810 to 1897 is not understood unless we realize that this was the period of greatest expansion in percentage, of greatest decline in prices, of steadily increasing wages and of the largest increase in the wealth of the industrial countries.

It is not absolutely according to the facts to say that we are in an era of declining prices. The price will depend upon the costs, but it is strictly according to the lesson of the past to say that the future growth of industry depends upon our ability to decrease prices without proportionately decreasing wages. Thus we may add to the wealth what has been destroyed by war and increase the wealth above that amount sufficiently to record the necessary improvement of the industrial fabric.

It is further necessary to point out that our ability to decrease prices will depend not only upon the economies we can make in production and manufacturing, but our ability to make economies in distribution and marketing. In goods that are distributed through wholesalers and retailers the possibility of a 10 per cent reduction to the user from economies in the retail business and the wholesale business is greater than a 40 per cent reduction in the manufacturing cost.

The avoidable and visible wastes in distribution and marketing are sufficiently important to permit the introduction of radical economies in this direction which will influence the costs to a very considerable degree.

In most lines of business comparatively little attention has been paid to the expenses of marketing and distributing the goods, and there is little understanding of the factors entering into this question.

The future improvement of our wealth and general condition of our industry depends very largely upon the

economies we can make in these elements of business. The flow of product from the factory door to the user is slower than the flow of product through the factory. At each point in the journey more cost is accumulated than should be necessary because of lost motion, inefficiency, useless methods, wastes of time and effort concerned not with the increasing of the flow of product, but with taking care of the delays and frozen elements that impede the flow.

The cost in distribution and marketing is in direct proportion to the speed of the flow, and anything that impedes the flow operates to increase directly the cost of the product to the user.

Every element in distribution and marketing has increased in cost in the last twenty years, and the efficiency of the individual engaged in distribution and marketing has not increased, so that in every respect the cost of moving one thousand dollars' worth of goods has increased.

It is necessary, therefore, that the business man determine the factors of marketing, the cost of these factors, the necessities of the operations involved and ways in which they can be improved, so that they do not require the same amount of time and effort for the unit of result.

Declining prices without declining wages are necessary to the continued prosperity of industry, and these cannot be secured without an entirely new consideration of what constitutes industrial efficiency.

The proper analysis of marketing is the basis of this new efficiency, and this analysis must be considered from the character and extent and speed of the flow of product in proportion to the importance of that product in the industrial fabric.

Some of the factors to be considered are obvious at the present time. Others will be determined only as our experience grows.

## A New Model of Speedometer

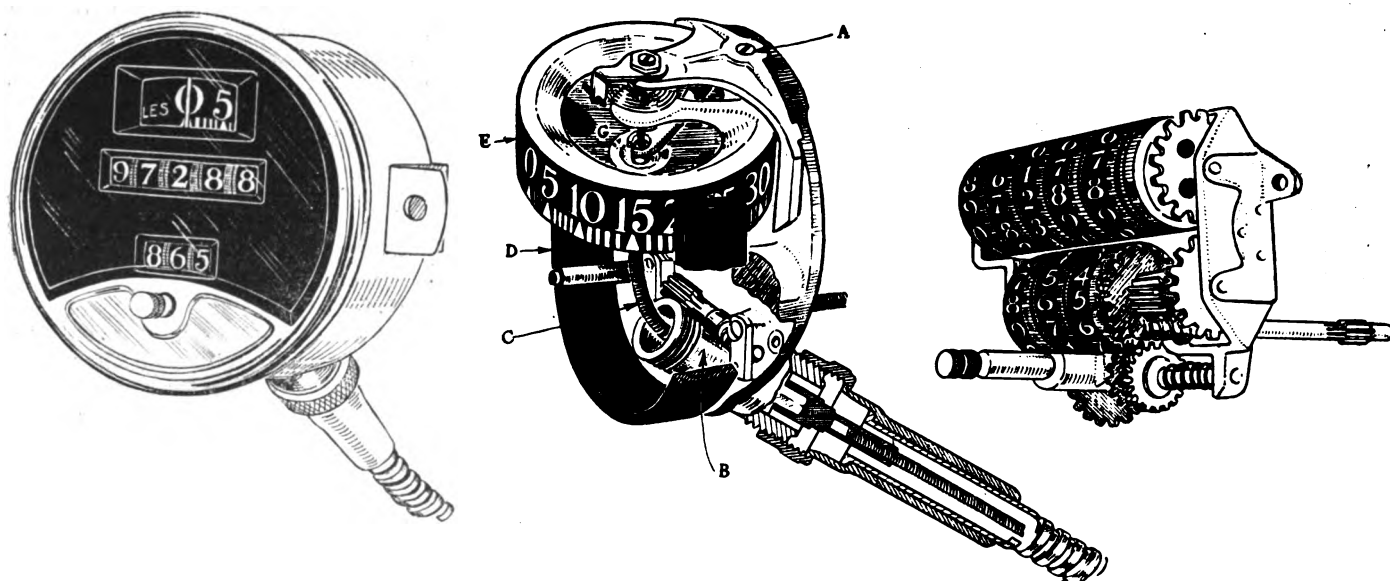
**T**HE new A-C speedometer is a completely revised design of the instrument which the Champion Ignition Co. announced in 1919. While operating on the same principle, it incorporates several improvements.

This speedometer operates on the magnetic drag principle, having a stationary, permanent horseshoe magnet mounted within the housing. An armature rotates within the magnet, being driven by a flexible shaft from the driving mechanism of the car. Between the armature and the poles of the stationary magnet is a non-magnetic element in the form of an aluminum cup having on its periphery a dial graduated in miles per hour. This light weight cup is sensitive to the magnetic drag caused by the rotating armature which shifts the magnetic lines of force in the direction of rotation. Owing to the light weight of the cup, the dial is very sensitive.

Among the various changes made are the following: The magnet, which was formerly adjustable, is now fixed in position and instead the speed element is now adjusted into and out of the magnetic field by an adjusting screw A. This adjusting screw is set at the factory and then sealed and covered so that it cannot be tampered with after the final adjustment. In the former

instrument automatic thermostatic control was used for changing the relations of the armature laminations one to the other. In the present instrument a solid or single piece rotor is used and the thermostatic control has been eliminated, compensation for temperature rendered unnecessary by the heat treatment of the magnetic elements, it is claimed.

An important improvement in the instrument resides in the provision of automatic lubrication of the high speed bearings. These bearings operate within glands which contain oil that cannot be thrown out of the bearing. This tends to increase the life of the instrument and to eliminate the noise which often occurred after several thousand miles of use. The flexible shafting is of the so-called dental wire type which was developed during the war by the Bureau of Standards. It consists of four layers of piano wire wound spirally in opposite directions, and while permitting a drive through a very sharp angle, is practically free from torsional distortions under the stresses imposed by driving the unit. The odometer is driven off the worm B, while the rotor for the speedometer part of the instrument is driven by a short piece of the flexible shafting C.



Left—New A-C speedometer. Center—Important elements in new A-C magnetic speedometer: A, adjustable screw; B, odometer driving worm; C, flexible shaft driving rotor of magnetic iron; D, magnets; E, non-magnetic cup carrying dials; F, odometer wheel and driveshaft; G, rotor of soft iron. Right—Odometer unit, showing mounting of dial wheels and driving members

# Changes in Body Design at the Automobile Salon

The popular sedan is apparently giving way to inside driven cabriolets and berlines. Increased use of the soft roof is general and manufacturers show a tendency to revert to long discarded features. Much attention is paid to interior equipment. More domestic than foreign models exhibited.

By George J. Mercer

THE Automobile Salon, which originated as an Importer's Salon, is becoming more and more an exhibition of cars of domestic manufacture. This year twenty of the thirty makes of chassis on exhibition are American-made. These include the Biddle, Brewster, Cadillac, Cunningham, Daniels, Dorris, Duesenberg, Falcon, Fergus, Lafayette, Lincoln, Locomobile, McFarlan, Packard, Pierce-Arrow, Rauch & Lang, Richelieu, Rolls-Royce, Stevens-Duryea and Winton.

Of the foreign contingent Italy presents the greatest number of chassis makes, including the Fiat, Isotta-Fraschini, Lancia and Spa. Great Britain is represented by the Lanchester and Sunbeam; Germany by the Benz and Mercedes, while France and Belgium have but a single car each, the Hispano-Suiza from the former country and the Minerva from the latter. The absence of all the leading French makers—Panhard, Renault, De Dion, etc.—is noteworthy.

The salon, as a whole, however, presents a satisfactory picture of the new in body design. There is a total exhibit of approximately 60 bodies. These are divided into 12 cabriolets, six broughams, 13 berlines, three limousines, three sedans, 12 touring car bodies, one roadster, one brougham-landaulet and seven inside drive cabriolets.

This list serves to show that the line of bodies presented for inspection is, generally, the most expensive made, and this would indicate that the exhibitors have an optimistic feeling as regards the general trend of business. About one-sixth of the exhibits are open bodies, and it was noted that the closed bodies include more of the falling and semi-falling top bodies than ever before. These are even more expensive than the stationary top kind.

## Cabriolets Set New Record

There is a total of seven inside drive cabriolets, which is a record. In previous years there have been but one or two examples of this type, and these have invariably been on the British-made Rolls-Royce. These bodies, in fact, seem almost to have superseded the sedan, for there are but three of the latter bodies exhibited. One of these three is a short close coupled body that is being considered by manufacturers as a production car in the near future. It is designed to be a combination of coupe and sedan.

The exhibition includes yet another new feature in body design, or rather a reversion to an old feature. This is the large number of berlines. This type of body in appearance resembles a sedan. It has a division, however, back of the driver's seat, and the upper part of this division is formed by a window that raises and lowers. Thus the body can be made into one or two compartments at will.

Some years ago this type of body was the only style acceptable by many car users, but it drifted into abeyance. Whether its revival this year will mean much to the quantity built car manufacturer in the coming season is doubtful. The general run of quantity built cars have a short wheelbase chassis and this makes it next to impossible to have a division back of the driving seat and still allow sufficient room for the rear door entrance. There has always been a certain proportion of buyers for enclosed bodies that insist upon more privacy than the single compartment body permits, but if there is not sufficient wheelbase it cannot be considered. However, it is remarkable that a large number of manufacturers are practically making this type supersede the sedan.

As was stated, the inside drive cabriolet has come forward as another substitute for the sedan. The sedan has enjoyed a long run of popularity, but at this show it only equaled in number the limousine that passed out as a favorite several years ago.

## Trying for Cheaper Production

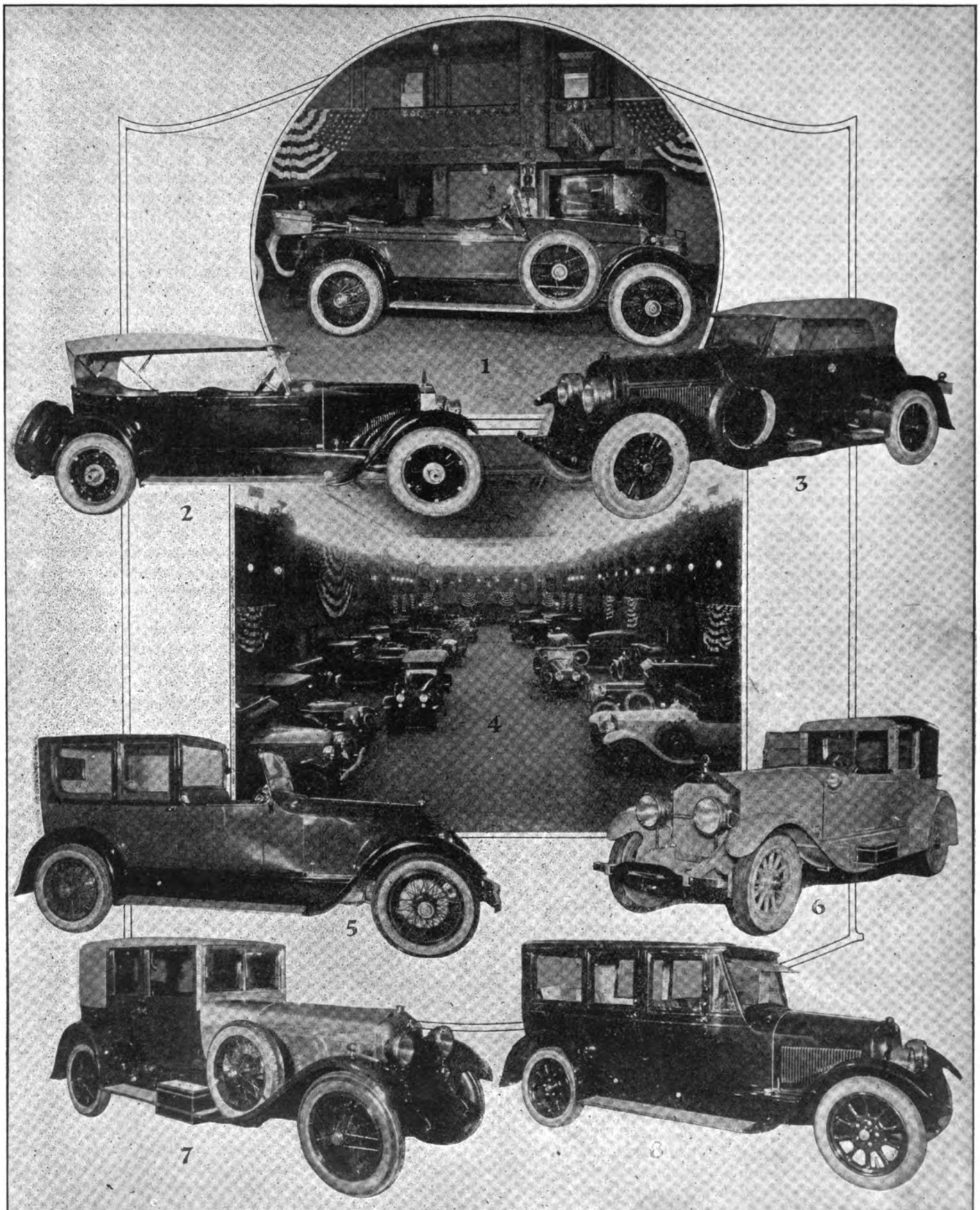
This change from the sedan to the inside drive cabriolet for short wheelbase cars indicates that there is a tendency to strive for cheaper production. Manufacturers are apparently attempting to make enclosed bodies as near the cost of the open body as possible.

A number of manufacturers have used fabric to cover part of the body sides in place of sheet metal, intending probably to use this measure as one to reduce costs. On the type of cars exhibited, however, this fabric is not cheaper, even though the cheapest fabric it is possible to buy should be used. It must be remembered that the fabric must be applied after the metal parts are painted and it requires expert workmen to properly put on the necessary moulding and apply the fabric. This work is less of an automatic operation than the task of putting on the metal. It is done at the time the painted surface is practically finished and the chances of marring such work are considerable. It is to be expected, however, that in time means will be found to cheapen this work and there will probably be seen more bodies with the sides covered with fabric. Such a development has advantages, for it is much lighter and lighter frame work can be used behind it than for the metal covering.

As to body equipment and accessories, it was noted that on all the close coupled bodies, as well as on those of the larger variety, the use of trunk racks is quite extensive. Many of these racks are of the folding type, and on some models the top of the tank is utilized as a base upon which to rest the trunk. The tank is protected by wood strips, and these give less of a conspicuous appearance than the



## New Models at the Automobile Salon



1—Cunningham  
2—Packard with Holbrook body

3—Lincoln with Murphy body  
4—General view of salon

5—Duesenberg  
6—McFarlan

7—Minerva  
8—Fiat



ordinary rack. In most cases the use of the rack is accompanied by equipment of the back of the body with perpendicular rods to protect the finish.

There appears to be no general tendency to replace running boards with steps, although this has been done in a few instances on open cars. The steps used as a rule are made to fasten to the body with a shank, similar to the method used on carriages, rather than having a square casting run up to the shield.

The exhibit served to demonstrate the increasing hold the soft roof has gained upon the body builder. Of the total number of bodies exhibited there is but one equipped with a solid roof and this was of the coach type formerly used on carriage work. All the others are made of fabric. Some few had metal formed over the edges and the appearance from the side gives the impression that there is an all metal top. Many of the bodies are skeleton lined on the interior. The bows and slats on such jobs form a visible lattice work. The space between the squares is about six inches. This design affords a light appearing upper structure and shows the tendency of body builders to make bodies as light as service will permit. The roof at best is but an umbrella and it is in line with good sense to make it light. It is also an added attraction to make it light in appearance. Brewster has one body in which the fabric was also used in the side and back quarter. Their method of applying the fabric, however, could be improved upon. The screw heads appearing in the moulding give a rough appearance, as though the car was one only suitable for hunting purposes or for cross country use.

There is a general use of ventilators on the roofs, as well as ventilators on top of the shroud. On many of the open bodies the lower half of the windshield is stationary. This has been true in the past on high class enclosed bodies, but the open bodies had not before been so equipped.

Mudguards on the models exhibited are principally the full crown shape and rather large. Even the few cycle guards shown are made with a reverse turn at the rear end. A few of the cars from abroad use a shape nearly horizontal both for the front and the rear. One exhibitor has guards covered with imitation Spanish leather.

The fabric sun visor is fairly well represented and the Brewster and Healey types of windshield are shown on various cars. The large circular headlight is very general, although several examples of cowl lights are shown. In many cases the spare tire is carried at the front.

Apparently there has been a reversion to some of the features that were used in earlier days. In practically every case, however, the use of the older form of body building is well applied and there is not the appearance of drifting backward. Rather there seems to be a well directed effort to combine the old with the new for the benefit of change and the old gives a touch of newness all its own. This trend was particularly noticeable in the tops of open bodies.

### The Body Lines

The body lines of the open type include, for the most part, the flat top edge. An effect that is quite new has been produced with a Holbrook body on a Packard chassis. A recessed panel about three inches wide extends the entire length of the body and hood. This panel is sunk down about one-quarter inch and is painted red, while the body is brown.

New radiator designs are predominated by the round form. The rear corners of open bodies are also rounded.

Open body trimmings do not differ from previous years, except, perhaps, there is more plainness in design. Design leather is also common and interior lights are used on one open body, these being the small round pattern fastened to the rear bow on each side. Step lights are

also used in some cases. They are generally placed within the splashers. Foot rests and robe racks are the rule and the trimmings on the newest designs are made to conform to the body line all the way around, including the back seat. In other words, the top line of the body is distinct and visible throughout, giving a clean-cut look to the interior, although it is doubtful if the rear seat is as comfortable as it would be were the trimmings higher. The outside handle is dispensed with on half the open bodies, while the others use both the outside and inside.

A variety of designs is shown in the trimmings of the enclosed bodies. The wood panel with decorative designs is used largely on the doors and the inlaid natural wood strip is also used across the division on the doors. The designs of the seats and backs give an appearance of comfort, either when plain or pleated. The use of divided seats is quite common, the division being made in some cases to swing back out of place in the front seat. The rear seats, however, have a substantial arm chair division. The use of the arm rest on each quarter panel is general.

The interior appearance of practically all the enclosed cars gives the effect of study in design. There is, however, on some of the models, a tendency to crowd all the various appliances into too small a space. For instance, the visible vanity case, the dictograph inside the door, pull-to handles, regulator handles, etc., all within a small space, give the appearance of too much silver punched together. Corner and center dome lights are the rule, as are visible vanity cases. The interior wood finish, in most cases, is confined to the moulding around the windows. The seats are, in many cases, furnished with pillows and pillows are used as foot rests. The doors, generally, are plain. On some of the berlines pockets are provided on the doors in the driver's section and occasionally a panel effect on the rear door is seen. More often, however, the rear door is entirely without design and never with a pocket on domestic cars.

The upholstering material is principally worsted and wool fabrics, broadcloth and bedford cords. The color gray predominates. There was but one body covered with mohair. On the berlines the driving compartment is finished in leather, and on some models a shoulder division is used.

As to colors, there is, as usual, a wide range. Brown and red are used together with good effect. There are several grays and a few blues. There are two unfortunate combinations, one being due to an overdose of red trimming and the other having a similar fault due to nickel and bright aluminum. Striping is used to some extent on half the cars, the broad glazed stripe with two hair lines being the most common. In a few cases the hoods are striped.

Body builders having exhibits at the salon are Brewster, Brooks-Ostruk, Pease, De Causse, Derham, Fleetwood, Healey, Holbrook, Locke, New Haven, Rochambeau, Smith-Springfield, Walterm and Murphy.

A more detailed account of the salon will appear in next week's issue of AUTOMOTIVE INDUSTRIES.

### A Show Room for Foreign Buyers

**W**OLSELEY MOTORS LIMITED of England have just opened what the London *Times* declares to be one of the most handsome and most expensive show rooms in the world. The new building is located in Piccadilly at the corner of Arlington Street, London.

While this show room will by no means be closed to the domestic purchaser its prime purpose is to stimulate exporting. The site selected is one which gives the new building an international status, and the splendor of the place should attract many buyers from all parts of the world.

# Recent Developments in Bodywork on British Cars

Small four-passenger cars have scanty leg-room and lower sides than are usual in British practice. Many framed curtains or light removable window panels are employed. General body design similar to last year.

By M. W. Bourdon

**T**WO trends stand out prominently after a careful inspection of British open bodies at the Olympia show, both relating to the smaller sizes of car of from 10 hp. to 14 hp. The first is a lowering of the high standards of passenger comfort and protection hitherto characteristic of British cars in general, and the second the widespread adoption of framed side curtains—or light, detachable panels—which open with the doors or in some other way eliminate many of the drawbacks associated with side curtains of the usual type.

Dealing with the first of these developments, it is obvious that on four-passenger "light cars" of the power mentioned the comparatively short wheelbase must have the result of restricting the body space behind the dashboard, unless, as is sometimes the case, the very undesirable plan of making the rear seat greatly overhang the rear axle is adopted. But the fault is not so much in this as in the reduced height of the side panels from floorboards to elbow line.

This lowering of the sides implies less "freeboard" above the seat cushions, unless the latter are lowered to a similar extent. Some makers have followed this plan, but it is not appreciated by potential users who have passed middle age, owing to the difficulty they experience of rising from unduly low seats and the physical discomfort felt on long runs on rough roads.

## Reasons for Reduced Height

The reason for the reduced height of body sides is clear. The desire is not only to reduce the wind resistance area, but also to obtain a symmetrical outline for the car as a whole. Naturally the smaller cars have lower radiators and hoods, but sometimes the radiator is made higher as a compromise between chassis and body requirements. Thus the 11-hp. Humber has had its radiator height increased 5 in. as compared with its forerunner, the 10-hp. But while this has brought the top line of the hood almost horizontal and in line with a reasonable height of body side, it would not allow the latter to be raised appreciably without detracting from the appearance of the car. But instead of providing seat cushions reduced as a whole in their height from the floor, a more pronounced rearward inclination has been given to both cushions and back rest, of the front seat in particular; while, therefore, the haunches of the passengers are lower than usual in larger cars, the slope of the cushion keeps their knees at the same elevation, and their legs from knees to feet do not assume that approach to the horizontal to which objection is taken by the average owner when low and nearly flat cushions are provided and which, by imposing the whole weight of the legs on the backs of the heels, is so tiring on long runs.

This plan of increasing the rearward slope of seat cushions and back upholstery is of advantage in another way; it enables the front seat to be brought farther forward without cramping the driver and his companion. Thus another couple of inches or so are available for the rear compartment and increases to that extent the leg-room or cushion width at the back without affecting overhang. And, of further advantage, the front seat occupants are brought closer to the windshield, so receiving more protection from the latter.

The extent to which the body sides have been lowered in relation to the seat cushions varies pronouncedly, of course, on different makes of bodies; but whereas formerly this "free board" ranged from 12 to 15 in. for cars of 15 hp. and over, the average is now 9½ in. on 10 to 14 hp. cars. The difference is further increased in many cases by the reduction in the thickness of the cushion, which prevents the occupants from "sinking into" the latter so much.

In respect to British body design in general, there is not much change from last year. More makers are carrying the side panels over the top edge of the framing, some using aluminum or mahogany beading to cover the junction of panel and upholstery, though more often the latter finishes in a "cord" above the edge of the panel. Side panels, too, are more often of the curved-in-top design, the curve in pronounced form extending down the side some 3 to 4 in. and leading into a continuous sweep to the bottom edge.

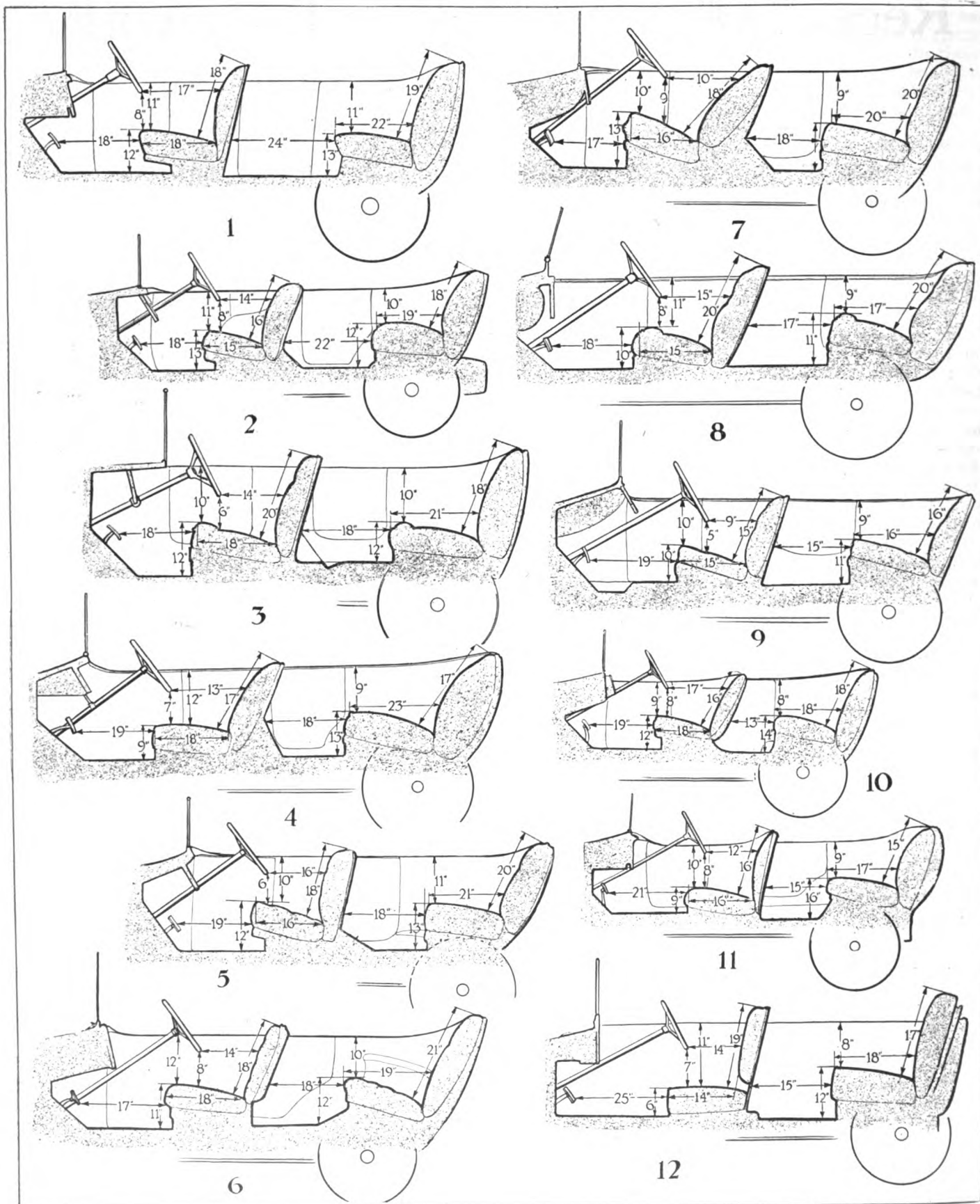
Buttoned upholstery is still most favored, though not infrequently cushions are plain with a roll or thickening some 4 in. wide and an inch deep at the front edge. Seat cushions generally are not sloped so much as they were, though there are very few examples of the flat, plain cushions and none of the semicircular (inside elevation) pattern observable on many of the cheaper American cars. Almost without exception British cushions are thicker in front than behind, some showing considerable difference in this respect.

## Light Cars None Too Roomy

On light cars with 96-108-in. wheelbase, the four-passenger bodies are frequently none too roomy, and a driver or passenger of more than average height and leg-reach is decidedly cramped. Then, too, with their comparatively low sides they are somewhat draughty at the back, though the front seat occupants are usually cosy enough, owing to the setting back of the cowl, which in some cases extends to within 8 or even 6 in. of the front edge of the front seat, a feature which necessitates the seat cushion overlapping the doorway.

Ventilators at the sides of the cowl are provided in approximately 40 per cent of cases, but they are of little

## Body Dimensions of Various British Cars



1—18 hp. Armstrong Siddeley  
2—15 hp. Wolseley  
3—14 hp. Vauxhall

4—14 hp. Sunbeam  
5—12 hp. Rover  
6—12 hp. Swift

7—11 hp. Humber  
8—Morris Cowley  
9—10 hp. Singer

10—10 hp. Wolseley  
11—10 hp. Calthorpe  
12—8 hp. Standard

advantage when the atmospheric temperature is over 75 deg. Fahr. Nearly all doors have front hinges and cannot, therefore, be set open to form air-scoops.

Very few British cars with open bodywork are intended for more than five occupants; that is to say, folding additional seats are found only on specially built bodies; as a result, there are very few rear compartments having as much as 26-in. floor space between the back of the front seat and the front edge of the rear cushion. This space averages 20-22 in. in cars of 15 hp. and over, with a cushion width of 18 to 20 in. front to back. It can be said, therefore, that full-sized, five-passenger bodies have very little overhang of passenger weight behind the rear axle.

Generally the axle lies approximately under the center of the rear cushion, though in the small sizes overhang is distinctly pronounced when the legroom is fairly adequate. Five-passenger bodies rarely have a rear seat wider than 44 in. inside measurement, and the majority of the cushions are only 42 in.

### A Standard Top

Quite a number of makers now standardize, for classes from 11 hp. upward, a sedan with fixed top and an "all weather" type—a folding top sedan with drop side glass. Both types of closed bodywork usually have only one door on each side, the top enclosing the passengers and driver in a single compartment. The door at the right is then generally at the front, 24 to 28 in. wide, the other, on the left, being at the back. Sliding and hinged back single bucket seats, or, alternately, single seats hinged to the floor allow communication from front to back. In some cases only two wide front doors are fitted, entrance to rear being by hinged or sliding front seats.

Concealed folding tops are not increasing in number; in fact, Austin in the next series of Twenties will return to the exposed folded top and Vulcain has already returned to it.

The accompanying diagrams prepared at the Olympia Show give twelve examples of British car bodies on chassis from 8 hp. to 18 hp. They are not drawn to scale, but the dimensions can be taken as approximately correct. They were originally prepared to indicate the seat cushion and back upholstery angles and shapes, and in this respect they have been drawn with particular care. Thin, unbroken lines indicate the outline and position of the doors.

The following remarks concerning the various constructions illustrated will give additional information indicating the trends of British standard bodywork design, as distinct from that on such cars as Rolls-Royce, Napier, Lanchester and other costly cars, for which the bodies are usually built to order.

**18 hp. Armstrong Siddeley.** This chassis, a new model with six-cylinder  $2\frac{3}{4} \times 4\frac{1}{8}$ -in. engine, has a wheelbase of 120 in. and a track of 51 in. It is supplied as a four-passenger car and its comparatively narrow track calls for "paddle-boxing" of the rear side panels to provide a seat width of 42 in. On present standards the leg room for the back passengers is above the average, the width between front seat back and cushion edge being 24 in., and this in effect is increased by the rear cushion being 22 in. wide. The body has four doors, 19 in. wide by 23 in. high, rear hinges, inside handles and leather buttoned upholstery, the front seat being a unit adjustable fore and aft. The cowl extends rearward to within 12 in. of the forward edge of the front seat cushion when the seat is in the position suggested by the diagram. The price of this model is £880.

**15 hp. Wolseley.** This also is a four-passenger body, the track (52 in.) prohibiting three passengers being

comfortably accommodated abreast at the rear; the wheelbase is 118 in. Here, again, more than enough floor space is available at the back and yet not enough for extra seats or luggage of any dimensions when four passengers are aboard. Only 3 doors, 18 in. wide by 22 in. high, are provided, the gear shift lever being on the right of the driver; but alongside the latter is a detachable panel in place of a door, normally secured by 4 studs and nuts and intended to be removable merely for chassis adjustments. The rear doors have their bottom corners cut away to clear the fenders. Adjustable front seats as a unit are provided for £24 extra on the car price of £800. The upholstery is of leather and buttoned; the cowl reaches back to within 12 in. of the front seat edge.

**14 hp. Vauxhall.** This is the new Four with a bore and stroke of approximately  $2\frac{15}{16} \times 3\frac{1}{8}$ , the chassis having a wheelbase of 116 in. and a track of 50 in. The body is a four-passenger with four  $\frac{3}{4}$  doors, the latter being only 15 in. wide and 15 in. high in body sides 22 in. deep, and therefore implying a sill 6 in. or so in depth. The cowl extends back to within 6 in. of the front cushion edge; the upholstery is of leather, plain, except for a single row of buttons near the top of each seat back; inside handles and front hinges are used for the doors and a metal framing for the folding top. The normal clearance below the steering wheel is decidedly meager, viz., 6 in., but with a flexible cushion it becomes ample even with a winter coat when the driver is in position. The car sells at £750.

**14 hp. Sunbeam.** Four-passenger open bodywork only is standardized for this new model Four with overhead valves ( $2\frac{7}{8} \times 4\frac{3}{4}$  in.). The wheelbase is 118 in. and the track 51 in. Three doors are fitted, 20 in. wide of the full height of the body sides, 21-22 in.; they have front hinges and inside handles. The front seats are adjustable fore and aft as a unit, the rear edge of the cowl being 16 in. in front of the cushion edge normally arranged; the upholstery is of leather, plain on the seat cushions and pleated on the backs. The folding top has steel tube framing. Price, £720.

**12 hp. Rover.** Despite its smaller "catalog" horsepower this has a slightly bigger engine than the Sunbeam, the dimensions being the same as the Vauxhall ( $2\frac{15}{16} \times 3\frac{1}{8}$  in.). It is a roomy four-passenger body, the rear seat being 42 in. wide and is often used for three adults. It has three doors 18 in. wide and 20 in. high, front hinges, inside handles; the leather upholstery is unusually "soft," thus giving a greater practical clearance between steering wheel and front cushion than the normal 6 in. implies. The front seat has two separate cushions, that for the driver extending 2 in. farther forward than the other, and the back of this seat is bulged slightly at the center, giving a slight curvature behind each of the occupants; the cushions and backs are buttoned, with plain side upholstery. The cowl extends to within 13 in. of the front edge of the driver's cushion. The price is £660.

**12 hp. Swift.** This is a four-passenger body on a wheelbase of 108 in. and a track of 48 in. The rear overhang is considerable (approximately 20 in.), the rear axle center being not far behind the front edge of the back cushion. This results in a by no means pleasing appearance—to say nothing of detracting from passenger comfort. There are three doors with front hinges, 18 in. wide by 22 in. high, the back ones being cut away considerably at their bottom rear corners to clear the fenders. The rear panels are "paddle boxed" and narrow arm-rests are fitted at the sides of the rear seat; the cowl extends to a point 14 in. forward of the front seat cushion. Price £600.

**11 hp. Humber.** The four-cylinder engine is 2 11/16 x 4 3/4 in., the chassis having a wheelbase of 105 in. and a track of 47 in. And yet in appearance the four-passenger car is much in advance of the Swift, with less overhang and yet quite ample leg room. The diagram, correct though it is in respect of the angle of the front seat back, conveys a rather false impression as to the natural pose of the occupants. That is to say, the greater slope of the cushion imposes more pressure on the bottom part of the back upholstery than usual and the latter "gives" to the passenger at the small of his back so as to make his normal pose more upright than the diagram suggests; it does not compel a semi-reclining attitude. Three doors are provided, 18 in. wide, the front cushion extending half way across the opening and reaching forward to within 8 in. of the back of the cowl. The upholstery is of leather and buttoned. The price of the car is £620.

**Morris Cowley.** Engine dimensions in this case are 2 3/4 x 4 in., the wheelbase is 102 in. and the track 48 in. Rear overhang is pronounced 22 in., bringing the axle almost under the front edge of the rear cushion. Only two doors are fitted, both on the left, though in a better grade model termed Morris Oxford, there are four doors and the upholstery is in leather instead of imitation, as in this case; body dimensions are, however, much the same in both types. The doors are 18 in. wide x 20 in. high and have inside handles; the cowl is 16 in. in front of the driver's cushion edge. This small four-passenger sells at £340.

**10 hp. Singer.** With a 96-in. wheelbase and 48-in. track this chassis with its 67 cu. in. engine has not been sold with anything but a two-passenger body until recently. The four-passenger appeared in public at Olympia for the first time. Passenger accommodation is meager, for too much of the chassis length is devoted to engine space and the somewhat excessive rake of the steering column makes the wheel too close to both seat cushion and back, viz., 5 in. and 9 in. respectively, before the driver is in position. (At Olympia it was stated that the steering column rake is to be altered to overcome this objection.) Three doors are fitted, the front one being 15 in. wide x 20 in. deep and the rear ones of the same width but only 13 in. deep—practically half doors, the object of which is to afford front support for the rear seat frame. The seats are narrow for two normal sized adults, viz., 36 in. only, but this is the usual width on these very small four-passenger models. There is 14-in. overhang behind the rear axle, the cowl extends to within 8 in. of the front edge of the driving seat, and the top line of the body is only 37 in. off the ground—a dimension which gives an idea of the size and low appearance of the car. The upholstery is buttoned and of leatherette, and the price is £420.

**10 hp. Wolseley.** This also was originally made only for two-passenger bodies, and its engine size (70 cu. in.) was considered small at one time even for that purpose. Even now, with its 99-in. wheelbase and 46-in. track, it is not offered as a full four-passenger, the makers styling it for "two adults and two young persons." But it is not infrequently used for four adults though, as the diagram indicates, the knee and leg room at the back is decidedly meager. There are two doors only, 15 in. wide, the opening at the back being reduced almost by half owing to the sweep of the front seat panel encroaching on the rear door space. Front hinges and both inside and outside handles are fitted, the top line of the body sides being 42 in. from the ground; above this the opened folding top extends for 28 in., which is distinctly high for a car of this type and gives it a somewhat top-heavy appearance—besides increasing the

wind resistance when the top is raised. The rear edge of the cowl is 12 in. forward of the front seat cushion. Price £525.

**10 hp. Calthorpe.** This chassis also has a 70 cu. in. engine with a 99-in. wheelbase, but the track is narrower than any other of these small four-passenger cars, viz., 44 1/2 in. Rear overhang from the axle to the back panel is considerable (24 in.) and this, too, with quite a shallow seat (17 in.) and scanty upholstery for the driving seat back. Leg room at the rear is increased by sinking the floor boards into a pronounced "well." The three doors are 16 x 16 in., the back ones cut away to clear the fenders. From the front of the driving seat cushion to the back edge of the cowl is 12 in.; the upholstery is buttoned throughout and of leather. The price is £375.

**8 hp. Standard.** In engine dimensions this new model is similar to the Singer (66 cu. in.), but it has been designed for either two or four-passenger bodies and has a wheelbase of 102 in., the track being 48 in. The four-passenger body affords an example of the plan of lowering the cushion height to obtain more free board—at the front only, however, for the axle center compels "boxing" of the rear seat base and gives the cushion a height of 12 in. as compared with 6 in. at the front. The front seats are separate, adjustable fore and aft and have hinged backs so that the fore and aft dimensions given on the diagram are subject to variation on account of this construction. The body has three doors, all of which are exceptionally wide, viz., 24 in. at the front and 22 in. at the back; they are 18 in. high and those on the left are separated by an ironed pillar 3 in. wide to carry the latch of the front door and the hinges of the rear one. The cowl is very distant from the front seat, its rear edge being 18 in. in advance of the cushion, and in this respect the car is almost unique among British productions of any size; this does not add to passenger protection and warmth, though facilitating entrance and exit. The back upholstery is detachable, to provide space behind it for the framed side panels of the folding top. The rear axle is only 12 in. in front of the back panel, the latter being the only one of the body which has not an absolutely flat surface. The upholstery is plain and of leatherette; doors have inside and outside handles and the top line of the body is only 36 in. from the ground. The price is £340.

## New Zealand Tariff Proposals

THE Coach-Builders' Association of New Zealand are urging the following scale of tariff on automobile imports: Two- or three-passenger roadster body, £30, with £40 surtax for foreign manufacture; four- or five-passenger touring car body, £50, with £60 surtax; six- or seven-passenger touring car body, £55, with £65 surtax; bodies fitted with canopy tops, fixed or movable, £65, with £75 surtax, or 50 per cent and 55 per cent *ad valorem*, whichever is the higher duty; imported chassis, excluding rubber tires, unassembled, 5 per cent, with 10 per cent surtax *ad valorem*; assembled chassis, 10 per cent, with 20 per cent surtax *ad valorem*; parts of bodies from 15 per cent with 20 per cent surtax and upwards *ad valorem*. The present duty on imported bodies is 20 per cent *ad valorem* and 10 per cent preferential surtax on bodies non-British or not from British Dominions, and 10 per cent *ad valorem* and 10 per cent surtax on British bodies.

The intention behind these demands obviously is to develop a native body-trade and it is noteworthy that the home built automobile bodies are accounted better and cheaper than those imported on cars, excepting the best grade chassis.



# Stevens-Duryea Producing High Grade Six

Successor to older company has modernized the chassis formerly built and is now active in competition for quality trade. Changes made in bringing the chassis up to date are here described and illustrated.

By Herbert Chase

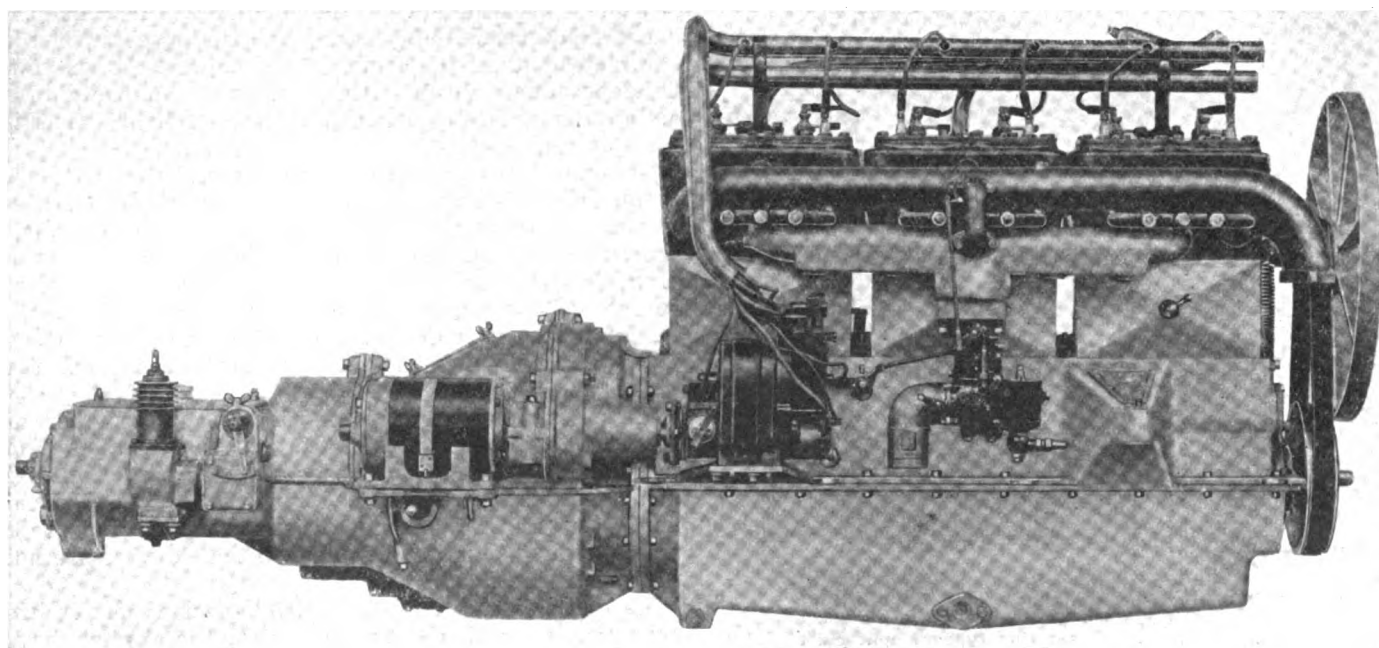
**S**TEVENS-DURYEA, INC., is now producing at its new plant a high-grade passenger car which is similar in most particulars to the car formerly produced by the old Stevens-Duryea company. The latter company, it will be remembered, retired from business and sold its plant several years ago. The present concern is an entirely new organization, but has continued, with some modifications, the manufacture of the same chassis formerly produced by the older company.

The Model E powerplant, which was one of the earliest unit types ever built, is substantially identical in most mechanical features with the older Stevens-Duryea powerplant, but incorporates a number of refinements and changes in external appearance made with a view to bringing it up to date and adapting it for use with present-day fuels. The cylinders are cast in pairs and mounted on an aluminum crankcase. The crankshaft is of the four-bearing type. The main bearings are  $2\frac{3}{8}$  in. in diameter and the crankpins  $2\frac{1}{16}$  in. in diameter. The changes include the addition of a Lanchester vibration damper inclosed within the pulley from which the fan is driven. There has also been fitted an entirely new set of manifolds. The exhaust manifold, which formerly had its outlet at the rear, has been changed to give a front outlet, thereby making it easier to prevent

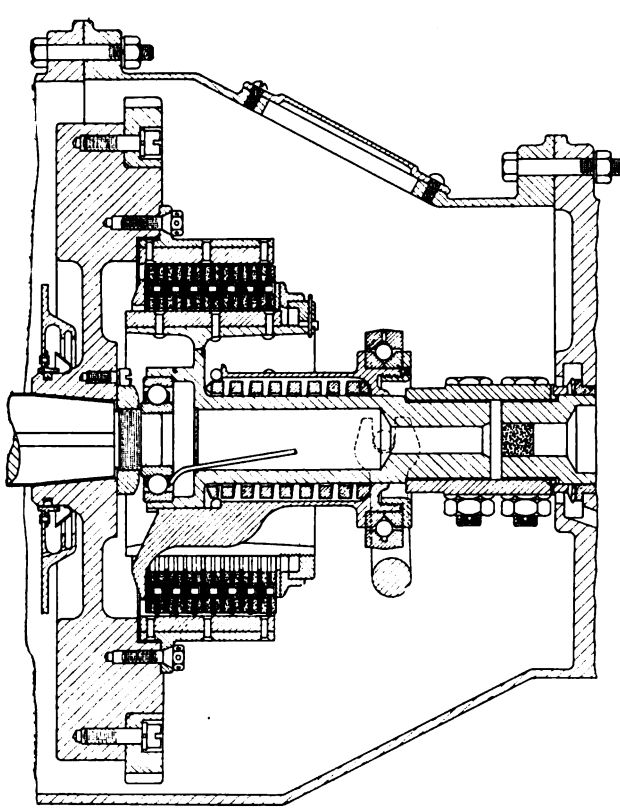
overheating of the floorboards in the driver's compartment. The central portion of the inlet manifold is now exhaust-jacketed. Hot gas discharged through the jacket returns to the exhaust pipe at a point below the carbureter. A throttle in the exhaust by-pass is arranged to open as the carbureter throttle closes, with a view to adding maximum heat to the charge at low throttle positions. A stove surrounds the exhaust pipe where it passes under the carbureter, and all the air entering the carbureter is drawn through this stove unless the sleeve on the carbureter inlet elbow is open, as it may be, if desired, in warm weather. The lower portion of the inlet manifold is jacketed with hot water taken from the top of one of the cylinder head jackets. Fuel is fed to the Stromberg carbureter by a Stewart-Warner vacuum tank of large size. This takes fuel from a 25-gal. tank in the rear of the chassis, whereas fuel was formerly fed by gravity from a tank under the front seat.

The engine is provided with pressure lubrication on the main bearings, but the connecting rods depend upon splash from troughs which are kept filled to a constant level by streams of oil from the pump.

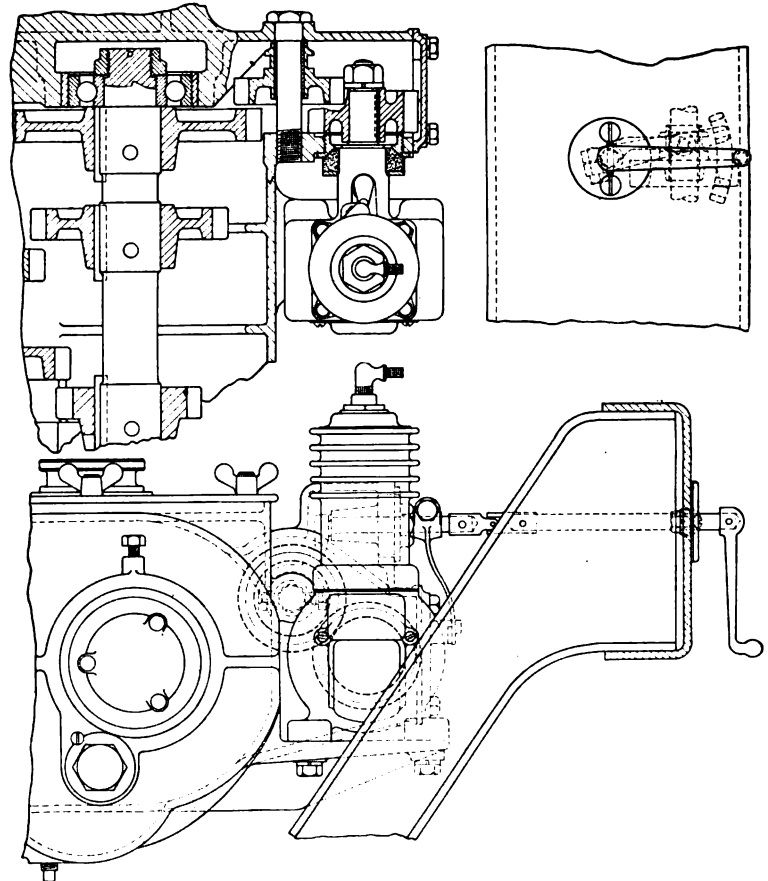
The engine is said to develop a maximum of 90 hp. at 2000 r.p.m. The clearance volume is 26 per cent of the total volume (clearance volume plus piston-swept vol-



Right side of the Model E Stevens-Duryea powerplant. Note new exhaust heated inlet manifold, and mounting of magneto, lighting generator and air compressor



The multiple dry-disk clutch can be removed without disturbing other units



The new air compressor, showing method of driving it by special gear in the transmission

ume). Cast iron pistons with split skirt, made in accordance with the drawing here shown, are employed.

The cooling system includes a centrifugal pump driven from a cross-shaft at the front of the engine. A thermostatic valve mounted on the discharge pipe from the engine is arranged to short-circuit the radiator while the engine is warming up or operating below a given temperature. A G. & O. radiator is used.

Ignition is now furnished by a Berling magneto which,

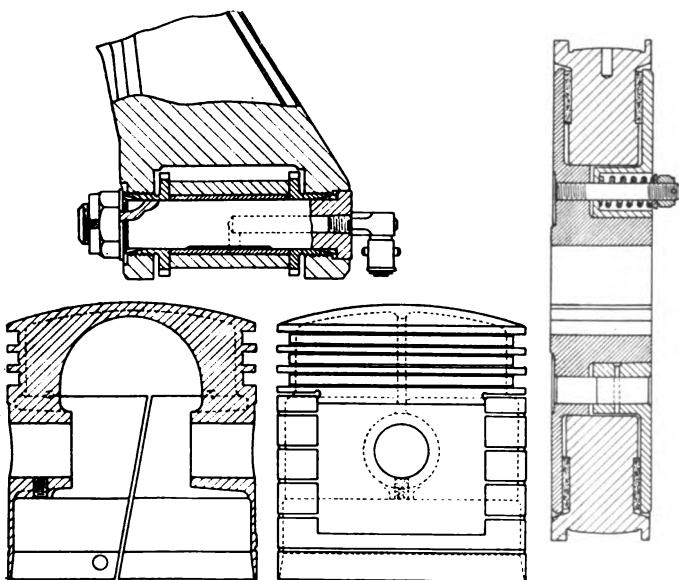
however, carries a second distributor, enabling the use of battery ignition for starting. A Westinghouse starting motor is mounted just below and to the left of the clutch case. It can be easily removed by taking out the flange bolts and pulling it to the rear. Starting is effected by throwing a small switch on the dash which operates, in turn, a relay and switch in the armature circuit. The lighting generator is mounted to the right of the clutch housing and is driven off the rear end of the same shaft which drives the magneto. This construction is made possible by having the timing gears in the rear instead of in the front of the engine. A six-volt, 120-ampere-hour Vesta battery, mounted amidship in a cast aluminum cradle attached to the outside of a chassis frame is employed.

All connections between the engine and rear axle are of the squared-shaft type, long a feature of Stevens-Duryea construction. The flywheel is mounted on a tapered square instead of a flange, this construction being used for the reason that the timing gears are at the rear of the engine. Helical gears, running in oil, are employed. They are made of Fabroil and are inclosed by a plate which separates the clutchcase from the crankcase.

The powerplant has a three-point suspension, one of the early features of Stevens-Duryea construction. No underpan is used, but the space between the crankcase and chassis frame is inclosed by deep U-shaped sheet metal troughs which slope aft and have at their rear end large air discharge openings, so that louvres are not required in the hood.

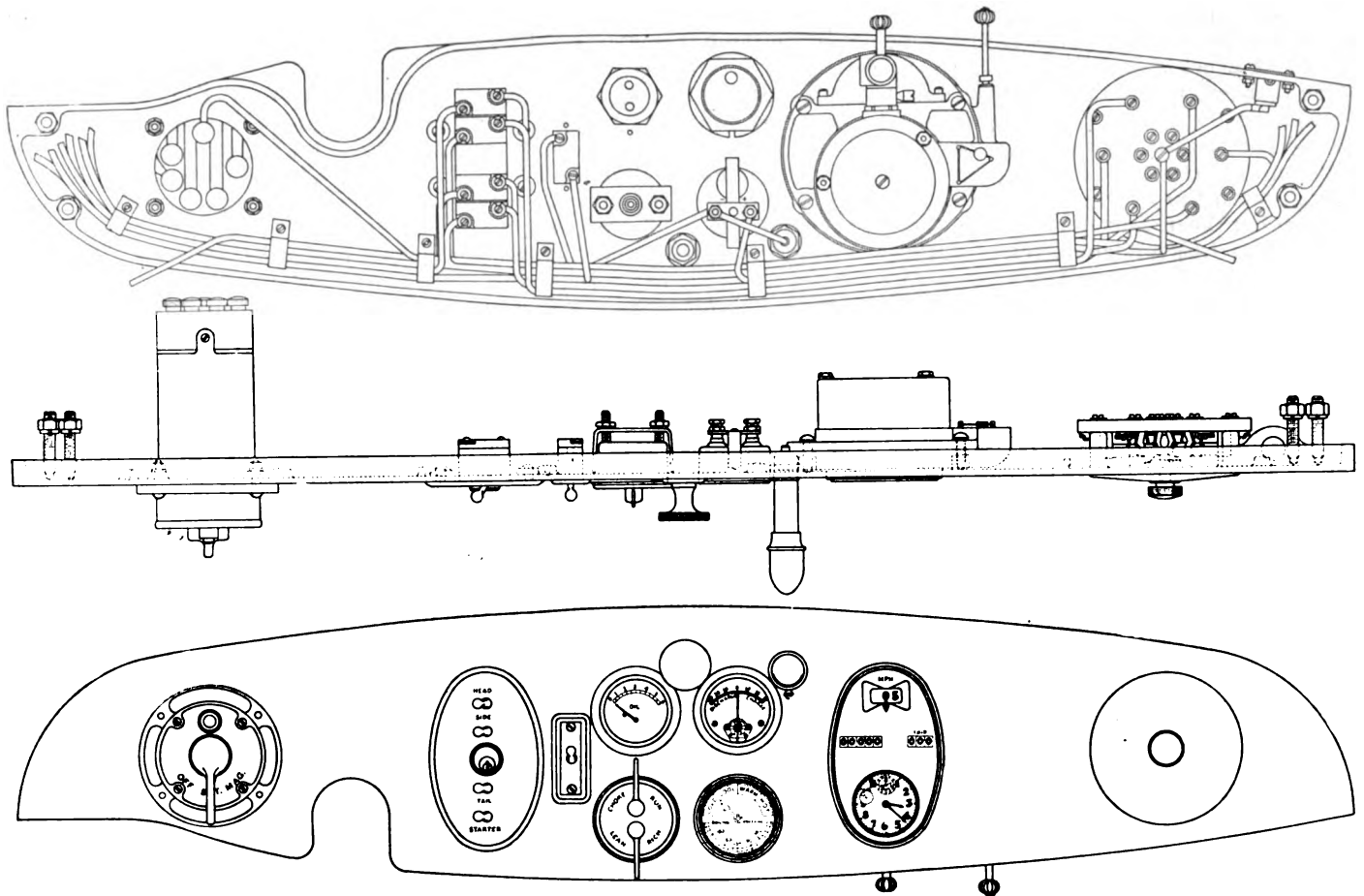
The clutch is of the dry, multiple-deck type. It has seven driving and six driven plates, the former have molded Raybestos linings.

A split-type square coupling is used for connecting

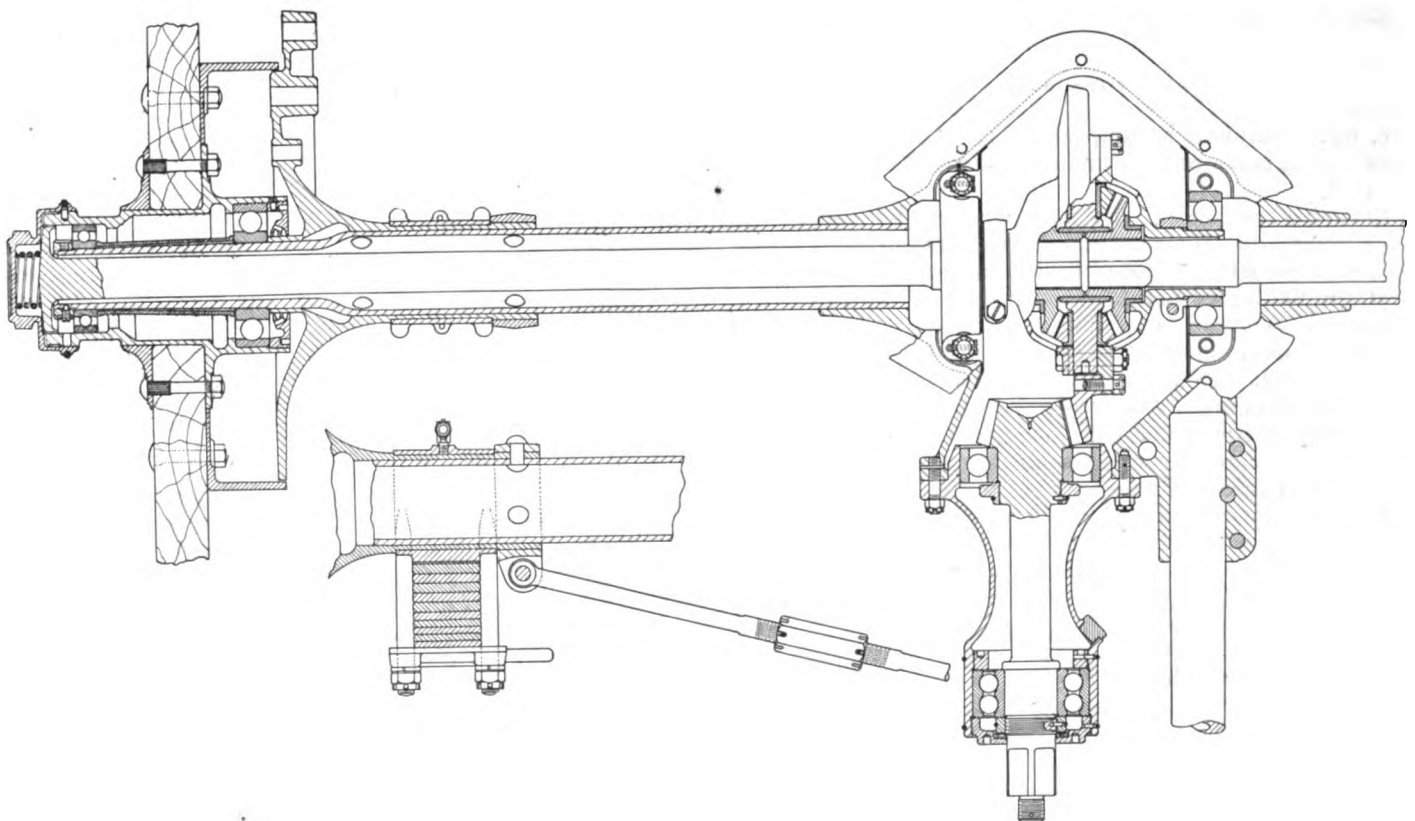


(Upper left)—Bracket and shackle for front end of rear springs, showing bushing used to take up side play  
(Lower left)—The piston showing type of split skirt employed

(Right)—The new Lancheester vibration damper which is built into the fan driving pulley



Instrument board, showing wiring and method of mounting instruments and switches



The full-floating rear axle, showing separate housing for pinion shaft and its bearings, and the substantial truss-rod employed

the clutch to the transmission. By taking out the bolts which hold this coupling together and slipping back the clutch it is possible to remove the latter without disturbing other units.

The transmission used is of the same progressive type formerly employed. This is operated by a lever at the left of the driver. The lever moves over a so-called "self-finding" quadrant which is said to make it impossible to mesh the wrong gear in shifting. To the transmission has been added a Kellogg air compressor, the mounting of which is shown clearly in the accompanying photograph of the powerplant.

The universal joints are of the hollow-cross type and are filled with grease which lubricates the pins under the influence of centrifugal force. The joints, in common with nearly all other units in the car, are made in the Stevens-Duryea plant.

The rear axle is of full-floating type and spiral bevel gears are employed. The pinion shaft, with its housing and bearings, forms a separate unit which can be easily removed for bearing adjustment. Ball bearings are used throughout. The central housing of the axle is of malleable iron. Into it are pressed and brazed steel tubes. The assembly, which appears rather light for a heavy

The frame is 1 in. deeper than formerly and is made of heat-treated chrome nickel steel. Arrangement is made for supporting the body on brackets attached to the outside of the chassis frame. These are provided with taper wedges for adjustment.

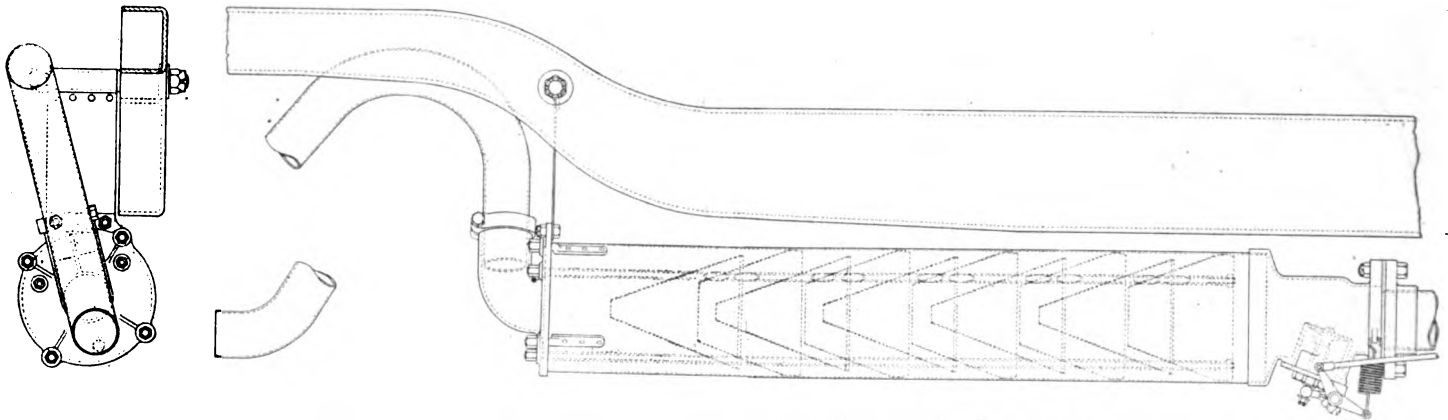
The steering gear employed is practically the same as that formerly used. It is mounted to the chassis frame by a single but substantial bolt which permits the steering column to be adjusted at an angle to suit the type of body employed.

The Alemite lubricating system is used for all chassis parts requiring grease.

The muffler, which is of Stevens-Duryea construction, employs a series of conical baffles, as shown in the accompanying cut. It is supported by sheet metal hangers from studs rigidly attached to the chassis frame. The hangers are sufficiently flexible to readily take care of the heat expansion of the long exhaust pipe.

The standard equipment for all models includes a long-distance Moto-Meter with dial indicator on the dash, a combined Waltham clock and speedometer, tire rack and two rims. Cord tires, either 33 x 5 or 35 x 5, are provided all around.

The seven-passenger touring car with full equipment



The muffler, showing conical baffles and method of support by flexible hangers

car, but is said to be amply strong, is reinforced by a substantial truss-rod. Standard gear ratios are 3.92 and 4.1 to 1.

Both brakes are on the rear wheels and operate on 14-in. cast iron drums. The external brake has cast malleable shoes with asbestos fabric lining. The shoes are held against an adjustable stop in the off position. The clearance of upper and lower shoes is established by an adjustment on the top of the upper shoe, and the spring which holds the two shoes of each pair apart prevents dragging. The internal expanding hand brakes have bronze shoes made in one piece. The latter are sprung into contact with the drums on engagement by action of toggles.

The rear springs are of the three-quarter elliptic type, 57½ in. long. They are underslung and pivoted on the rear axle. The drive is taken through the front end of the rear spring, but torque and brake reaction are taken by a torque tube.

An adjustable bushing is used to take up side play and wear on the shackle at the front end of the rear springs. The bushing is screwed into the eye of the bracket, as will be noted by reference to the accompanying cut.

The front axle is of the conventional Elliott type, of Stevens-Duryea make, and has ball bearings in the wheels and ball thrusts on the steering pivots. Half-elliptic springs, 40 in. long, are used in front, and Gabriel snubbers are employed all around.

and tanks filled is said to weigh 4700 lb. The wheelbase is 138 in.

A number of body models are provided, but while these are more or less standard in some particulars, nearly all incorporate special features and are, therefore, practically custom made. They are lower than the earlier bodies, are constructed of high-grade materials and are well finished and appointed. The use of left-hand gear shift and hand brake gives a clear front compartment. The new instrument board and its fittings are shown in one of the cuts.

The price of the Model E chassis is \$5,600.

**A** LENGTHY report from the Government's department of Overseas Trade deals with the trade situation and trade prospects of China. The authors are H. H. Fox (Commercial Counsellor), and H. J. Brelt (Commercial Secretary), and they show that China, despite all sorts of adverse factors, is progressing steadily toward Western modes and usages. Included in this progress is a recognition of the need and economic value of good roads and of automobiles for connecting towns and opening up territories. Almost 5 million dollars worth of automobiles were imported into China in 1920, the great bulk of them from the United States, though British cars are an increasing quantity, which would be larger but for the high cost of the cars compared with American.

He reports favorably of the prospects of trucks which he says are coming into general use.

# A New Rotary Valve Engine

Chief advantage claimed is that of absolutely silent operation. Absence of valves and tappet rods at side of cylinder block allows location of accessories close to cylinders and a consequent narrow engine. The valve design remains the same in principle as the one first produced in 1914.

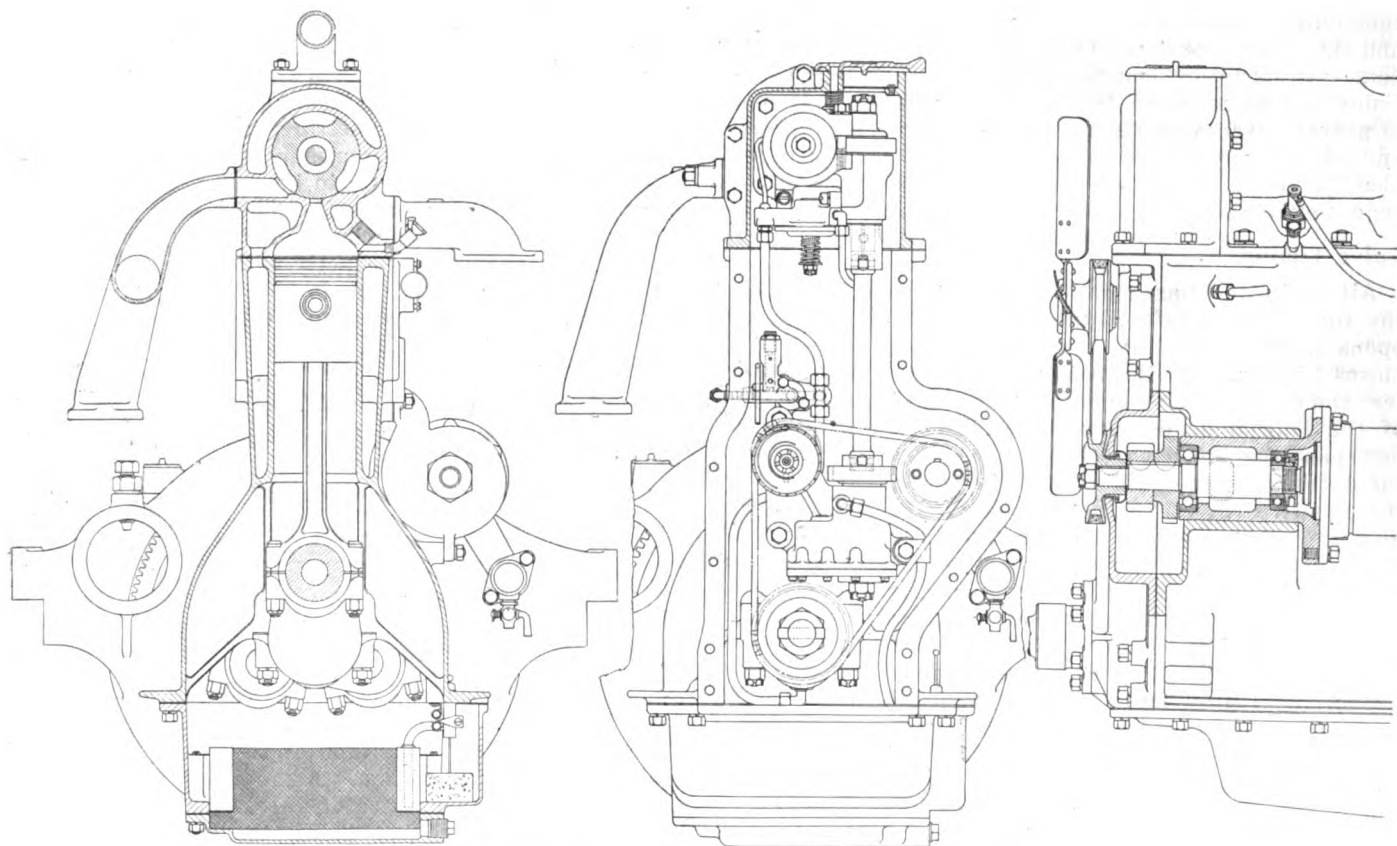
**T**HE original design of rotary valve engine developed by Eugene Bournonville was described in *The Automobile* of Dec. 24, 1914. Mr. Bournonville at that time had rebuilt a Fiat four-cylinder car, having removed the original cylinder block and substituted therefor a new block with valves of his design. We are informed that after this change was made the engine ran better and more efficiently than before, and the old car is still in use, doing truck duty for the plant. During the war, development work ceased for a while, but recently it has been taken up again, and an entirely new six-cylinder design has been created which is now in production on a small scale. By "entirely new" is meant that the design of the engine is in no way based on that of the Fiat on which the early experiments were made; the valve design, while remaining the same in principle, has been improved in many respects.

A number of sectional views of the latest design of engine, known as the Bournonville rotary six, are shown herewith. The rotary valve is located within a cylindrical casting which also forms the cylinder head, but is referred to as the valve head. The valve consists of two identical hollow cylinders located end to end, which are driven at one-sixth crankshaft speed. The drive is

communicated to the two halves of the valve from a shaft extending all the way through them, through a cross-shaped spider keyed to the shaft and engaging into slots in the valves proper, this spider being located between the two halves of the valve.

While on the subject of the valve drive, it may be well to at once describe the rest of this drive. From the crankshaft the drive is communicated to an accessories shaft through a Link-Belt silent chain which runs over a self-tensioning idler. A vertical shaft is driven from the accessories shaft through a pair of helical gears and another pair of helical gears at the top end of the vertical shaft communicates the drive to the valve shaft. A downward extension of the vertical shaft drives the oil pump of the lubricating system, and through a spur pinion on the vertical shaft near its upper end is driven an oil measuring device delivering lubricant for the valve to the stream of combustible gases entering the valve chamber. All this portion of the engine is clearly illustrated in the front elevation with cover removed, shown herewith.

Reverting to the valve head, the combustion chamber is formed in this casting and is of such form that it can be easily machined. Disregarding the cylinder port, which



A number of sectional views of the Bournonville rotary valve engine

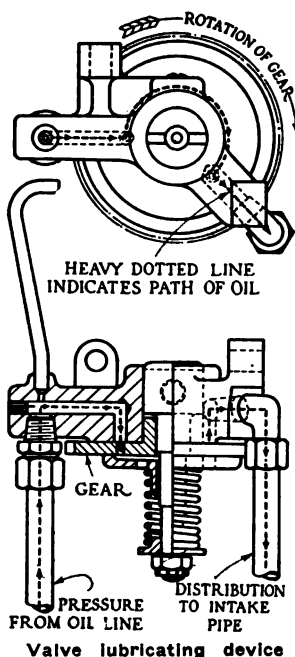


extends vertically upward, the compression space is of the form of a body of revolution and can be machined by feeding a tool of the precise section down into it. A horizontal outlet type of carburetor is fitted to the valve head on one side at the middle of its length, and delivers combustible mixture into the passage within the valve. This mixture then flows through the passages of the two halves of the valve, to both ends of the valve, and then enters a passage, called inlet passage, which is cored in the valve head. This passage extends the whole length of the valve head, and mixture can enter it from both ends. This inlet passage is placed in communication successively with the different cylinder ports by pockets in the valve. Each half of the valve has three sets of three such pockets, each set being in line with the cylinder port of one cylinder. As the cylinder needs to be placed in communication with the inlet passage once every two revolutions of the crankshaft and there are three pockets on the same circumference of the valve, it follows that the valve needs to make only one revolution to six of the crankshaft. The same pockets in the valve which serve for the inlet also serve for the exhaust. There is one exhaust port cored in the valve head for each cylinder, and the pockets in the valve place the cylinder port in communication with the exhaust ports in the proper rotation. The very moment that communication between the cylinder port of any cylinder and its exhaust port ceases, communication between that same cylinder port and the inlet passage is established. Using the same valve for the inlet and exhaust tends to prevent excessive heating of the valve by the exhaust and at the same time to promote vaporization of the heavy ends of the fuel which may enter the inlet passage unvaporized.

#### Valve Timing

All ports and passages are accurately machined and the timing is therefore quite definite. The inlet valve opens 5 deg. past top dead center and closes 35 deg. past the bottom dead center; the exhaust valve opens 45 deg. ahead of the bottom dead center and closes 5 deg. past the top dead center. Owing to the uniform speed of rotation of the valve, the effective valve opening area increases uniformly, remains at the maximum for a while (longer for the exhaust than for the inlet valve) and then decreases uniformly. The maximum valve opening area (for a  $3\frac{1}{2} \times 5\frac{1}{4}$ -in. engine) is 1.507 sq. in. The cylinder port is rectangular in section  $\frac{1}{2}$  in. wide by  $3\frac{3}{8}$  in. long. The valve is  $3\frac{3}{4}$  in. in diameter and its peripheral speed is 187 ft. per minute at an engine speed corresponding to 1000 ft. piston speed per minute.

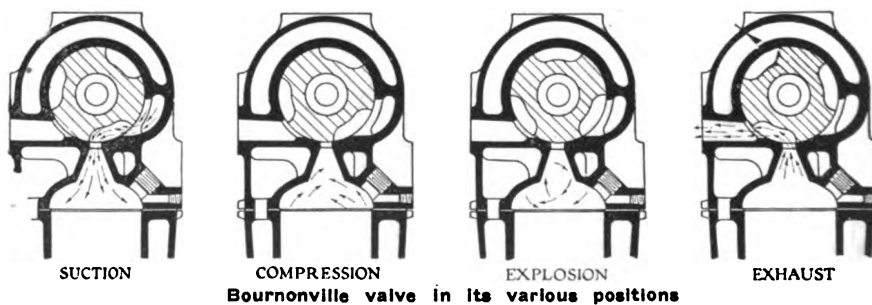
It is this low surface speed of the valve combined with the small clearance allowed between valve and valve bore that permits satisfactory lubrication by a small amount of light cylinder oil. The valve is ground on



its outside and the bore of the valve head is lapped out with white cast iron (malleable iron) laps and so called 15-minute carborundum lapping compound, so as to obtain a clearance of between 0.0017 and 0.002 in. By a special feeding device, one drop of oil is fed into the inlet pipe between the carburetor and the valve head for every 12 revolutions of the crankshaft. An illustration of this oil-feeding device is shown herewith. It is mounted on the gearcase at the upper end of the vertical shaft on the forward end of the engine. It consists essentially of a spur gear which meshes with a spur pinion on the upper end of the vertical shaft. This spur gear is provided with an oil pocket which fills up with oil every time it comes into register with the oil inlet passage (communicating with the regular pressure lubricating system of the engine). After a motion of a little more than half a turn the pocket in the spur gear comes into register with the delivery port communicating with the charge inlet pipe, and the oil then subject to the suction in the inlet port and is drawn into the charge stream therein, together with which it enters the inside of the rotary valve. Here the oil tends to separate out, owing to its greater inertia than the gaseous charge, which asserts itself every time there is a change in the direction of motion, and to collect in eight internal circumferential oil grooves, four in each half of the valve. From these grooves radial holes are drilled to the outside of the valve. Through these holes the oil is gradually fed at several points to the bearing surface of the valve.

#### Valve Well Jacketed

The whole of the valve head is water-jacketed, except that portion where the inlet passage is located, which does not require any provisions for cooling it. The water jacket extends around the spark plug bosses. Water enters the valve head jacket through ports communicating with ports in the top of the cylinder block and leaves the valve head jacket through two openings on top to which the water return manifold is bolted. An interesting point in connection with the production of the valve head is that the casting is made with six core print holes on the sides, and in setting the part for the boring operation it is located by means of pins from the outside of the cylindrical wall to be bored out, thus insuring uniform thickness of wall. There is a valve timing hole drilled in the valve head on top at the rear end; when this hole registers exactly with a hole of the same size in the valve, the piston in No. 1 cylinder should be in the top dead center position. When the explosion oc-



curs in the cylinder the valve has the maximum seal on both sides, viz.,  $\frac{3}{4}$  in.

The outstanding advantage of the rotary valve is its absolutely silent operation. An incidental advantage is that, owing to the absence of valves and tappet rods at the side of the cylinder block, the accessories can be located close to the cylinders and the engine made quite narrow.

# Various Methods of Chassis Lubrication

The need for convenient and adequate methods of chassis lubrication is emphasized, and the various devices and methods intended to accomplish this function are briefly described. Lubricating materials are compared.

By Cornelius T. Myers\*

ONE of the commonest experiences in our daily life is that of the efficacy of lubrication in minimizing surface friction, thereby reducing effort and operating cost as well as prolonging the life of the device. There is hardly an instance of mechanical movement among the millions of devices that surround us daily that does not depend for existence upon adequate lubrication.

The automobile industry early faced and has persistently improved the lubrication of engines, gear-boxes and rear axles because lack of good lubrication in these units was quickly followed by ominous noise and real disaster. But there are many other parts of a motor car or motor truck, commonly referred to as chassis parts, which depend on good lubrication for even reasonably long life. As temporary lack of lubricant on these parts does not stop the running of the car or make its operation uncommonly disagreeable, much less attention has been paid to their welfare, although the total of the damage due to this neglect amounts to a large sum annually.

For four or five years more and more attention has been given to the subject of chassis lubrication.

The main reason why chassis lubrication is neglected by owners and operators is because it is an inconvenient dirty job. The secondary reason is that many chassis bearings will function for a considerable length of time in spite of lack of lubrication. Sooner or later, however, they fail and often cause the early failure of other parts. Especially is this true of such parts as spring-bolts, steering pivots, clutch bearings and universal joints, where bearing pressures or rubbing speeds are relatively high.

Investigation will show a staggering bill chargeable to lack of chassis lubrication. It can easily reach \$10 per year for the average size touring car and can run above \$50 per year for a large truck in heavy service. I estimate that the charge runs about \$5 per year for 4,000,000 Ford cars, plus \$8 for 5,000,000 other cars, plus \$20 per year for 600,000 motor trucks, or a total of \$72,000,000 annually.

If proper attention were given to lubricating the chassis parts of cars and trucks, as they are built and equipped to-day, it would call for a minimum of 2 hr. per week per vehicle. At 50 cents per hr., this would bring our annual bill for attention to \$500,000,000 per year. Since this would result in saving only \$75,000,000 to \$125,000,000 per year in repairs, there is small hope that users as a whole will devote their attention to the dirty job. In other words, the inattention of the user is justified and he saves money by refusing to be bothered.

I see no reason why machines cannot be so built and equipped that 6 hours per year will suffice to give them far better chassis lubrication than most of them now receive. This would reduce the attention charge to \$29,000,000 and save a minimum of \$46,000,000 per

annum and possibly more than double that sum, which would be available to purchase new cars that would have a greater sales appeal and would be less of a service station problem.

One way to avoid lubrication difficulty is to eliminate rubbing surfaces. Recently there have been some attempts to do this, and effort naturally enough centered at points, such as the spring shackle bolts, where pressures up to 1000 lb. per sq. in. are sometimes encountered. The result of one effort in that direction is the Belflex fabric shackle. (Described in AUTOMOTIVE INDUSTRIES for Nov. 10, 1921.)

Another development which eliminates spring shackle bolts is the rubber shock insulator used on the Mack bus chassis. (Described in AUTOMOTIVE INDUSTRIES for Sept. 15, 1921.)

Fabric and rubber shackles are still in the development stage and it may be some time before their good and bad points can be evaluated by experience. Both have been tried before with indifferent success, but the applications cited above embody detail modifications which may overcome past failures. A number of years may elapse before experience enough is gained with these devices to have warranted their use on more than a small percentage of our motor vehicles. Meanwhile, we shall have with us hundreds of millions of rubbing surfaces that must have lubrication.

Self lubricated bushings are being used extensively for bearings where pressures are light and rubbing action comparatively infrequent. They serve well where they are protected from dust and moisture as in the clutch pilot bearing and sliding sleeve, steering gear post tube, etc.

Self lubricated bushings do not stand up for any satisfactory length of time under heavy or steady loads, especially where they are exposed to dirt and moisture. For spring eyes, spring shackles, axle steering pivots and steering cross rods they will stand up only when given an additional source of lubrication. Such service needs a far greater amount of lubricant than can possibly be held in the bushing. When this gives out some wear immediately takes place and the particles rubbed off become imbedded in the soft material in the bushing. The bushing then becomes a lap and begins to eat into the pin or shaft. When any wear has taken place atmospheric moisture can enter and oxidize the pin, the oxide later being rubbed off and held by the bushing. This can often happen before any other wear takes place. Further, the indentations for holding graphite decrease the load carrying area by 10 to 30 per cent. The Cleveland Graphite Bronze Co. having had experience with many hundreds of thousands of self-lubricated bushings in all kinds of service for the past 4 years, no longer recommends them except for oscillating light load bearings or intermittently rotating light load bearings.

\*Condensed from a paper recently presented before the Metropolitan Section of the Society of Automotive Engineers.

The grease or oil cups of the average passenger car are seldom given attention more than once a week, and the great majority of cars are lucky to receive such attention more than once a month. Motor trucks, when cared for under a good garage inspection system, get somewhat better attention, but the chassis bearings of thousands of trucks get but slightly more attention, comparatively, than does the average passenger car.

In gearboxes we have an instance of careful thought for lubrication in an inaccessible position. The details have been carefully worked out so that, under ordinary conditions, two fillings with moderately heavy oil per year will suffice for satisfactory service. The same practice applies to rear axles, so far as the lubrication of parts in the housing is concerned. The lubricating method in these two instances is that of retention of lubricant and exclusion of dirt, to which method the design and operation of these parts lend themselves. This also applies to wheel hubs, and might be extended to universal joints, steering-gear housings and some types of fan mountings.

### Continuous Lubrication

The lubrication of engines has been given careful and constant attention until very reliable systems have been developed. These systems are all based upon a continuous supply and wastage of lubricant, and the exclusion or removal of foreign matter. It is upon this principle that the lubrication of most chassis parts should be handled, involving a more or less continuous flow of lubricant. The more continuous this flow when the vehicle is being operated, the more efficiently will the bearing surfaces be lubricated, other things being equal. This being the case, care must be exercised to see that dirt, moisture or other non-lubricating matter is not picked up and led to the bearing surface.

Ball and roller bearings must operate behind tight closures, or at least closures that allow but a trace of moisture or dirt to enter. Bath lubrication is very satisfactory under these conditions, which are found in gearboxes, rear axles and wheels. Where the ends of bearings are in any way exposed to the elements, bath lubrication, of course, is not available, both on account of contamination and excessive wastage. A plain or bushed bearing must then be used; and to constantly maintain an oil film, preventing surface abrasion and oxidation by moisture, a clean automatic feed must be supplied.

The most important consideration in the design of the chassis lubrication devices is the choice of lubricant. Shall grease or oil be used? Each has advantages and drawbacks. Grease is stiff enough, as a rule, to be more cleanly than oil and not flow over painted surfaces near the grease cups. It lends itself to compact and simple design of cups integral with spring bolts and its firmness allows grease cups and fittings to be set at an angle or even in an inverted position, which is often very convenient where holes for the cups must be tapped in restricted locations. Some claim that grease will support heavier bearing loads, but the difference is more apparent than real. Grease can be forced by hand screws from the cups to the various surfaces. On the other hand, grease must stand under heavy indictments. It is a dirt carrier, and the methods of handling it expose it to dirt at every turn. Grease cannot easily be cleaned when dirty whereas oil can be filtered and much partly used engine oil can be used for the parts of the chassis. Another important consideration is that most greases contain considerable amounts of soap and inert matter which make them more or less stiff and heavy, but which have a negative qualification as a lubricant. Grease

does not readily spread itself in a film over the wearing surfaces, especially if it is applied when they are loaded or when cold. This offsets the apparent advantage of being able to force grease through cups or fittings for it escapes from the end of a bearing without actually spreading over the bearing surface, the appearance of the grease being a misleading sign that the bearing is properly lubricated. If all parts of a bearing are not lubricated the dry spots will soon accumulate dirt or inert matter and start a cutting action. When very cold it is almost impossible to force grease through small drilled holes and channels.

An improvement over the ordinary method of handling grease in grease cups is that of Searing. Grease is packed in small paper cartridges, which can be slipped into the cup, and the grease forced to the bearing by the thumb screw. This assures clear grease and the messiness of filling the ordinary cup is avoided.

Within the past three years a notable attempt has been made to increase the effectiveness of grease lubrication by means of pressure application. The Alemite and other similar systems are used by a large number of concerns building passenger cars and trucks. They provide a much handier and more effective way of applying grease than by means of grease cups, and have the additional merit of being comparatively inexpensive to install, even on cars in service. They have most of the failings of the older methods, however; for handling a grease container around the average chassis is always a dirty job. The fittings and hose sooner or later accumulate dirt which is forced into the bearings. When the fittings are not closed with caps, dirt and water from the washing hose will enter them. The number of times per month that individual attention is necessary is still excessive, and for the best results a special grease must be used. On such parts as wheel hubs, universal joints and radiator fans, which with difficulty retain oil and have a reservoir for a considerable amount of grease, this system is very satisfactory.

A modification of the grease gun system calls for an air-tight grease pail to which pressure can be applied by a tire pump, and the grease forced through a flexible tube to the various fittings. This eliminates the filling of the grease gun and protects the grease from dirt—a very desirable feature.

### Oil the Best Lubricant

Oil as a lubricant, has great advantages over grease, but its proper application to chassis bearings has required more painstaking design than has usually been given to it. This has previously militated against its use, especially on passenger cars, but the advantages that follow are appealing more and more to designers and to users:

Oil will maintain as heavy a gearing load as grease, and with less friction. Oil fed to one properly located point in a bearing will quickly spread over the entire bearing surface. It will flow through a very small hole, and it can be conducted a considerable distance by means of capillary attraction and surface tension. It carries much less dirt than grease, it can be filtered, and it is not nearly so much exposed to dirt when in bulk or when being applied. It contains no inert matter to clog holes and channels. The oil used in the engine can be used in the chassis oils. Oil is much more easy to apply automatically than grease. A flow of clean oil tends to clear a bearing of any dirt which it may contain, and a bearing arranged for oil lubrication can be flushed and cleaned with gasoline or kerosene. When oil is used on spring bolts the seepage works down into the spring leaves and keeps them from rusting, then stiffening and sometimes breaking.

After studying and endeavoring to improve chassis lubrication of motor vehicles, and having tried almost every kind of device and method known to-day, the au-

thor has come to the conclusion that the best results will be attained when following requirements are met:

Oil should be used (preferably engine or axle oil) unless pressures or rubbing speeds are very light and intermittent. Devices should be built into the chassis or its parts, so that they are not excesses liable to be damaged; should need attention but once in two or three months; should not require special filling attachments, which get dirty, damaged or misplaced; should feed automatically when lubrication is needed; should feed clean oil, eliminating dirt and moisture; should be simple, sturdy and have no moving parts to wear, get out of adjustment or be misplaced.

The feed should be constant when in action so as to flush the bearing at points remote from the feed opening. In general each part to be lubricated should be independent of the others so that failure of lubrication at one bearing does not affect other bearings.

The devices or system should not interfere with the accessibility of other chassis parts which may need adjustment or repair; should have a minimum number of filling points, all to be quite accessible; should not waste oil and should be as cleanly as possible.

Surprisingly small amounts of oil constantly fed will maintain the necessary film between surfaces. By choking down a copious supply to a minimum there need be but a small amount of seepage. In some cases even this need not be wasted, but can be led to another rubbing surface. Seepage from spring bolts, for instance, will gradually work between spring leaves, seepage from the steering gear housing can be led to the steering arm and from pedal shafts to clutch and brake linkages.

#### Various Oiling Devices

The last few years have seen numerous oiling devices offered for lubricating chassis parts. Among the more serviceable are the Bowen wick oil cup.

The Blooming cup operates somewhat on the manner of the Bowen, but lacks the wick. It depends on splash to feed oil through the small hole in the vertical center tube. The Madison-Kipp oil cup has a spring closed plunger which when pulled out and pressed in, forces a small charge of oil past the ball check valve to the bearing. It holds enough oil for quite a number of injections, which are easily and quickly applied.

The Van-Oiler is mechanically fed by a vibrating valve from a reservoir above to a little basin in the bottom of the cup where a constant level is maintained by the student-lamp principle. As oil washes over the edges of the basin due to car motion, it is replenished from above. The Vibra oil cup has a spring controlled valve which allows drops of oil to pass as it vibrates due to the motion of the vehicle.

One Roberts & Monroe system is similar to the Alemite except that it employs oil, usually of the grade 600 W, as a lubricant. The oil pressure is built up by means of the spring plunger and is automatically released when the hose connection is pressed into the fitting. This pressure flushes as well as lubricates the bearings, and is a great improvement over grease cups or the used variety of oil fittings.

The other Roberts & Monroe system, the Romon, is a most elaborate attempt at thorough chassis lubrication. It consists of a multiple plunger oil pump in a chamber which holds 2 or 3 qts. of oil and contains 10 to 16 plungers actuated by cams which are operated by a hand ratchet lever. A pipe from each plunger feeds the various chassis bearings, each bearing being supplied with a fitting containing a ball check valve. Once per day, or oftener if thought necessary, the driver of the vehicle operates the ratchet lever a number of times, forcing clean oil to every bearing that has a pipe connection. Whether the flexible connections to front and rear axles will stand up under continued vibration is yet to be demonstrated, while the complex piping makes a repair

job awkward and reduces accessibility. The system has great merit from the owner's standpoint, as it is handy and clean to operate.

The Myers magazine oiling system employs hollow brackets, shackles, etc., holding  $\frac{1}{2}$  to  $1\frac{1}{2}$  pints of oil, which lasts 30 to 90 days. This oil is automatically fed, in small but sufficient amount, to the various pins, shafts and bearings by means of capillary attraction and surface tension. Felt wicks reach from the bottom of the oil cavities or magazines to the tops of tubes or drilled holes down which they pass to the bearing to be lubricated. The tops of the tubes or of the drilled holes are located near the top of the magazines and the felt wicks completely fill the holes. This prevents excessive feed or loss of oil by gravity or splash, and the wicks act as filters as well as feeds. Vibration or oscillation of the bearing causes a very slow but steady flow of oil to feed the bearing which ceases when motion ceases. With loose fitting wicks there is a tendency to overfeed the bearing. This can be controlled by attachments which fit in the tube or holes and regulate the flow to suit the need. This system was used on the 20,000 Class "B" military trucks. Several magazines can be piped to one accessible filling point, and 15 minutes once in two months should be sufficient to give thorough chassis lubrication.

Wick oiling of spring bolts has recognized advantages. The Franklin car for a number of years has been equipped with hollow spring bolts into which dipped wicks that lead to the bearing surface of the bolts. Some trucks are similarly equipped, but the supply of oil which can be carried in the pin is necessarily quite limited. The clutch and brake controls of the Franklin car are also equipped with wick oiling devices; and the Lippard-Stewart light truck provided lubrication for clutch and brake controls by wicks in hollow shafts and by magazine oiling brackets.

Drag links for the steering mechanism made by the Cincinnati Ball Crank Co. are arranged so that they can be filled with oil and fed by wicks through the ball sockets to the ball connections at either end of the drag link.

Clutch sleeves, release bearings and pilot bearings have always been difficult to lubricate. Pilot bearings have for the most part been ball bearings which received little or no lubrication, and they have given very good service when dirt or moisture did not reach them.

#### Spring Lubrication

There has been some argument against the advisability of lubricating spring leaves because it lessens the damping effect of interleaf friction; but spring makers put graphite between the leaves to cut down friction, and there is no doubt but that cars ride better when new than when the springs are old and rusty. Most instruction books state that springs should be taken apart once a year and regreased, and there are numerous devices on the market, evidently in response to a demand for such things, for applying oil to springs. Among them is the Sterling oil saturated felt pad held to the side of the spring. The Dilso system calls for cupped end spring leaves, each cup containing a small oil soaked felt pad. The Anderson boot provides a complete enclosure in which grease is packed.

EDITOR'S NOTE.—The paper was concluded by quoting Norman F. Smith, superintendent of the garages of the Consumers Co., Chicago, as saying that over 50 per cent of the repairs on trucks are the result of bad lubrication. As a standard method of lubrication Mr. Smith recommended that some grease cups be filled every four or five days, and that a definite schedule be worked out, and adhered to, for filling other cups.

# State Laws and Their Effect Upon Motor Truck Sales

The tendency of many states is to bar the heavy truck from the highways either by imposing weight restrictions or through an extremely heavy tax or registration fee. The lack of uniformity of these fees stands out as a distinct feature. Present taxes should be made a part of sales studies.

STATE legislation concerning motor trucks has become so widespread and so strenuous as to be an important factor in truck selling. It is obvious that motor trucks should bear their share of the tax burden and thus pay from their earnings certain sums for maintenance of the highways which they use. Certainly, too, they should be subjected to weight and other restrictions. At the same time the truck must be recognized as an economic factor in transportation and its tax burdens and restrictions imposed with that thought in mind.

While there is a general agreement as to these facts, at least among automotive interests, state laws dealing with fees and restrictions show little evidence of any general agreement among legislators as to methods of practically or uniformly applying the principles of taxation or restrictions. Truck manufacturers have interested themselves in striving to secure a scientific study and analysis of these matters, with the result that they have pretty generally accepted the proposed Uniform Vehicle Law advocated by the Motor Vehicle Conference Committee. This committee is composed of representatives of the American Association of State Highway officials, N. A. C. C., American Automobile Association and the Highway Industries Association.

## The Uniform Law

So far as tax impositions are concerned the proposed Uniform Vehicle Law recommends that none but State taxes should be imposed on motor vehicle operation, and for this purpose only the two factors of horsepower and weight should be used. As for actual amount, the proposed Uniform Vehicle Law sets forth the following:

Equipped with	Per hp.	Per 100 lb. gross weight of vehicle and load
Pneumatic tires .....	25c.	25c.
Solid tires .....	25c.	35c.
Iron, steel or other hard tires .....	25c.	50c.

While the highway maintenance requirements of one State may make this schedule of fees unnecessarily high—while in other states they may not be high enough, nevertheless the Conference Committee believes that as a practicable working basis for the majority of states the new rates proposed are fair and equitable.

In the matter of size and weight restrictions, the following specific recommendations are set forth in the proposed Uniform Vehicle Law:

28,000 lbs. gross weight distributed not more than 22,400 lbs. on one axle nor more than 800 lbs. per in. width of tire measured between the flanges of the rim.

While for one reason or another all of the State legislatures that have given consideration to the proposed Uniform Vehicle Law since its promulgation have not

seen fit to adopt its specific recommendations in these matters of fees and restrictions, it is gratifying to know that during the course of the present year, when 42 states held regular sessions of their legislatures, many laws to a greater or less extent were passed with provision based upon the fundamental principles of the proposed Uniform Vehicle Law. Even so, a careful analysis of the various laws as they stand shows what a vital concern, in the matter of sales promotion of motor trucks, these various phases of State motor vehicle laws have.

In a certain sense every tax is an added sales resistant, as it adds so much to the original price or the operating cost of the vehicle. Thus, from a marketing standpoint the details of variations in State laws as regards fees and regulations must be carefully considered. The accompanying table, prepared from data collected by the Motor Vehicle Conference Committee, presents these variations in detail.

The sales possibilities of a given truck type and the sales resistance to be overcome, however, vary considerably from State to State because of the fees and regulations peculiar to individual territories. Twenty-one states have recently passed new laws that would increase the registration fees in those states. A study of these new laws reveals a number of points bearing upon the marketing possibilities in individual states. Certain general facts stand out clearly.

The distinct increase in each State in which a new law has been passed reaches in one State as high as 1900 per cent for a 5-ton truck, while there is an average increase of something like 432 per cent for this type of vehicle. The different bases used for computing fees render impossible an exact computation of fees, but fairly accurate comparative data can be obtained on the basis of a given typical truck. This basis of comparison is used in this article.

## Heavy Fees for Heavy Trucks

The tendency is, of course, to impose heavier fees upon the heaviest trucks. An examination of the grading of fees, in fact, indicates that the taxes have probably been devised in certain instances with the idea of taxing the heavy truck off the road. An interesting light on this topic is given by a comparison of Figs. 1 and 2.

Fig. 1 compares the cost of registering a given 2½-ton truck under the old and new laws in the states where changes have been made. Certain physical characteristics have been assumed for this typical medium-sized truck that the fees might be computed for each State. The results obtained from the 2½-ton truck are typical, in a relative way, of all trucks under 3½ tons. Fig. 2 is a chart for a 5-ton truck constructed on a similar basis. It may be said that the chart for the 5-ton job



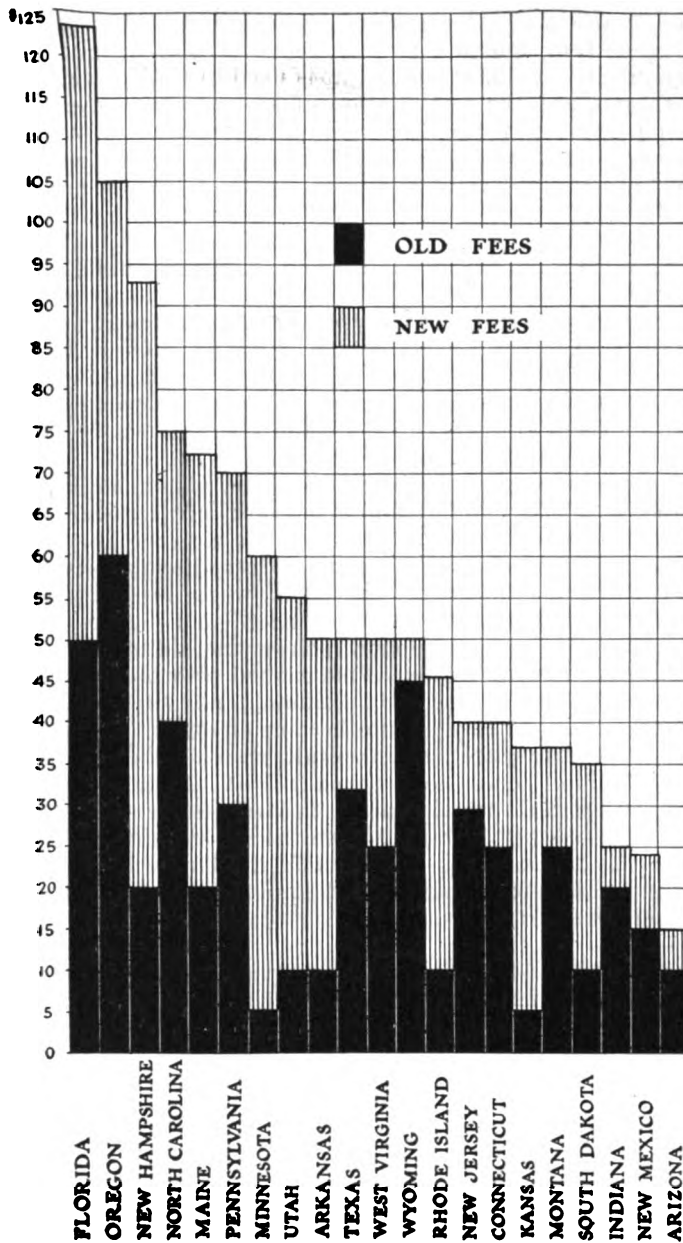


Fig. 1—Chart showing the increased cost of registering a 2½ ton truck in the various states in which new laws have been enacted increasing registration fees. The chart is based on the assumption that the truck is of 30 hp.; has a chassis weight of 5,000 lb.; body weight of 1,000 lb.; a gross weight of 11,000 lb.; is equipped with solid tires with a width of 7 in. each and originally cost \$3,000

is typical of what would be shown for other trucks of greater weight, except that the tendencies indicated in the 5-ton chart would merely be somewhat accentuated in the case of heavier models.

A comparison of these two charts shows clearly that the percentage of increase in fees on heavy trucks is greater in most cases. The extent of this tendency is shown in the following comparative figures, showing percentage of increase on the typical 2½-ton and the typical 5-ton trucks in the various states where changes have occurred:

State	Per Cent Increase	
	2½-Ton Truck	5-Ton Truck
Florida	146	130
Oregon	75	66½
New Hampshire	365	775
Texas	56	50
North Carolina	87½	200
Pennsylvania	133½	100
Minnesota	1,100	900
Maine	133½	192
Utah	450	1,300

State	Per Cent Increase	
	2½-Ton Truck	5-Ton Truck
Arkansas	400	1,400
West Virginia	100	311
Wyoming	11	26
Rhode Island	360	300
New Jersey	38	23
Connecticut	60	150
New Mexico	60	177
Kansas	650	1,900
Montana	50	50
South Dakota	250	400
Indiana	25	87½
Arizona	50	150

An idea of the sales importance of these figures can be gained from the fact that under existing laws in the 48 states there is a difference of \$392.50 in the cost of registering this typical 5-ton truck in West Virginia, where the rate is highest, and in Louisiana, where the rate is lowest. The difference in the case of the 2½-ton truck is \$115.50 in Florida, where the rate is highest, and in Louisiana, where it is lowest. Louisiana, however, is likely to soon rise from her position at the bottom of the list, for while this article is being written the legislators in that State are considering drastic increases.

The chart shown in Fig. 1 may be properly used as a basis for discussing truck fees in general, as the truck used in making the chart gives typical results for the middle and low capacity vehicles.

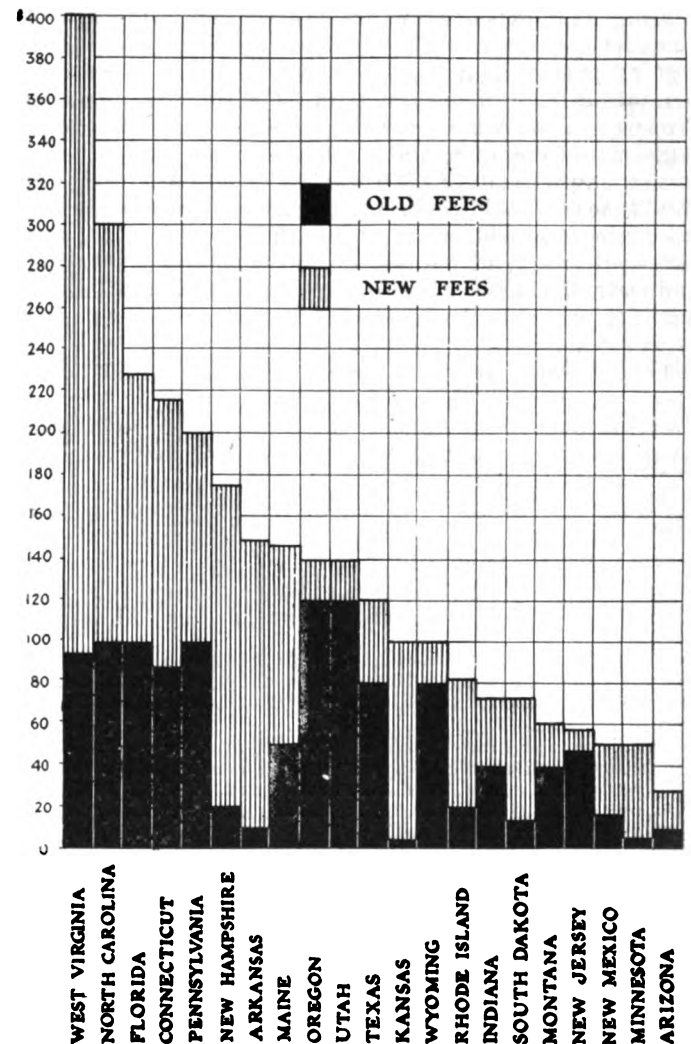


Fig. 2—Chart showing the increased cost of registering a 5 ton truck in the various states in which new laws have been enacted increasing registration fees. The chart is based on the assumption that the truck is of 36 hp.; has a chassis weight of 9,000 lb.; body weight of 1,500 lb.; gross weight of 20,500 lb.; is equipped with double solid tires with a width of 6 in. each, and has an original cost of \$4,500

In this class there are two states in which the registration fee will be \$100 or more, the highest being \$123, in Florida. A fee of this size will probably be of little moment as a sales resistant in the case of certain types of sales. The big fleet owner who operates his trucks as a part of a business of considerable volume, either as a trucking company or as a transportation unit of another business, will not be greatly influenced by a fee even as large as this. A fee of even \$123 is not, of course, any appreciable per cent either of the original cost of such a vehicle or of the operating cost for a year.

In the case of the single truck buyer, however, who is likely to have little capital to begin with, a cash payment of this size may weigh materially in his determination to buy and operate such a vehicle. Even a cash payment of \$50 required of such a man at the beginning of each year is likely to act as a distinct sales resistant. And there are 18 states where the fee for this truck would range between \$50 and \$100.

As a matter of fact, an addition of \$50 or \$100 to the operating cost of any truck is a decided factor in sales at the present time, when sales depend to a greater extent than ever on low original cost and possible operation economies.

### Additional Expenses

Additional expense factors are present, moreover, in many states which tend to increase considerably the cost of operating a truck. These include the gasoline tax, which is now operating in 14 states, and personal property taxes which are imposed, in addition to the registration fee, in 35 states. If this truck were assumed to use approximately 2000 gal. of gasoline a year, this would mean an additional tax of \$20 in 13 of the gasoline tax states and \$40 in the other. The personal property tax would vary, of course, in accordance with the rate and method of assessment in each State and each locality, but it is probable that some \$11 or more would be added in this way.

These figures are, of course, pure guesses and would vary considerably in any given case, but they serve to visualize clearly the various tax burdens with which the truck salesman must contend in different instances.

An analysis of the various State laws shows extreme variation in methods of computing registration fees. There has been no systematic or uniform action in this respect, for there are no less than eight different methods of determining the fees. These methods, and the number of states having each in use, are as follows:

Load capacity .....	26
Gross weight .....	10
Horsepower .....	4
Percentage of cost .....	2
Horsepower and gross weight combined .....	2
Horsepower and load capacity combined .....	2
Chassis weight .....	1
Tire width .....	1

The states in which the fee is based upon load capacity are as follows: Alabama, Arizona, Arkansas, Colorado, Connecticut, Georgia, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland (on solid tires), Massachusetts, Mississippi, Montana, New Mexico, North Carolina, Oklahoma, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, West Virginia and Wyoming.

The eight states basing their fees upon the gross weight of the vehicle and load are as follows: Delaware, Florida, Idaho, Illinois, Nebraska, Nevada, New Hampshire, New Jersey, New York and Washington.

Maryland, Louisiana, Missouri and Ohio are the four determining the amount by charging so much per horsepower, while North Dakota and Minnesota are the only

two charging a percentage of the cost. A combination of a certain amount per horsepower plus a certain amount per 100 lb. gross weight is used in California and Michigan, and the combination of horsepower and gross weight is used in Rhode Island and Tennessee. Oregon hit upon an original scheme when it was decided to base the fee upon the total width of the tires, and Pennsylvania stands alone as the State in which chassis weight is the basis.

Even the variance in the methods of determining fees, however, is but a part of the story, for no matter what methods are used practically every State charges a different sum. In a few cases the result comes out practically the same, but a glance at Fig. 3 will show the variations in the various states. The two curves showing the costs of registering a 5-ton truck and a 2½-ton truck both reach the same low point. The high point, however, is reached in different states, which might be taken as another indication that there is a tendency to charge a higher rate for heavier trucks than for those of medium weight. For example, West Virginia hits the high mark of \$400 for a 5-ton truck, while for a 2½-ton the price is \$50. The peak in the 2½-ton curve is in Florida. This chart clearly shows the differences in registration costs that were mentioned previously.

Naturally, all this would be eliminated if the proposed Uniform Vehicle Law should become effective. Its adoption in every State would result as indicated by the straight lines across each curve in Fig. 3. Thus the fee for the typical 2½-ton truck in each State would be \$36, which is \$28.50 higher than the lowest and \$87 less than the highest fees now in effect. Thirty of the 48 states charge fees above this figure for the registration of a 2½-ton truck.

The fee for the typical 5-ton truck under the uniform law would be \$80.75, which is about \$73 higher than the lowest and \$320 lower than the highest fees now in effect. Twenty-four, or exactly one-half, of the states charge above this rate.

It will also be noted that three states charge more for registering a 2½-ton truck than the uniform law would require for a 5-ton truck. Conversely, six states charge less for the 5-ton truck than would be charged for the 2½-ton were the law in effect.

It should also be noted that the proposed law recommends that the proceeds be used exclusively for highway purposes. In this connection the Motor Vehicle Conference Committee believes that these highway purposes should only include maintenance and repair of highways properly located and adequately built to carry motor vehicle transportation efficiently and economically. The Conference Committee regards as unsound and inequitable the use of such money for capital outlays involved in highway construction and reconstruction.

### Weight Restrictions

Reverting to the weight restrictions imposed by the proposed law, the Conference Committee expressed the opinion that the restrictions would be liberal enough to permit a State to take advantage of the economies which come from the use of the larger commercial motor vehicles; on the other hand, they are low enough and of such a character that vehicular travel on the highways is amply safeguarded and highway foundations and surfaces fully protected from destruction.

Leaving all such conditions aside, however, and assuming that the limitations would be effective in localities where they are needed, it is certain that the adoption of this provision of the proposed Uniform Vehicle Law would give highway engineers a definite working basis. Road construction in the future would be carried on

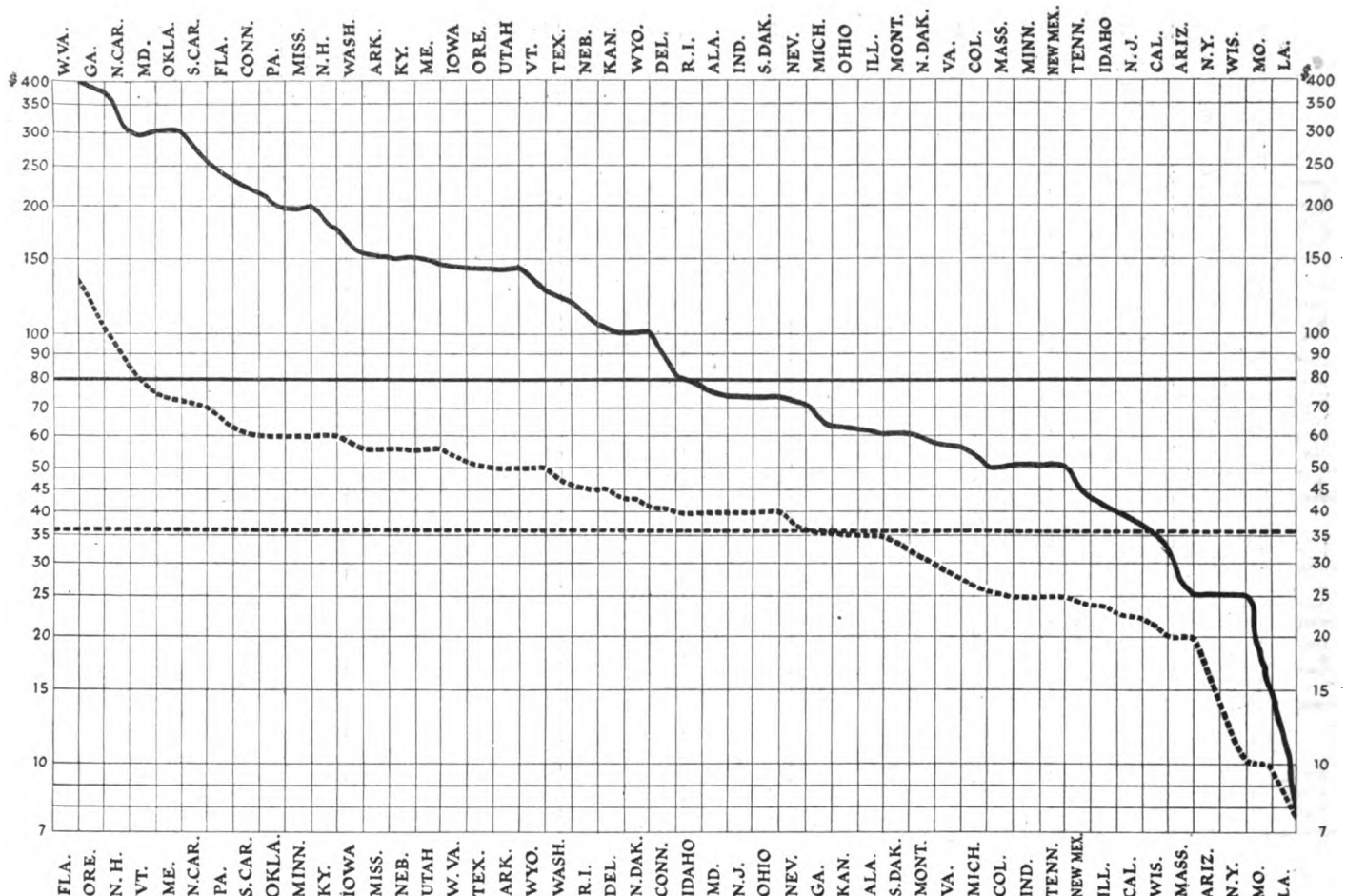


Fig. 3—Chart showing the cost of registering the typical 2½ ton and 5 ton trucks in the 48 states under existing laws. The heavy curve indicates the cost of the 5 ton truck, while the dotted curve indicates the cost for the 2½ ton. The straight lines drawn across the curves represent the cost of registering each truck under the Proposed Uniform Vehicle Law

with the idea in mind that trucks of the weight specified were to pass over them.

Weight limits are now imposed in 32 states and about as much variance is seen in this matter as is the case of the registration fees. In 10 of these 32 states the changes brought about by new laws have decreased the size of the load permitted. Four of these ten, however, are states in which there were no former restrictions along this line. In three states, California, Colorado and Utah, the limits have been changed so as to permit the hauling of heavier loads than were previously allowed.

It will be noted that in four states weight limits have been imposed that would bar from the highways a 5-ton truck such as is used as a typical example in this article. In the accompanying figures, however, the fee for such a truck has been computed on the assumption that it would be allowed to operate and to show what the fees would be were these restrictions removed without changing the cost of registration. These states are Florida, Maine, South Carolina and Utah.

There are various methods of determining what loads shall be carried, but the one prevalent in most states is dependent upon the width of the tire. Usually the states permit a gross weight of something over ten tons and then specify that there shall not be more than a certain number of pounds per inch width of tire. This figure ranges from 500 to 800 lb. A few states specify the number of pounds to be carried on an axle, and in 10 states greater restrictions are imposed if other than pneumatic tires are used.

A study of all these variations, not only as regards weight, but taxes as well, forces the conviction that

adoption of a uniform law such as the one proposed would produce beneficial results to all concerned. It would, however, give highway engineers something definite upon which to base their plans.

It is scarcely to be expected, however, that its adoption will be immediate. This would be desirable, but legislative action in the past has never immediately reflected anything like the best results of scientific conclusions, and it is not likely to do so in the future. The determining factor will be the necessities of economic transportation. As the motor truck further proves its usefulness and further convinces legislators that it has filled an economic need, this type of vehicle will neither be unfairly taxed nor ruled off the roads. To prove itself a proper unit of commercial transportation, its economies will, of course, be proved to overcome the cost of building and maintaining roads suitable for its use. Sufficient data are not yet available to settle the question decisively, but work along this line is being carried on and ultimately will aid in solving this complex problem.

The relation of truck design to road maintenance, the operating costs of various types of trucks under given conditions, the practical possibilities of road construction from a theoretical and a financial standpoint and other similar studies, many of which are now going on, will have a definite bearing in finally determining legislative regulations. The influence of these studies will be reflected as well in shaping markets.

In the meantime, the various factors of existing laws and the legislative trends shown by comparison with past laws should form a definite part of sales studies in connection with motor trucks.

## State Laws Governing Motor Truck Regulation

State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
				Old	New	Old	New	Old	New		
Alabama	No new law	Tons capacity 1 and less.....\$15.00 1 to 2.....22.50 2 to 3.....37.50 3 to 4.....56.25 over 4.....75.00	No change					30	No change		Registration fee in lieu of all taxes
Arizona	Jan. 1, 1922	Horsepower 25.....\$5.00 26 to 40.....10.00 over 40.....15.00	Tons capacity 1½ and less.....\$10 1½ to 3.....15 over 3.....25						City.....10-15 Country.....30	1 cent per gallon	Personal property
Arkansas	May 1, 1921	Flat rate of \$10	Tons capacity 1 and less.....\$15 1 to 1½.....20 1½ to 2.....25 2 to 2½.....30 2½ to 3.....35 3 to 3½.....40 3½ to 4.....45 4 to 4½.....50 4½ to 5.....55 5 to 6.....60							1 cent per gallon	Personal property
California	No new law affecting fees. Amendment 1921 with respect to weight limit.	40 cents per h.p. plus the following unladen weight: Less than 2 tons.....\$5 2 to 3.....10 3 to 5.....15 5 and over.....20	No change	Maximum gr. wt. for 4 wheels, 30,000 lbs.; 6 wheels and 3 axles, 40,000; per in. width tire base, 700 lbs.		102 in.	No change				Personal property
Colorado	Amended 1921	Tons capacity 1.....\$10.00 1 to 2.....17.50 2 to 3.....25.00 3 to 4.....37.50 4 to 5.....50.00 for each ton over 5.....25.00	No change	Maximum gr. wt., 8 tons.	Gr. wt. on 4 wheels, 10 tons.		Width, 12 ft. in prairie districts; 9 ft. elsewhere.		General, 35; mountain highways, 20; curves, 18; vehicles of gr. wt. over 3 tons, 15.	1 cent per gallon	Personal property
Connecticut	Jan. 1, 1922	Tons capacity ½ and less.....\$11 ½ to 1.....15 \$5 additional for each ton up to 5 tons. 5 to 5½.....\$87.50 5½ to 6.....100.00 6 to 6½.....112.50 6½ to 7.....125.00 7 to 7½.....150.00 7½ to 8.....200.00 over 8 tons.....200.00 plus \$100 per additional ton	Tons capacity 1 and less.....\$30 \$10 additional for each ton up to 3½ tons. 3½ to 4.....\$137.50 4 to 4½.....162.50 4½ to 5.....187.50 5 to 5½.....218.75 5½ to 6.....250.00 Over 6 tons.....250.00 Plus \$100 per additional ton	Gr. wt., 25,000 lbs.	No change					1 cent per gallon	Personal property
Delaware	No new law	\$2 per 500 lbs. gr. wt.	No change	Maximum gr. wt., 26,000 lbs.; per inch width of tire, 700 lbs.	No change	Width, 96 in.; height, 12 ft., 2 in.	No change	City.....15 Country.....30	No change		Registration fee in lieu of all taxes.
Florida	Jan. 1, 1922	Tons capacity 1 and less.....\$10 1 to 2.....25 2 to 4.....50 over 4.....100	Pneumatic tire equipped, 75 cents per 100 lbs. gr. wt. Solid tire equipped, \$1.12 per 100 lb. gr. wt.	Country roads, 16,000 lbs. with pneumatic tires, 8,000 lbs. with solid.		None	Width, 84 in.; height, 12 ft.	25	30 15 on bridges and turns; passing street, 5. If gr. wt. in 5 tons or more, 10.	1 cent per gallon	Personal property
Georgia	No new law	Tons capacity 1 and less.....\$15 Increase of \$7.50 per ½ ton. 3½ to 4.....\$75 4 to 5.....150 5 to 6.....275 6 to 7.....750 over 7.....1,125	No change					30	No change	1 cent per gallon	Personal property

State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
				Old	New	Old	New	Old	New		
Idaho	No new law	Gross weight 1 and less.....\$15 1 to 1½.....20 1½ to 2.....30 over 2.....40	No change	No vehicle to be loaded to exceed 50% over the manufacturer's rated capacity	No change	Width, 96 in.	No change	30	No change		Registration fee in lieu of all taxes.
Indiana	Jan. 1, 1922	Tons capacity ¼ to ½.....\$6 ½ to 1.....8 1 to 2.....10 2 to 3½.....20 3½ to 5.....30 5 to 7½.....40 7½ and over.....50	Tons capacity less than 1.....\$6 1 to 2.....8 2 to 3½.....10 3½ to 5.....20 5 to 7½.....30 7½ and over.....40	10 ton capacity	7½ ton capacity			City.....10-15 Country.....25	No change		Personal property
Iowa	No new law	Tons capacity 1 and less.....\$15.00 1½.....22.50 2.....30.00 2½.....45.00 3.....65.00 3½.....90.00 4.....105.00 4½.....120.00 5.....135.00 5½.....150.00 6.....165.00 Per ton over 6 50.00	No change	Per in. width of pneumatic tire, 800 lbs.; solid, 600 lbs.				Gr. wt. tons: pneumatic, less than 3, 20; 3 solid, less than 3, 25; 6, 30; 8 solid, less than 8, 35; 3 to 6, 40; 6, 12; metal, 10.			Registration fee in lieu of all taxes.
Kansas	July 1, 1921	Flat rate, \$5	Tons capacity 1 and less.....\$15.00 1 to 1½.....22.50 each ¼ ton up to 3 tons capacity.....\$70.00 3 to 4.....100.00 4 to 5.....120.00 5.....140.00 plus \$25 per ton or fraction thereof.								Personal property
Kentucky	No new law	Tons capacity ¼ and less.....\$22 ¾ to 1.....30 and \$10 per additional ¼ ton up to 3. ¾ to 1.....110 ¾ to 1½.....120 ¾ to 1½.....130 ¾ to 1½.....140 ¾ to 1½.....150 over 6.....160 plus \$40 for each additional ton.	No change	Per in. width of tire: rubber.....800 lb. metal.....500 lb.				Capacity tons City 1.....10-15 1 to 2½.....7-14 2½.....7-11 Metal.....6-8 Country 1.....25 1 to 2½.....20 2½.....15 Metal.....10		1 cent per gallon	Personal property
Illinois	No new law	Gross Weight 2½ tons and less.....\$12.50 2½ to 6.....22.50 6 to 7½.....35.00 over 7½.....60.00	No change	Per in. width of tire, 800 lbs.; per axle, 16,000 lbs.; within cities of 20,000, increase 50%.	No change	Width, 8 ft. Length—trailer combination, 65 ft.		Gr. Wt. Pneumatic 2½.....25 2½ to 6.....20 6 to 7½.....15 Over 7½.....12 Solid 2½.....20 2½ to 6.....15 6 to 7½.....12			Personal property
Louisiana	New law pending.	Flat rate, 7.50	No change								Personal property
Maine	July 9, 1921	Tons capacity 1 and less.....\$10 and \$10 additional for each ton up to 6. For each ton between 5 and 10, \$15 additional.	Tons capacity ¼ and less.....\$10 ¼ to 1.....15 1 to 2.....20 2 to 3.....25 3 to 4.....30 over 4.....110 Vehicles equipped with 2 or more solid tires pay 33½% additional.	18,000 lbs. Per in. width of tire, 800 lbs.	18,000 lbs. gr. wt. on 4 wheels; per in. width of tire, 700 lbs.	Width, 96 in., height, 12½ ft.		Gr. wt. tons 4 to 6.....15 Over 6.....6			Personal property

This table is based on statistics gathered by the National Automobile Chamber of Commerce. In the column "Date new law is effective," where the caption "No New Law" appears, it is meant to indicate that there has been no change in the law since Jan. 1, 1921.



## State Laws Governing Motor Truck Regulation—Continued

State	Date New Law Effective	Registration Fees Previously in Effect	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
			Old	New	Old	New	Old	New		
Maryland	No new law	Pneumatic tires Per h. p. .... .60¢ (Minimum, \$10) Solid tires Tons capacity \$20 per ton up to 3 3 to 4 ..... \$100 4 to 5 ..... 150 5 to 6 ..... 300 6 to 7 ..... 500 Electric—solid—half above rates	Maximum gr. wt., 10 tons. Per in. width of tire, 650 lbs.	No change	Width, 90 in.	No change	Solid Tons 2 and less ..... 25 2 to 6 ..... 15 Over 6 ..... 12 Metal tires ..... 6 Pneumatic City ..... 15-20 Country ..... 35 Over 3 Tons ..... 25	No change		Personal property
Massachusetts	No new law	Tons capacity 1 and less ..... \$10 1 to 2 ..... 20 and \$10 additional for each ton. Electric trucks, half above rates.	Maximum gr. wt., 14 tons; per in. width of tire, 800 lbs.	No change	Width, 96 in.; length, 28 ft. Trailer combination, 65 ft.	No change	City ..... 15 Country ..... 20 Over 4 ton gr. wt 15 Metal tires ..... 4	No change		Personal property
Michigan	No new law	Per h. p. .... 25¢ Per 100 lbs. unladen wt. 35¢ Electric ..... \$1 Per 100 lbs. wt. .... 35¢	Size of tire in. Max. wheel load lb. 2 ..... 700 2½ ..... 900 3 ..... 1200 3½ ..... 1600 4 ..... 1900 5 ..... 2200 6 ..... 2700 7 ..... 3200 Max. gr. wt., 15 tons	No change	Width, 96 in.; height, 12½ ft. Trailer combination, 60 ft.	No change	20 to 10, varying with load.	No change		Personal property
Minnesota	April 25, 1921	Flat rate, \$5		2% value of vehicle Minimum fees. Tons capacity Less than 2 ..... \$15 2 to 4 ..... 30 Over 4 ..... 50 Used solely for road and agricultural work not subject to fees.	No change	Width, 96 in.; height, 12½ ft.; length, 30 ft. Trailer combination, 85 ft.				Personal property
Mississippi	No new law	Tons capacity Under 1 ..... \$10 1 to 1½ ..... 15 2 ..... 20 2½ ..... 30 3 ..... 40 3½ ..... 55 4 ..... 75 4½ ..... 115 5 ..... 155 6 ..... 200 7 ..... 250 Over 6 ..... 300		No change			City ..... 15 Country ..... 30			Personal property
Missouri	No new law	Horsepower 2 and less ..... \$2 2 to 11 ..... 4 12 to 23 ..... 6 24 to 35 ..... 10 36 to 47 ..... 14 48 to 59 ..... 16 60 to 71 ..... 20 72 and over ..... 24		No change			25	No change		Personal property
Montana		Tons capacity 1 and less ..... \$5 1 to 2 ..... 15 2 to 3 ..... 25 Over 3 ..... 40		Tons capacity 1 and less ..... \$10.00 1 to 2 ..... 22.50 2 to 3 ..... 37.50 Over 3 ..... 60.00			City ..... 15 Country ..... 25	No change	1 cent per gallon	Personal property

State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
				Old	New	Old	New	Old	New		
Nebraska	No new law	1 ton gr. wt. .... \$10 for each 100 lb. additional gr. wt. .... 50¢	No change	Per in. width of tire, 600 lbs.; on one wheel, 9,000 lbs.	No change	Width, 7¼ ft.; height, 12 ft.	No change	35	No change		Personal property
Nevada	No new law	Per 100 lbs. gr. wt. .... 35¢	No change	Gr. wt. 10 tons per in. width of tire, 400 lbs.; Solid tires, 600 lbs.	No change			Reasonable; varying with weight and kind of tire. Maximum ..... 25	No change		Personal property
New Hampshire	Jan. 1, 1921	Horsepower ..... \$10 15 and less ..... 15 30 to 40 ..... 20 40 to 50 ..... 25 50 to 60 ..... 30 60 ..... 40	Per 100 lbs. gr. wt. Pneumatic tires ..... \$ 60 Solid. (Minimum, \$30) . 85 Metal. (Minimum, \$30) . 1.00		Per in. width of tire, 750 lbs.; gr. wt., 20,000 lbs. maximum wt. per axle, 15,000.	Width, 96 in.; length, 30 ft. Trailer combination, 85 ft.					None
New Jersey	Jan. 1, 1922	Tons gr. wt. ½ and less ..... \$8 ¾ to 1 ..... 9 1 to 1½ ..... 12 1½ to 2 ..... 15 2 to 2½ ..... 20 2½ to 3 ..... 24 3 to 4 ..... 28 4 to 4½ ..... 36 4½ and over ..... 40 and an increase of \$2 for each additional half ton. Ownership of corporation outside state, \$100 additional.	Tons gr. wt. ½ and less ..... \$10 ¾ to 1 ..... 12 1 to 1½ ..... 15 1½ to 2 ..... 20 2 to 2½ ..... 24 2½ to 3 ..... 28 3 to 4 ..... 36 4 to 4½ ..... 40 4½ and over ..... 44 and an increase of \$2 for each additional half ton. Ownership of corporation outside state, \$100 additional.	Per in. width of tire, 800 lbs.; gr. wt., 30,000 lbs.	Per in. width of tire, 800 lbs.; basis max. width of rubber, 25,000 lbs. gr. wt., unless permit for 30,000 is obtained.	Width, 92 in.; length, 28½ ft.; height, 12½ ft.	Width, 96 in.; length, 28 ft.; height, 12½ ft.	Gr. wt. tons: 4 to 6 ..... 16 6 to 8 ..... 14 8 to 10 ..... 10	No change		Personal property
New Mexico	Jan. 1, 1922	Per h. p. .... 50¢	No change	Rim of tire 3 in. or wider if capacity exceeds 2,000 lbs.	No change. "Unreasonable use of highway forbidden."		Width, 96 in.	Option of local authorities	City ..... 15 Country ..... 30 Railroad crossings 6	1 cent per gallon	Personal property
New York	No new law	Tons gr. wt. 2 and less ..... \$10 and an increase of \$5 for each additional ton up to 14. Over 14 ..... \$70 Plus \$10 for each additional ton.	No change	Per in. width of tire, 800 lbs. Maximum gr. wt., 25,000 lbs.	Width to be taken: Base channel or between flanges and rim.	Width, 8 ft.; height, 12½ ft.	Racks may be 8 ft. at bottom, 12 ft. at top.	Maximum ..... 30	No change		None
North Carolina	July 1, 1921	Tons capacity 1 ..... \$12.50 1 to 2 ..... 25.00 2 to 3 ..... 40.00 3 to 4 ..... 65.00 4 to 5½ ..... 100.00	Tons capacity less than ½ ..... \$12.50 ½ to 1 ..... 25.00 1 to 2 ..... 40.00 2 to 3 ..... 65.00 3 to 4 ..... 100.00 4 and over ..... 300.00							1 cent per gallon	Personal property
North Dakota	No new law	Per dollar list price, \$.005 Per 100 lbs. wt. .... .20 Per h. p. .... .10 For second year, 10% reduction; third, 25%, and thereafter, 40%. In addition ton capacity is assessed as follows: Less than 3 ..... \$3 3 to 4 ..... 5 Over 4 ..... 10	No change					City ..... 10 Country ..... 30	No change		Registration fee in lieu of all taxes.
Ohio	No new law	Horsepower 25 and less ..... \$8 26 to 35 ..... 12 Over 35 ..... 20 Electric ..... 8 20¢ per 100 lbs. gr. wt. is added to above.	No change	Max. gr. wt. 10 tons; per in. width of tire: steel (3 in.) 500 lbs.; rubber, 600 lbs.; per axle 14,000 lbs.; One wheel not to exceed 35% gr. wt.	No change	Width, 96 in.; length, 30 ft. Trailer combination, 85 ft.	No change	Tons gr. wt. Pneumatic Less than 5 ..... 25 5 to 8 ..... 20 8 to 10 ..... 15 10 to 15 ..... 10 15 to 20 ..... 8 20 to 30 ..... 5 30 to 40 ..... 3 40 to 50 ..... 2 50 to 60 ..... 1 60 to 70 ..... .5 70 to 80 ..... .25 80 to 90 ..... .15 90 to 100 ..... .10			Personal property

State Laws Governing Motor Truck Regulation—Continued

State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
				Old	New	Old	New	Old	New		
Oklahoma	No new law	Tons capacity 1 and less.....\$15 1 to 1½.....20 1½ to 2.....25 2 to 3.....40 3 to 4.....60 4 and over.....100 Reduction of 20% each year for 3 years, except those of 5 ton or more capacity (Minimum, \$10).	No change								Registration fee in lieu of all taxes.
Oregon	Jan. 1, 1922	Tons capacity 1 to 1½.....\$32 1½ to 2.....48 and an increase of \$12 for each half ton.	Total tire width (1 or more solid tires) 14 in. and less.....\$35 15 to 17.....42 18 to 22.....55 23 to 26.....65 27 to 30.....105 31 to 36.....128 37 to 40.....140 (4 pneumatic tires) 20 in. and less.....35 21 to 23.....42 23 to 25.....49 26 to 32.....56 33 to 40.....70	Gr. wt., 22,000 lbs.; per axle, 17,000 lbs.; per in. width of tire, 900 lbs.; for 30 in. tire width of all wheels, 600 lbs.; more than 30 in. Max. for metal tires, 6,500 lbs., on hard surface roads.	Width, 96 in.		30, 25, 22, 20 and 18 for pneumatic tires and gr. wt. 18, 15, 12, 10, 8, 6,000 to 22,000 lbs. 25, 20, 18, 15 and 12 in. P. H. for solid tires. Metal tires, 8.			2 cents per gallon	None
Pennsylvania	Jan. 1, 1922	lb Chassis Wt. 2,000 to 3,000.....\$20 3,000 to 4,500.....25 4,500 to 6,000.....30 6,000 to 7,000.....50 7,000 to 8,000.....75 8,000 to 10,000.....100 10,000 and over.....150	Chassis Wt. 1 to 1½ Tons.....\$21 1½ to 2.....32 2 to 2½.....40 2½ to 3.....56 3 to 3½.....80 3½ to 4½.....100 4½ and over.....125 Electric with solid or pneumatic tires in pneumatic tire class.	Per in. width of tire 800 lbs. gr. wt., 28,000 lbs., wt. 1 axle, 19,500 lbs.		Width, 96 in.; length, 28 ft.	28 to 10, varying with wt. of chassis and whether pneumatic or solid tires.	No change		1 cent per gallon	None
Rhode Island	Jan. 1, 1922	Tons capacity 1 and less.....\$7 Over 1.....7 Plus \$3 per ton up to 4. 4.....16 Plus \$1 per ton up to 9. Over 9.....40	25¢ per h.p., plus following for each 100 lb. gr. wt. Pneumatic Solid Metal 25¢ 35¢ 50¢								Personal property
South Carolina	No new law	Tons capacity 1 and less.....\$15 1 to 2.....30 2 to 3.....60 3 to 4.....100 4 to 5.....200 5 to 6.....250 6 and over.....350 25% reduction for pneumatic tires.	No change	4 tons capacity unless by special permit.		Width, 7½ ft.	No change				Personal property
South Dakota	Jan. 1, 1922	Tons capacity 2 and less.....\$6 2 to 3½.....10 3½ to 5.....15	Tons capacity less than 1.....\$15 1 to 1½.....20 1½ to 2.....25 2 to 3.....35 3 and over.....75							1 cent per gallon	Personal property
Tennessee	No new law	50¢ per h.p., plus \$5 per ton capacity; electric, \$25 plus \$5 per ton capacity.	No change		3 ton capacity in counties having population between 21,461 and 21,485.						None

State	Date New Law Effective	Registration Fees Previously in Effect	New Fees	Weight Limits		Dimension Limits		M. P. H. Speed Limits		Gasoline Tax	General Tax
				Old	New	Old	New	Old	New		
Texas	Jan 1 1922	Tons capacity 1 to 2.....\$16 2 to 3.....32 3 to 4.....48 4 to 5.....80	Tons capacity 1 to 2.....\$30 2 to 3.....50 3 to 4.....80 4 to 5.....120	Per in. width of tire, 500 lbs.; per wheel, 5,000 lbs.	No change	Width, 7 ft.	No change	25	Gr. wt. tons Pneumatic.....15 2.....12 3.....10 4 and over.....10 Solid.....14 Over 2.....10		Personal property
Utah	April 1, 1921	Flat rate of \$10.	Tons All 2 or Cap. Pneu. more Metal 1.....\$20 \$27 50 \$40 1½.....25 35 00 60 2.....30 45 00 80 2½.....35 55 00 3.....45 65 00 3½.....55 80 00 4.....65 100 00 4½.....75 120 00 5.....90 140 00 On special permit truck over 5 ton is charged \$30 extra per ton.	Gr. wt., 10 tons.	Gr. wt. 11 tons; per wheel, 3¾ tons; per in. width of tire, pneu- matica, 600 lbs. dirt or gravel 400 lbs.		Width, 96 in.	Reasonable and safe	Gr. wt. tons Pneumatic Less than 3.....30 3 to 4.....25 Over 4.....16 2 or more solid Less than 3.....20 3 to 4.....15 Over 4.....8 Metal.....5 m.p.h.		Personal property
Virginia	No new law	Tons capacity 1.....\$15 each additional ¼ ton... 5	No change	Maximum gr. wt., 24, 000; per in. width of tire, 700 lbs.	No change			City.....10 Country.....20	No change		Personal property
Vermont	No new law	Tons capacity ¼ to 1.....\$20 1 to 1½.....30 1½ to 2.....40 2 to 2½.....50 2½ to 3.....75 3 to 4.....100 each ton over 4, \$25 addi- tional.	No change	Per in. width of tire, 600 lbs.; maximum gr. wt., 6¼ tons.	No change	Width, 8 ft.; height, 12 ft. 2 in.	No change	4 tons.....15 6 tons.....12			Registration fee in lieu of all taxes.
Washington	Jan. 1, 1922	Weight up to 6,500 lbs., \$10, plus 40¢ per 100 lbs. over 1,500 lbs., plus 40¢ per 100 lbs. of rated capacity. Over 6,500 lbs., \$10, plus 50¢ per 100 lbs. over 1,500 lbs., plus 50¢ per 100 lbs. rated capacity.	No change	10,000 lb. load.	Gr. wt., 24,000 lbs.; per axle, 2,400 lbs.; per in. width of tire, 800 lbs.			Tons capacity 2 to 3.....15 3 to 4.....14 4 to 5.....12 Over 5.....10	Pneumatic.....25 Tons capacity Solid.....20 2 to 4.....20 4 to 6.....18 6 to 8.....16 8 to 10.....14 10 to 12.....12	1 cent per gallon	Personal property
West Virginia	Jan. 1, 1922	Pneumatic tires, 30¢ per h.p., plus 30¢ per 100 lbs. gr. wt. Solid tires Tons capacity 1.....\$15 2.....25 3.....40 4.....95 5.....125 Over 7.....200	Pneumatic tires, no change. Solid Tons capacity 1.....\$25 2.....50 3.....100 4.....200 5.....400 Over 7.....200	Per in. width of tire, 800 lbs.; gr. wt., 30,- 000 lbs.	Per in. width of tire, 600 lbs.; gr. wt., 25,000 lbs.; per axle, 17,000 lbs.; per wheel, 9,000 lbs.	Width, 90 in.	No change				Personal property
Wisconsin	No new law	Lb. capacity Under 2,100.....\$15 2,100 to 5,099.....20 5,100 or more.....25	No change	Per in. width of tire, 800 lbs.; gr. wt., 24,000 lbs.; per axle, 18,000 lbs.	No change	Width, 96 in.; length, 30 ft.					Personal property
Wyoming	Jan. 1, 1922	75¢ per 100 lbs. of vehicle fully equipped.	Tons capacity 1 and less.....\$15 1 to 2.....30 2 to 3.....50 3 to 4.....75 Over 5.....150		Gr. wt., 25,000 lbs.						Personal property

# A Distribution Policy for the Brazilian Market

The country, as large in area as the United States, is divided into at least seven definite districts. An agency for each of these territories, instead of one for the entire nation, would facilitate distribution and selling. The necessity for studying the foreign market is emphasized. The opinions expressed are those of a salesman who spent much time in Brazil.

**E**STABLISHMENT of selling and distribution policies in foreign countries has been carried out along somewhat vague lines in the past. This condition, however, could probably not be well avoided, for in an industry as comparatively young as the automotive industry, there has not been any too much time to permit the establishment of sound methods at home. Yet, this latter has been done to a certain degree, and some stern steps have been taken in getting things on a more or less sound basis abroad.

The time is coming, however, and at no very distant date, when the American manufacturer who desires to market his goods away from home must establish definite methods in the countries he enters, and must develop the possibilities of those countries with as much care and study as he has spent in developing the home markets. The domestic merchandiser has at his finger tips the needs of practically every section of the United States and knows to a pretty fair degree of accuracy what type of automobile will sell best in California and what type is more prevalent in Maine. He knows the various degrees of prosperity which each community is undergoing and he acts accordingly. However, when he considers a foreign market he is apt to look at it as a whole and make no attempt to analyze the varying needs of the different sections there.

Exporting is increasing in volume and will increase still more in the near future. This is particularly true of South American exports. Conditions are rapidly righting themselves, and men who have spent considerable time there have declared that there is a shortage of motor cars. Recent figures showed that there were approximately 1000 cars in customs at Buenos Aires, while normally there should be about 2500 at this time, which is the opening of their sales season. American-made cars are popular in South America; they have won their way into the hearts of the Latin-Americans. The dealers there are good business men and they know what they want and why they want it. The economy and ease of operation of American cars has appealed to them, especially since gasoline is selling for something like 67 cents a gallon.

The fact that in Rio de Janeiro there are some 28 Pope-Hartford cars of the vintage of 1908 still scooting about the streets, with a new horn attached for every year of service, indicates that the South Americans are convinced that American cars will stand the tests. These old cars not only make their way about the city streets, but they may be observed climbing the difficult hills of Tijuca and bumping over the rough roads of the state of Minas. American cars have proven their ability in

that part of the continent. And there are many parts of Brazil that are practically virgin territories for the manufacturer of automobiles.

Brazil is the largest political division of the South American continent. It is larger in area than the continental United States, excluding Alaska, and slightly larger than the great bulk of Europe lying east of France. Despite this fact many American manufacturers have attempted to sell automobiles over the whole of Brazil through the establishment of one agency in the entire country.

Many, too, have tied up their foreign business with export agents. Whether or not this latter is a sound policy permits considerable discussion, but those who have made a close study of exporting methods have agreed that the manufacturer himself or his direct representative, is far better equipped to handle American automobiles in foreign countries than the export agent who may be marketing oil cloth, phonographs and a brand of canned goods in addition to the automobile.

## Divided Into States

In giving one firm the agency for all of Brazil, manufacturers have apparently forgotten that the country is divided into states similar to this country, and that there is keen competition among states there. Commercially the country has not progressed as rapidly as has her neighbor, Argentina, but it must be remembered that she is not so old from the standpoint of colonization. Brazil is also handicapped in that she has no gold standard, but that bids fair to be righted within the next year.

There are at least seven separate and distinct districts of Brazil, and the far-sighted exporter will look to the establishment of branch agencies in each of these districts. In each there is a principal city, and that city represents the center of some particular industry.

Some 900 miles up the Amazon, a journey of five days from the mouth of that river, there is Manáos, with a population of 80,000. This city is in the heart of the rubber country and practically every form of motor vehicle could be sold there. The port city for this Amazon territory is Para. The rubber industry also predominates there and the city is well equipped with docks and is an important maritime and commercial center.

To the south of Para on the coast is a city that has been practically untouched by automobile salesmen from the United States. That city is Pernambuco, an extremely wealthy city of some 150,000. The sugar industry stands out above others, although cotton is a large



crop, and trucks, passenger cars and tractors are needed. Still further south is Bahia, abounding in poor roads, rough streets and tobacco. The tobacco industry in this section is on a par with that industry in the United States and goods from there can be found in all European markets. Bahia and the country roundabout have not developed to the extent of other districts, but plans are under way for much road work. The market there for cars and motor trucks is not yet as good as in other sections. However, the market for tractors is fair, and the coming of cars and trucks will, without doubt, force the building of better roads and improvement of streets. There is another city between Bahia and Rio de Janeiro which is not included as a headquarters for one of the districts, but which is of more or less importance nevertheless. This city is Victoria, the coffee center. Its streets are rough and atrociously kept. Only light cars exist there, but there are opportunities for development.

Next along the coast comes Rio de Janeiro. The possibilities of this city are too well known to cause much discussion. In fact, many exporters have seemed to consider Rio de Janeiro a good big part of Brazil and conclude that when they have supplied the market there they have about supplied the Brazilian market. It is, of course, the most important city of the country, but not by any means the only important one.

To the south of Rio de Janeiro there is the city and state of São Paulo, where numerous industries abound. Coffee, cattle, cotton growing, cotton factories and packing plants are in the district, and, generally, it is the commercial center of the country. This is a state where crops can be grown three times a year and on the mountain tops and sides rice grows wild. The city is typically American and English is spoken almost as much as Portuguese. The section is unusually wealthy and offers a market for all types of cars, trucks and tractors.

The last district is the state of Rio Grande do Sul, sometimes called the "Iowa of Brazil." The state is wealthy in agricultural products and the principal city

there, Porto Alegre, is the center of the rice industry. There are many other prosperous cities about Porto Alegre, including Pelotas, Rio Grande do Sul and Blumenau.

### Progressive Developments

There is much more that could be said about these districts, enough, in fact, to fill a book of travel, but the brief outline presented shows a few of the possibilities in Brazil if a careful plan of distribution were worked out. Each of these cities serves a territory that is rich and still in the process of development. There is more road building going on in Brazil than in any other country of South America. There are reasons for this, however. In the first place Brazil possesses all the necessary materials for this work. Secondly, the government is determined to open up the interior of the country and thus far has been successful in their attempt. They are lending every possible aid to promote road building.

Agriculturally, Brazil is progressive. Tractors are wanted and wanted badly. Brazil will pay the transportation charges, or furnish the transportation for tractors in order to get them down there. The government controls the steamship line, Lloyd Brasileiro.

Unlike some other South American countries, the duty on trucks in Brazil is low, being only 5 per cent ad valorem. It must be remembered, however, that on city streets dual tires are required and chains are forbidden. In the country, however, trucks are being used for all purposes and chains may be used.

The motor car in Brazil has advanced beyond the pleasure stage, and the many people there regard it as a necessity. Chauffeurs, taxicab drivers and owners take better care of the motor cars than they do in the United States.

Coming back to the distribution problem, the situation in Brazil is much the same as in the United States, so far as territory and the number of industries to be served are concerned.

## German Automobile Exports for 1920

**D**URING 1920 there were exported from Germany automotive vehicles, chassis and airplanes of a total weight of 437,400 Doppel-centner (220 lb.), and 31,906 Doppel-centner of parts. The number of complete vehicles exported was 17,534 and their value, 1,184,295,000 marks. The value of the parts exported was 89,912,000 marks. In addition there were exported 3,541 motorcycles, valued at 25,564,000 marks. The figures for complete vehicles show a large increase as compared with the last full year before the war (1913) when the number of exported passenger cars and trucks combined was only 9,848. There was only a slight increase in the exports of motorcycles, however, from 3214 in 1913 to 3541 in 1920, and also only a slight increase in the exports of parts, from 25,679 Doppel-centner in 1913 to 31,906 in 1920. The distribution of Germany's exports in 1920 is shown by the following table, the figures representing Doppel-centner.

German imports of automobiles in 1920 were of very little consequence. There were imported 223 passenger cars and chassis for same, as compared with 1830 in 1913; 124 trucks and chassis for same, as compared with 159 in 1913, and 50 motorcycles, as compared with 503 in 1913. It is not unlikely that most of the trucks imported were intended for the Armies of Occupation and do not represent commercial imports.

### German Exports of Motor Vehicles, Chassis and Dirigible Aircraft

Country of Destination	Complete Vehicles (Units of 220 lb.)	Parts (220 lb.)
Belgium .....	7,532	2,083
Denmark .....	32,451	2,057
France .....	5,828	3,897
Great Britain .....	35,186	673
Italy .....	2,018	1,259
Netherlands .....	74,784	2,393
Norway .....	14,897	352
Austria .....	5,589	7,540
East Poland .....	4,092	66
Portugal .....	14,832	26
Finland .....	13,336	352
Sweden .....	54,554	3,347
Switzerland .....	48,753	3,068
Spain .....	70,128	277
South-East Asia .....	9,983	101
U. S. A. ....	1,586	47
Central America .....	1,602	33
South America .....	9,808	300
Other countries .....	30,441	4,036
<b>Totals .....</b>	<b>437,400</b>	<b>31,906</b>



# The FORUM



## Neglect of Details in Finishing a Car

Editor, AUTOMOTIVE INDUSTRIES:

I have had some interesting experiences with a certain 1921 six cylinder car and I believe that a discussion of them will prove interesting to readers of AUTOMOTIVE INDUSTRIES. On the whole the car has been extremely satisfactory, but it certainly has failed in a great many trifling ways which, however, have much to do with the pleasure and profit of motoring.

There are two things that particularly stick in my crop at this moment. One is the fact that as far as I have been able to discover, it is impossible to buy a single headlight lens simply because headlight manufacturers prefer to sell a man two new ones when he breaks one. This is an imposition that is going to force me to put in plain lenses of the Ford style rather than be played for a sucker.

The other thing that particularly annoys me is the difficulty of obtaining a single leaf for an automobile spring. As you know, when a spring fails, usually only one leaf gives way. But it is not an easy matter to buy a single leaf, particularly from an automobile dealer. I am informed by the dealer who sells my car that he has tried very hard to purchase individual leaves, but spring makers are reluctant to sell single leaves because it is more profitable to force the unfortunate owner to purchase a complete spring when he breaks a single leaf.

Engine, clutch, transmission and axles, and other important units on this car are perfect, after some 12,000 miles of use, but the details might be improved without the expenditure of very much cash. Take the case of headlights, for example: both small and large sockets have had to be replaced because they were made out of aluminum instead of brass, and this metal was so soft and the general construction of the socket was so faulty that the sockets became useless after a few thousand miles. The doors to the headlights are hinged at one side and retained by a snap catch on the other side. These catches were defectively designed, with the result that a severe shock would jar open the doors. The wiring of the headlights was so skimmed that it was impossible to open the doors more than part way. This in itself was an inconvenience, and, due to frequent jarring open of the doors, the wires soon became chafed away and new wiring was therefore necessary. The conduit system in which this wiring was enclosed is so laid out that the job of removing just one headlight wire required one hour, and the replacement of this particular wire took just as long. Five cents of improvement at the right points would have eliminated all this trouble, and trouble it was. It is no fun driving with lights that are flickering and threaten to go out any minute. A man must be able to place confidence in his lights, and this has only been possible since the car has been re-wired. The taillight socket, by the way, was also replaced.

The latches in the door locks were originally of cast bronze and these cracked one by one with the result that all four locks on the car had to be replaced. It was not

possible to buy new latches, but complete new locks had to be purchased.

A right rear spring broke in the main leaf, close to the front spring bolt, and a complete new spring had to be purchased because it was impossible to obtain a single leaf except by ordering it from the spring maker. Because of difficulties in disassembling and assembling this spring, including the bad fit of the bolts it took two good mechanics six hours' hard work to do the job, and the running board apron was mutilated in the process, because it was impossible to withdraw the front spring bolt without knocking a hole in the running board apron.

Casual inspection of the under side of the car one day disclosed the fact that none of the cotter pins on either the service or emergency brake had been spread. I discovered to my horror that the cotter pin on the clevis pin connecting the service brake rod to the pedal had dropped out and that the clevis pin itself was almost ready to drop out. Any automobile manufacturer who fails to spread cotter pins ought to be jailed!

The service brake mechanism is so laid out that it is impossible to adjust the brakes so that they will hold well and yet not drag when five people are in the car. If they are adjusted to give maximum stopping ability, they will drag with five people in the machine almost without exception.

One other thing that is worth mentioning, is that the high tension ignition wires are wrapped around the end of the engine and that every once in a while the heat melts off enough rubber on one of the wires to short circuit some spark plug. The spark plugs, by the way, are placed so close to the under side of the exhaust pipe that it is almost impossible to screw one in or out without burning your fingers, and, in fact, in performing this operation, the shell of the plug actually touches the pipe. Care must be taken in connecting a spark plug to prevent the high tension current from jumping to the exhaust pipe.

There are many other points that need attention. If you want my private opinion, I think that this particular company tried conscientiously to build a good car and all the units are good, but they failed because they have never really finished the job. Details which cause the owner trouble and expense have not been given proper attention.

HAROLD F. BLANCHARD.

## Relation of Gearset Construction to Economy

Editor, AUTOMOTIVE INDUSTRIES:

Since your issue of November 17 requests comments on the fuel economy question, the view of an outsider may be of some interest. Of all the articles which have appeared on this subject the one in which Mr. Nelson described the results of tests using high axle ratio seems to offer the largest gain in economy. This gain was obtained without the use of any special constructions.

The chief obstacle preventing the universal attainment of economy in this way is the difficulty of making

gear changes, except at low speed. The noise of the intermediate gears in present-day transmissions is also an objection.

If the constant mesh type of gearset were made with herringbone gears it would be practically noiseless. If an individual clutch of small size were used to bring the members of the positive jaw clutch to the same speed before engagement, gears could be changed easily and noiselessly at any speed.

If the American driving public is to learn economy before it becomes a necessity the all-high-gear car must be replaced by a more economic type which can be easily handled by the ordinary driver. A silent overdriven fourth speed would add economy to the virtues of most of our present-day cars without sacrificing performance.

D. C. PRINCE.

## Counterbalancing Two-Cylinder Vee Engine

Editor, AUTOMOTIVE INDUSTRIES:

I have a problem in automotive design which I hope you will be able to solve for me.

I have built a two-cylinder engine from certain Curtiss Model OX parts, utilizing the first two cylinders. These two cylinders project radially from the crankshaft, and are set at an angle of 90 deg. The motor is of 4 in. bore and 5 in. stroke. It was built, but developed excessive vibration. Of course, due to the displacement of the cylinders, the explosions did not occur 360 deg. apart, but varied from 360 by this 90 deg.

I believe the vibration is due to a lack of crankshaft counterbalancing, and I now desire to counterbalance the crankshaft. The complete piston, connecting rod, and bolt assembly weigh  $4\frac{3}{4}$  lb. apiece. The questions I desire answered are these:

1. In counterbalancing, is only the offset weight of the crankshaft considered, or is the weight of the pistons compensated for?

2. What weight of counterbalance and what shape are necessary to counterbalance this engine? L. R. L.

In a two-cylinder 90 deg. Vee engine the so-called primary components of the inertia forces due to the reciprocating parts in the two cylinders combine to make a constant, uniformly rotating force which can be balanced completely by the application of balance weights to the crank arms, and only the secondary components of the inertia forces, which rotate at twice the speed of the crankshaft, cannot be balanced. The value of the constant rotary force which is the resultant of the primary components of the inertia forces on the two sets of reciprocating weights is

$$F = 0.0000142 W l N^2 \text{ lb.,}$$

where  $W$  is the weight of the reciprocating parts of one cylinder (piston, piston pin, rings, pin locking screw and one-third of the weight of the connecting rod);  $l$  is the length of stroke in inches and  $N$  is the number of revolutions per minute.

This force must be balanced by the centrifugal force on the balance weights, which is

$$F' = 0.0000284 W' N^2 r,$$

where  $W'$  is the weight of the balance weights required for this purpose, and  $r$  the average distance of this weight from the axis of rotation. Hence,

$$0.0000142 W l N^2 = 0.0000284 W' N^2 r$$

from which it follows that

$$W' r = W l / 2$$

The lower ends of the connecting rods are rotating weight and they are virtually centered at the center of the crankpin. As already stated, these lower ends are generally

considered to represent two-thirds of the total weight of the rods. Hence, if the weight of each connecting rod is  $W''$ , the rotating weight of the connecting rods is  $4 W''/3$ , and as this weight is located at a distance  $l/2$  in. from the axis of rotation, its moment around this axis is

$$4 W''/3 \times l/2 = 2 W'' l/3$$

This also must be balanced by the balance weights and the weight required for this purpose is  $W'''$  where

$$W''' r = 2 W'' l/3$$

In addition the balance weights must contain weight sufficient to balance the offset parts of the crank itself, that is, part of the crank arms and the whole of the crank pin. The moment of these parts around the center line of rotation should be carefully determined from the drawing of the crankshaft, and weight should be provided in the balance weights to equal this moment. Suppose that the unbalanced moment of the crank is found to be  $A$  lb-in.

The two balance weights must then be made of such moment around the crank axis that the centrifugal force on them will equal combined effects of inertia on the reciprocating parts, centrifugal force on the lower ends of the connecting rods and centrifugal force on the unbalanced parts of the crank itself. The moment, therefore, should be

$$W_l r = W l/2 + 2 W'' l/3 + A,$$

where  $W$  is the weight of the reciprocating masses of one cylinder, including one-third the weight of the connecting rod;  $l$  is the length of stroke in inches;  $W''$  is the weight of one connecting rod and  $A$  is the moment of the unbalanced portion of the crankshaft around the crankshaft axis.—Editor.

## Wants Manufacturers to Adopt Standard Gear Shift Positions

Editor AUTOMOTIVE INDUSTRIES:

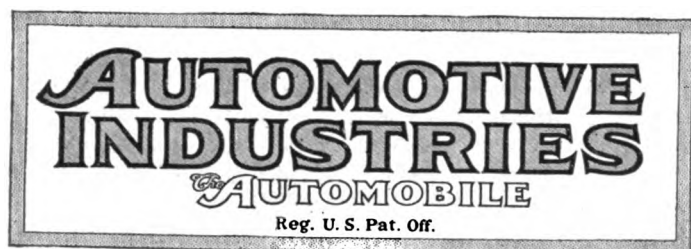
Almost every issue of your paper carries something about standardization of various parts of the automobile. I notice in your issue of November 17th you have an article on transmission standardization.

Why don't the automobile manufacturers get together and standardize the gear shift? Practically everything else has now been taken care of with this exception and it is very confusing to a man driving different cars. At the present time I have a Buick and a Cadillac, and am continually getting the two shifts confused. Most of the cars are now using what is called standard shift, that is, the same as that used on the Cadillac, but there are several, such as the Buick, Dodge, Hupp, etc., with distinctive ones. Can't something be done to standardize these and help the drivers? R. B. LINSLEY.

## Passenger Car Body Standards

THE Passenger Car Body Division of the Standards Committee of the Society of Automotive Engineers is working on proposed standard specifications for door handles, plate glass, leather, door hinges, fender irons, nickel plating, rolled sections and moldings, top irons, wood screw drills and windshield side arms. The Division is also preparing definitions of the various types of passenger car bodies now in common use.

G. W. Kerr, chairman of the Sub-division on Leather, believes that the formulating of standard specifications covering the thickness of leather, the thickness of buffing, and allowable imperfections and methods of grading, is one of the most useful things the Division can at present undertake. Representatives of a number of prominent leather manufacturers are co-operating to this end.



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## Market Analysis Data

THE work of the Bureau of Foreign and Domestic Commerce has been described in detail and automotive manufacturers are rapidly recognizing the service which this bureau and its automotive division may render.

The Bureau of Census is another agency to which the manufacturer may well give attention in connection with his domestic marketing studies. This Bureau, as well as the others which form a part of the Department of Commerce, has been thoroughly reorganized. Its figures and studies in the past have been routine to a large extent and its industrial figures, in particular, have been published so long after the date to which they refer as to be almost useless for practical business purposes.

To meet the current needs of business, however, a monthly survey of production and stocks is being published by this Bureau with the assistance of various trade associations. This summary should be of direct value to the automotive industry.

The bureau has recently issued, as well, surveys of

different cities, showing the ownership and encumbrance of homes in the given cities. These brief reports show the number of homes, the number of owner occupants, the number of mortgaged homes, the average market value of mortgaged homes and a number of other detailed facts along this line. Such data is of very practical value to the automobile sales manager, who is interested in intensive market analysis.

Doubtless the Bureau of Census will publish other material of similar value. It will be worth while to follow its work rather carefully and to profit by the studies which it makes.

## The Owner to the Manufacturer

WE hope every automobile manufacturer will read the letter entitled Neglect of Details in Finishing a Car, which appears in this week's Forum, and pass it on with instructions that it be read by responsible persons in the engineering, production, inspection, purchasing and service departments. The letter contains a message from an intelligent car owner who deserves to be heard. Present car owners are future car purchasers and the manufacturer who persistently refuses to heed just criticism on the part of the owner will, sooner or later, lose, and deserve to lose, his business.

In the case cited, assuming that each of the departments concerned were given a reasonably free hand, it would appear that the engineering department was at fault for making a poor wiring layout, for so locating the running board apron that the spring bolt could not be readily removed, and the spark plug too close to the exhaust pipe, and for the design which made it impossible to prevent dragging brakes. Probably the production department was at fault for a wiring job that made it impossible to open the headlamp doors, and for poorly fitted spring bolts. Certainly the inspection department should not have passed the defective wiring and should have seen that all cotterpins were in place, before the car left the factory. No doubt the purchasing department (possibly with the expressed or tacit consent of the engineering department in the form of inadequate specifications) was responsible for the cheap headlights with poor catches and the unsatisfactory door latches which broke and required early replacement. The inability to buy single headlamp lenses or single spring leaves indicates a shortsighted service policy.

So we find that a lack of attention to details, manifest in a number of different departments or due to carelessness and a lack of proper thought or co-operation, resulted in spoiling what would otherwise have been a very satisfactory car. We fear that similar shortcomings are characteristic of many cars produced in large quantities. The purchaser is expected to stand the grief, and the consequent expense which the lack of thoroughness entails, when a few dollars spent in cleaning up these troublesome details would have saved the purchaser a much greater expense not to mention the delays and annoyance which gives him just ground for complaint and causes him to be a critic rather than a boost to the car.

Doubtless the car was never built at any price which is entirely free from certain annoying troubles, but we venture to state that a very large percentage of purchasers who have owned and operated cars would willingly pay the few additional dollars which it might cost if greater care and thoroughness were used to assure him reasonable freedom from the petty annoyances and delays which are caused by carelessness somewhere in the factory. The service station can and often does care for such troubles, but usually not until they have annoyed the purchaser and made him more or less dissatisfied. How much better (and probably less expensive, in the end, to all concerned) it would be if the difficulty were cured or prevented altogether by exercising proper care in all departments of the manufacturer's plant.

## Transformation of Hydrocarbon Fuels

OUR present motor fuel and the fractions of crude petroleum immediately below it in the scale of density consist of a series of hydrocarbon compounds which differ comparatively little in chemical composition but vary materially in their physical properties. As far as heat values are concerned, there is almost no difference when the comparison is made on the weight basis, and on the volume basis the heavier members of the series are even superior. As regards chemical composition, the lighter members contain slightly more hydrogen and less carbon than the heavier members. If it were possible to easily and cheaply convert the heavier into the lighter members of the group, not only could the possible supply of motor fuel be greatly increased, but the fuel could be better adapted to present-day engines.

The transformation indicated evidently can be made in two different ways, viz., by eliminating some of the carbon in the heavier fractions or else by adding to their hydrogen components. As the hydrogen and carbon are chemically combined it means in either case a breaking up and a re-formation of the molecules. The first-mentioned process is now in practical use and is known under the name of cracking. The heavier fractions of petroleum distillate are subjected to heat and pressure, which break up the molecules, cause some of the carbon to separate out in the form of coke, and convert the fuel into hydrocarbons of higher volatility, the proportion of hydrogen to carbon atoms in the molecules being greater. While commercially successful, it is understood that this process gives considerable trouble from coking in the apparatus.

The second plan, that of combining additional hydrogen with the hydrocarbon molecules, has not been practically developed so far as we are aware, but the fact that German chemists have succeeded in "hydrogenating" naphthalene, a hydrocarbon compound of another series makes it appear possible to also "hydrogenate" the paraffin hydrocarbons. There are comparatively little differences between the heats of formation of the different members of this series, the more volatile members having the greatest heat of

combination on the weight basis. The transformation is effected by a catalytic process, in which the elements to be combined—in this case the hydrocarbon of low volatility and hydrogen gas—are brought together in the presence of a third substance, a catalyst, which has the property of favorably influencing their chemical activity. Such catalytic processes are now extensively used in industrial chemistry, notably in the synthetic production of ammonia. The catalyst used for many of these processes is iron, which, being a common metal, renders the process relatively inexpensive. In this way acetylene gas can be combined with additional hydrogen to form a new hydrocarbon, which is liquid at ordinary temperatures and is said to be similar to Pennsylvania petroleum.

It would seem that the possibilities of transforming the heavier into the lighter paraffin hydrocarbons by means of catalytic hydrogenation should be looked into if they have not already received the attention of our petroleum chemists.

## Who Will Make the Buses?

TRUCK manufacturers are the logical makers of motor buses. As this potential field develops, truck manufacturers should be in a position to supply its needs and to reap the resulting profits. There is a general feeling among experts that specially designed chassis will be necessary for satisfactory bus work and that considerable research and experiment will be necessary before suitable designs are developed. If this development is left to agencies outside the industry, to these outside agencies will properly accrue the bus business.

Some truck makers have already recognized this fact and are doing considerable work along bus lines. One executive, for example, stated recently that "we have decided that there are three big fields for truck sales well worthy of our serious consideration and we are going to exploit them for all they are worth. We have in mind the school bus field, the roadmaking industry and the motorization of electric railways. We believe that potential sales here are very great."

An executive of a big parts concern, interested in bus development, stated recently that he did not think the truck industry was fully alive to the possibilities of the bus field and that he feared they would awake some morning to find that outsiders had stepped in and taken the business of this growing field. The subject is worth serious consideration in any case.

## Legislation and Trucks

ATTENTION is called to the tables accompanying an article in this issue on "State Laws and Their Effect Upon Motor Truck Sales." These tables contain the latest available information on registration fees, size, weight and speed restrictions, gasoline taxes and other impositions laid down in the various states. The data show the tendency in many states to attempt to rule heavy trucks off the highways.

These tables should furnish interesting information to the truck manufacturer or sales manager.



# Making Ready for Post-Show Sales

## Car Manufacturers Add to Inventories

### Export Trade Also Contributes to Keeping Parts Business to October Level

NEW YORK, Nov. 29.—While November production of motor cars undoubtedly will show a total less than for October, the business of parts and accessory manufacturers this month will hold close to the level of last. This somewhat paradoxical situation probably is due to the fact that car makers are replenishing their inventories in preparation for the business which will come with the New York and Chicago shows. In many instances they are preparing to bring out entirely new models or make improvements in the old lines.

The parts makers have been frankly surprised at the volume of orders this month. They looked for a lean thirty days and feared a long, hard winter. In many cases, sales the first third of the month fell off as expected, but after that there was a rapid and substantial increase both in releases and new business. Equally gratifying is the fact that many plants already have booked substantial orders for December.

While preparations for post-show sales are responsible for a part of these purchases of units and accessories, another factor has been the increase in foreign trade. There has been a distinct betterment in export sales this month, especially for the past fortnight, and as a consequence it is probable production for the last two weeks will exceed the first two. This business is beginning to take up the slack, or the final 10 per cent, which means profits.

The rapid rise of the pound sterling has made possible the sale of American made motor vehicles in all the English-speaking countries. Sales have been larger also in northern Europe as well as in Australia and the Far East. There has been some improvement in South Africa and in certain parts of Latin America. Business in Mexico has held its own. Trade in Latin America has been helped by the fact that this is the real selling season there, but general conditions are improving.

## OCTOBER SALES OF M. A. M. A. MEMBERS SHOW DECLINE OF LESS THAN 5 PER CENT

NEW YORK, Nov. 28.—Sales by members of the Motor and Accessory Manufacturers Association for October showed a falling off of approximately \$1,000,000, as compared with September, but the decline was less than 5 per cent. This showing was much more satisfactory than was expected, because it was believed production of motor cars last month would be considerably curtailed.

It is a striking commentary on the stability of the automotive industry that October marked the eighth successive month in which the volume of business of the parts and accessory manufacturers was practically the same. Beginning with March, which showed a gain of 93 per cent, as compared with February, the greatest fluctuation for any month was in June, which showed a decrease of 15 per cent over May. Increases were reported in July, August and September, but the change from the preceding month in each instance was less than 2 per cent.

The total of notes outstanding reported for October showed a decline of 5.82 per cent. This reduction was almost identically the same as was reported in August and September. The figures for each month this year follow:

Month	Total Purchases	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	\$6,264,587	.....	\$8,099,727	.....	\$4,359,871	.....
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,063,118	39.08 Inc.
March	20,120,386	93.30 Inc.	6,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,358	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,144,891	1.09 Inc.	4,358,546	00.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,483,500	5.82 Dec.

The position of the larger passenger car manufacturers in relation to inventories is steadily improving and every effort is being made to get them straightened out by the turn of the year. Many already have written off their losses. There is no disposition on the part of the stronger companies to evade their commitments with suppliers, although they are asking price concessions.

(Continued on page 1093)

## Signal Motor Corp. Files Incorporation

DETROIT, Nov. 28.—The Signal Motor Corp. has filed articles of incorporation and will continue the manufacture of the line of trucks formerly made by the Signal Motor Truck Co. at the Detroit factory. The new company has a capitalization of \$85,000 which is based upon the assets purchased from the receiver of the Signal Motor Truck Co. The officers of the new company are: President and treasurer, M. B. Hoagland; vice-president, H. S. Sternberg; secretary, H. H. Emmons; assistant treasurer, J. C. Dibsall. The directors include the officers and J. L. Dryden and W. K. Hoagland.

Production of the new line will be started at once. The models will be the same as in the past except for refinements. Reduction in prices already has been announced.

## Michigan to Act on Durant Request to Sell Stock Dec. 1

LANSING, MICH., Nov. 29.—Application of the Durant Motor Co. of Michigan for permission to sell stock in this State has been taken up by the Securities Commission and a hearing will be given on Dec. 1. The company seeks permission to market \$5,000,000 worth of common stock at \$10 par with commissions which are not to exceed 15 per cent.

The Michigan company is one of the four subsidiaries of Durant Motors, Inc., and soon will begin production of cars for the middle section of the country. Stockholders of the parent company as of May 12 when 507,572 shares of the authorized 1,000,000 at \$10 had been issued were: W. C. Durant as trustee or members of his family, 234,271 shares; R. H. Collins, 10,000 shares; A. B. C. Hardy, 1950 shares; A. H. Sarver, 1775 shares; F. W. Hohensee, 1000 shares; G. H. Hannum, 2000 shares; Fred W. Warner, 1100 shares, and T. W. Warner, 10,000 shares.

## DURANT ANNOUNCES PRICES

NEW YORK, Nov. 29.—The following prices have been announced on the Durant Six which will be made by the Durant Motor Car Co. of Indiana at the Sheridan plant in Muncie: Roadster \$1,600, touring car \$1,650, coupé \$2,250, sedan \$2,400.

# Parts Contracts Again Looming Up

## Violations Charged Against Car Makers

Feeling Grows That Action  
Should Be Taken to Rem-  
edy Situation

NEW YORK, Nov. 28.—Indifference to contractual relations on the part of motor car manufacturers has again become a question of importance, according to manufacturers of parts and accessories. The complaint is made that with the exception of solidly established companies in the vehicle building field, there has become apparent a disposition to disregard obligations and resort to shrewd horse trading methods.

### Customers Seek Releases

Several parts makers have complained recently that customers have sought release from contracts on one plea or another and then gone into the open market to buy the same supplies at more advantageous prices. Another practice which is said to have become more or less common, is to threaten that unless sharp price concessions are made on old commitments, the purchaser will shift his business to some other house. In the present era of keen competition threats of this character have in many cases carried considerable weight.

The following statement on this subject was made by one of the largest and most substantial parts makers in the country:

"We are of the opinion that the position taken by many of the motor car manufacturers is indeed an unjust one, and works a hardship on the parts manufacturer. For example, considerable expense is incurred by the parts maker in soliciting manufacturers business. He is successful in receiving a contract, but instead of that being an asset, as it should, it becomes a liability.

### Assumes Arbitrary Position

"The parts maker covers on material, has same shipped into his plant on what he believes is a bona fide release; conditions change somewhat and the automobile manufacturer slows up his production and immediately wires the parts maker to hold up shipments. He has no regard for the contract which is entered into with you nor for the release he has given you. He takes the arbitrary position that unless shipments are withheld, he will discontinue the use of your product, that you are not cooperating with him, etc. Should you contemplate shipping him material ready, he will advise you he will refuse to accept shipments.

"The parts maker has gone to considerable expense in making up patterns and is losing money on the initial order for parts, expecting to realize his profit, however, when the customer uses a fair quantity of his prod-

## HARDING IS INVITED TO N. A. C. C. DINNER

NEW YORK, Nov. 29.—President Harding has been invited to speak at the annual dinner of the National Automobile Chamber of Commerce which will be held Monday evening, Jan. 9, while the automobile show is in progress here. The invitation has been based on the ground that the automotive industry is the second largest in the country and that the dinner would afford the President an opportunity to carry a message of good cheer to the country on the revival of business.

A real turn for the better is expected soon after the first of the year. He has been told that the great transportation industry is filled with enthusiasm and that an address from him would inspire new confidence and determination to progress.

The conference on the limitation of armaments undoubtedly will have been ended by that time and an address here would give him an opportunity to discuss the success of the international parley.

uct. The material is in his plant, which he has been compelled to pay for. Product is in the process of manufacture; he has paid for the labor in making up the parts in question up to that given point. If he stops the manufacture of those parts at the first operation, it only means he must carry same along in his warehouse, hoping that some day the manufacturer will give him a release; that is, if by that time he has not changed the dimensions or design of same.

"His inspection department is more rigid and in order not to make his liability too great, he rejects parts which would have been acceptable in normal times to them.

"When the question of payment for material, which he has received, is brought up for consideration, he first delays payment of same, and then he wishes you to take notes or trade acceptances in payment, and in many instances, requests dating besides the paper settlement.

"We believe the parts maker should insist on his contract and teach the automobile  
(Continued on page 1096)

## CORINTHIAN MOTORS FORMED

PHILADELPHIA, Nov. 28.—The Corinthian Motors, Inc., this city, incorporated under the laws of Delaware, will manufacture the Corinthian, a 4-cylinder passenger car equipped with a Wisconsin motor. The company is directed by Charles B. Lewis, president and engineer, formerly of the Lewis Motor Truck Co. of San Francisco, builder of the Lewis truck.

## Will Build Knight Engine 20 in Pontiac

Operations at Elyria Plant Will  
Be Continued for Other  
Models

TOLEDO, Nov. 29.—Gradual realignment of production and scaling down of costs is seen in the announcement of Vice-President Charles B. Wilson of the Willys-Overland Co., here that all model 20 Willys-Knight engines will be built in Pontiac, Mich., at the plant of the Wilson Foundry & Machine Co., a corporation which was formed and developed by Wilson as an ally of the Willys-Overland organization.

These engines have been produced in Elyria. The iron castings have been made in Pontiac and aluminum castings in Toledo. Now the whole process is brought to Pontiac. The model 88-4, of which there is not such a large demand, will still continue to be turned out at Elyria.

The change will take effect Feb. 1, 1922.

The Elyria plant will be retained by Willys-Overland Co. It was taken over from the Edwards-Knight Co., when Willys secured the Knight motor franchise. The engines for the new Knight motored Republic passenger bus will also be made at Elyria.

The Willys-Overland plants at Toledo will be closed on Dec. 15 for the annual inventory which it is estimated will not take more than two weeks this year. The results of the New York automobile show are expected to govern the production after the middle of January. Plant officials hope to get back to 750 daily production.

## Alfred Named to Assist in Directing Willys Sales

TOLEDO, Nov. 28.—Joseph H. Alfred has been appointed assistant sales manager of Willys-Overland, Inc., a position newly created. He will have direction of the operations of the branches of the company and of general sales promotion and sales development work throughout the dealer organization.

Alfred has been assistant comptroller of the company for the last two years and during the three years previous served as Willys-Overland traveling auditor.

F. H. Thompson, formerly traffic manager of the company, will continue to act as direct assistant to A. C. Barber, sales manager. Leo I. Longfellow, manager of the car order department, has had his field of duties greatly extended.

## Navy Advertises Old Battleships

### Ford Has Proposed to Buy Vessels to Obtain Metal from Them

WASHINGTON, Nov. 28—Efforts of the Navy Department, through a canvass of steel makers, shippers, builders and scrap dealers of the country to organize a large salvage company for the purpose of salvaging old war vessels, has renewed interest in the recent efforts of Henry Ford to purchase these vessels.

The automobile manufacturer has made a proposal to take ships of this type for the purpose of dismantling them and using the metal in the manufacture of tractors and automobiles. While the proposal has not yet assumed definite form, the Navy Department already has begun an advertising campaign to dispose of a large tonnage of old battle ships, cruisers, destroyers, monitors and yachts. Added to this list would be four battle ships and six cruisers in the event the American proposal of disarmament is adopted.

#### Salvage Company Proposed

Recognizing that the purchase and salvage of these ships would require an enormous capital, the department has in mind the suggestion of interesting private capital to incorporate a salvage company. Whether or not Ford would be willing to enter into such an undertaking with other interests is a question, and by some is considered doubtful, but it is believed he might be ready to take a large part of these ships and do his own work of salvaging. The Navy Department does not want to engage in any of the work of salvaging itself, but is proposing to sell the ships "as is," leaving it to the salvage interests as to how the ships shall be disposed of.

In this connection, it is thought that it would be feasible to adopt the plan used in England. Under this system, the vessels are purchased for salvage, taken to shelving beaches and dismantled, the metal being disposed of to steel makers and used in the open hearth furnaces for the manufacture of steel. In addition to the steel in the vessels, there are large quantities of non-ferrous metals, such as copper, and also high grade Scotch boilers and machinery. While some of the latter is not of a commercial type, part of it can be used in industrial plants.

## Yellow Cab Doubles Production Schedules

CHICAGO, Nov. 28—The manufacturing program of the Yellow Cab Mfg. Co. for the year 1922 will be double that for the year 1921. The company states that this increased production schedule and greater efficiency on the part of employees enable it to reduce prices on its taxi-

## BUSES CARRY 15,000 MONTHLY IN TOLEDO

TOLEDO, Nov. 28—Motor buses on Toledo streets are carrying approximately 15,000 passengers a month at the present time. There are nearly 70 buses in service. Many developments are expected in the next few months.

cabs, effective Jan. 1, 1922. No orders are being accepted for delivery during the months of November and December. Deliveries are being made, however, on orders already on file.

Cash prices on Model O, five-passenger brougham taxicabs, effective Jan. 1, according to the number purchased, are as follows:

Cabs		Chassis	
1 to 10.....	\$2,340	1 to 10.....	\$1,440
11 to 25.....	2,290	11 to 25.....	1,390
26 to 50.....	2,240	26 to 50.....	1,340
51 and up....	2,200	51 and up....	1,300

The new prices represent a reduction of \$400 on fleet orders. Prices of extra equipment have also been greatly reduced and in some instances extra equipment has been included as regular. Special Timken-Detroit axles and Continental engine are used on the cars.

## Body Builders to Hold Exposition in January

NEW YORK, Nov. 28—The Automobile Body Builders Association will put on a motor car body exposition in the Twelfth Regiment Armory, this city, Jan. 9 to 14. Although the show will run concurrently with the national automobile show it will have its own distinctive features. One of the purposes will be to visualize the economic importance of the body builders as a group. Another will be to make it easier for automobile manufacturers by drawing up practical specifications, and also easier for the body engineers to adopt the most advanced ideas.

The exhibits will be confined to commercial and passenger car bodies and to the materials used in fabricating them. Bodies of every type will be shown. Some will be finished and trimmed while others will be unfinished, making possible an examination of framing, metal-ling and other constructive features. A large number of entries for the show already have been received.

#### HOLM RADIATOR BANKRUPT

MILWAUKEE, Nov. 28—The Holm Radiator Corp., manufacturer of radiators for passenger and commercial cars, tractors, farm lighting plants, etc., has been declared a bankrupt, and Victor L. Gleans has been placed in charge of affairs as trustee. Liabilities are given as \$36,118 and assets of \$67,244 are claimed. The concern was established about 18 months ago. H. H. Holm is president and W. V. Simmons secretary.

## Court Approves Sale of Portage

### Seiberling Purchase of Plant Goes Through Following Action of Stockholders

CLEVELAND, Nov. 28—Following the action of stockholders in withdrawing their petition of protest, Federal Judge D. C. Westenhaver in this city has approved the sale of the Portage Tire & Rubber Co. to Frank A. Seiberling, president of the Seiberling Rubber Co., a \$55,000,000 Delaware corporation.

#### Stockholders Agree

AKRON, Nov. 28—Stockholders of the Portage Tire & Rubber Co., who protested against the sale of the company to Frank A. Seiberling have withdrawn their petition and agreed to the sale. It is stipulated that Seiberling shall set aside \$750,000 worth of stock in the recently incorporated Seiberling Rubber Co. and to hold this stock 30 days subject to purchase by Portage stockholders on the basis of two shares of the preferred and five shares of the common for \$250.

Seiberling will pay \$800,000 for the Portage plant and will buy the inventory at its appraised value of nearly \$1,000,000. He will incorporate the Portage company for \$800,000 preferred and \$750,000 common and also will incorporate the Lehigh company at New Castle, Pa., for \$750,000 common. Production of the new Seiberling tire will be started within 30 days.

#### Asks to Sell Stock in Ohio

COLUMBUS, Nov. 28—The Seiberling Rubber Co., of which Frank A. Seiberling, former president of the Good-year Tire & Rubber Co. is the head, today applied to Arthur L. Stewart, commissioner of securities, for authority to issue and place on sale \$5,000,000 in preferred stock and 500,000 shares of no par common.

Commissioner Stewart has dispatched examiners to look over properties at Akron and New Castle, Pa., which Seiberling proposes to purchase with money raised from sale of the stock.

## Mitchell Down 10 Days for Inventory Taking

RACINE, WIS., Nov. 28—The Mitchell Motors Co., Inc., has reduced its force from 60 to 70 per cent for about ten days in order to facilitate inventories and balancing of stocks. Usually this recess is not taken until about the middle of December. It is expected that former schedules will be resumed the early part of the month.

The new model of the Mitchell Six, known as the F-50, is regarded as the best product the factory has ever turned out and is meeting with an excellent response among distributors and dealers.

## New Foreign Cars Reach Far East

### Italian, German and French Makers Conduct Vigorous Sales Campaign

LOS ANGELES, Nov. 28—European automobile manufacturers, especially the makers of Italian, German and French cars, are directing vigorous sales campaigns in the Far East and are meeting with considerable success, according to W. J. Grinnan, trade emissary of Pacific Coast interests, who recently returned from a year's tour of Japan, China, Straits Settlements and the Dutch East Indies. While American cars have a very firm hold in the overseas Pacific markets and enjoy a very good reputation, the stiff European competition that is developing threatens to cut materially into the American trade.

#### Germany Ships Opel

In Japan, Grinnan says, the prohibitive sales tax imposed last April has almost completely stopped the sale of the large high priced cars. Automobile dealers and owners are organizing vigorous opposition to the high taxes and it is now considered likely that they will be modified.

The first shipment of Opel cars from Germany was received in Tokio recently and created wide interest. The Opel is described as of typical German production, very solidly made, with transmission amidships, transmission brake, and both torque tube and radius rods. Japanese enclosed bodies will be fitted.

The large Italian car, Isotta-Fraschini, fitted with the first eight-cylinder-in-line engine to be seen on the Japanese market, was recently imported by a Tokio firm. The Isotta is declared to be one of the best Italian cars, and the eight-cylinder model is fitted with four-wheel brakes and other modern refinements.

#### Fiat Goes into Japan

The Fiat Co. is reported to have shipped about 100 automobiles of different types into the Japanese markets during the last few months. A. J. Sutermeister, general agent for the Far East of the Fiat Co., is quoted as saying that his company at present is paying much attention to turning out open cars, usually four seaters, which can be placed in the Japanese market at the price of about 5000 yen.

The new Eco, expressly designed for the Australian market, is receiving considerable notice not only in Australasia but also in the Far East. The car was especially designed to meet high temperatures, bad roads and lack of available water for re-filling the radiator during long trips. Also, the high cost of gasoline in Australia has been taken into consideration. The new car has an improved and enlarged cooling system, better springs, ample water capacity and is declared to be more economical to operate than the average auto-

## HIGHER FREIGHT RATES WILL FORCE TRUCK USE

ATLANTA, Nov. 28—Leading sand and gravel dealers of the Southeast testifying before the Georgia Railroad Commission here in the hearing for increased freight charges, declared that if rate increases are permitted the carriers the sand and gravel industries of the State will have to use motor trucks entirely for transportation. The increases sought would make freight charges in excess of the value of the material if granted.

mobile. The Eco has been assembled of American parts and it is planned to make future assemblies in Australia, using American components.

## Studebaker-Wulff Buys Business of Rotary Tire

ZANESVILLE, OHIO, Nov. 28—The Studebaker-Wulff Rubber Co. has purchased the Rotary Tire & Rubber Co. which has been in the hands of a receiver. The creditors will be paid in full and Rotary stockholders will have an opportunity of taking stock in the new company.

While the debts of the Rotary Tire & Rubber Co. will be paid in full by Studebaker-Wulff, they will be deferred over a period of five years. The plant will begin producing tires about Dec. 1.

Peter E. Studebaker is president of the company. The vice-president and general manager is B. F. Wulff, formerly assistant district manager of the Kelly-Springfield Tire Co. at San Francisco and Chicago. H. C. Buchanan, director and superintendent, was formerly production superintendent of the Akron plant of the Kelly-Springfield Tire Co. The secretary and export manager is F. A. Rendon, previously export manager for the Lee Tire & Rubber Co.

The Rotary Tire & Rubber Co. was organized in January, 1918, and equipped a factory in this city for the manufacture of both pneumatic and solid tires. Before the plant was well into operation the post-war readjustment began to effect them adversely and they were thrown into receivership.

## Old Timers to Dine in New York on Jan. 9

DETROIT, Nov. 28—The Old Timers' Club, which was reorganized last year during automobile show week in Chicago, will hold its first annual New York dinner on Monday evening, Jan. 9. This meeting promises to be a distinct novelty, since the "S. S. Flotilla," restaurant, at 55th Street and Sixth Avenue, has been engaged exclusively for the Old Timers and their guests, and all speeches and other forms of banquet forensics are barred.

## Starts to Revise New Revenue Law

### New York Senator Introduces Bill to Create Tax Commission

WASHINGTON, Nov. 28—Enactment of the tax bill at the extraordinary session of Congress has proved such a disappointment that already a movement is under way to set it aside next year by another revision of internal revenue laws. Senator Calder of New York has introduced a bill to create a tax commission in this country which would be empowered to study the whole question of internal taxation and report to Congress at the earliest possible moment.

This commission would be authorized to investigate the effect upon Federal revenues of tax-exempt State and municipal securities, and possible methods of Federal taxation of such securities; to investigate the effect of the existing differences in law between the Federal taxation of individuals and partnerships and of corporations; to investigate the taxation of expenditures and the reduction of the tax rates upon savings, as means of raising revenue, stimulating thrift, and redistributing the burdens of taxation; to investigate the effect of income and profits taxes upon the accumulation and investment of liquid capital; and to make from time to time such recommendations as it deems advisable pursuant to such investigations and to report on or before the first Monday in December of each year to the President of Congress as to its activities.

It is significant to note that Senator Calder told his associates that "the tax bill is a disappointment to the people of the country, particularly the men who have looked forward to its enactment in the hope that it would inspire the business men of America to renewed activity."

## Martin Urges Guides to Aid Night Flyers

CHICAGO, Nov. 28—Glenn L. Martin, president of the aircraft company of Cleveland, bearing his name, in an address before the Chicago Rotary Club said that some kind of government aid to aviation was needed.

"We need airplane signals or lighthouses every 15 miles to guide night flyers," Martin said. "Within 15 years airplanes will be going between all our larger cities at a speed in excess of 100 miles an hour, with a death rate no higher than that of the railroads at the present time."

"The motor truck uses between four and six gallons of fuel an hour and travels about 15 miles carrying a load equal to half of its own weight empty. This is about 50 per cent efficient. Airplanes are now 40 per cent efficient, measured by the same standard, using as much as 20 gallons of fuel an hour, with an average speed of 100 miles an hour. Soon it will take only 7 hours to fly from Chicago to New York."

## Goodrich Makes Big Cut in Inventories

Also Reduces Bank Indebtedness in Nine Months—Goodyear Current Assets \$67,000,000.

NEW YORK, Nov. 29—In the first nine months of this year inventories of the B. F. Goodrich Co. were reduced from about \$72,000,000 to \$38,000,000. This reduction necessitated increased production to maintain adequate inventories in finished products.

During the same period the bank indebtedness has been reduced by over \$23,000,000, and it is expected that the company will have entirely liquidated this indebtedness by the end of the current year. The company's balance sheet as of Sept. 30, 1921, shows current assets and liabilities as follows:

Assets: Cash in bank and on hand, \$2,298,041; United States Liberty Loan and Canadian Victory bonds, \$41,242; bills receivable, \$978,872; trade accounts receivable, after deducting reserve to cover doubtful accounts, discounts and allowances, \$19,524,219; other accounts receivable, \$433,943; raw materials, partly manufactured and finished stock, \$38,294,325; total, \$61,570,642.

Liabilities: Bills payable, \$5,900,649; accounts payable, \$3,994,555; sundry accrued liabilities, \$1,875,234; total, \$11,770,438.

Since the period noted, the company states it has been able to increase its cash balance to approximately \$3,500,000 and has reduced its bills payable to about \$3,100,000 as a result of additional inventory liquidation. Notwithstanding the reduced volume of business the company expects to make a satisfactory showing of its earnings for the year.

### Goodyear Balance Sheet

Balance sheet of Goodyear Tire & Rubber Co. as of Sept. 30, 1921, showed current assets of \$67,000,000 or \$10,000,000 in excess of \$57,500,000 aggregate bonds and debentures outstanding. Under sinking fund provisions of these securities the \$57,500,000 liabilities which they now represent will be turned into that much added book value, approximately \$60 a share, for the common stock.

From profits each year the company must take sufficient funds to retire \$1,500,000 first mortgage bonds and at least \$1,363,600 of the debentures. Interest saved on the debt thus retired must be used to purchase prior preference stock at not over 110.

In 10 years more than \$30,900,000 of value should be added to common stock through retirement of prior liens. This would be equivalent to \$35 a share on the 885,474 shares of no par common stock outstanding.

### WELBORN CORP. FORMED

KANSAS CITY, Nov. 28—The Welborn Corp. has been incorporated under the laws of Delaware for \$4,000,000, of which \$1,500,000 is preferred stock and

has acquired the business of the Coleman Tractor Co. Frank I. Welborn is president of the corporation. The other officers are Earl L. Woods, long associated with tractor manufacturers, vice-president and general manager; Arthur Coleman, originator of the Coleman tractor, secretary, and Louis N. Burns, for thirty years identified with tractor work, merchandising counselor. They, with Roland Hughes, constitute the board of directors.

## Indiana to Investigate Standard Oil Co. Rates

INDIANAPOLIS, Nov. 29—U. S. Lesh, attorney general of Indiana, has determined to institute an investigation of the Standard Oil Co. under a complaint that the corporation is selling gasoline on a smaller margin of profit here than elsewhere and at a price lower than independents can meet with the purpose of stifling competition.

The chief question at issue is whether the Standard Oil Co. established a 1-cent profit margin instead of 2-cent as had been its practice and that of independents because of the superiority of its marketing organization or as a direct attempt to stifle competition. The inquiry will determine whether State and national anti-trust and restraint of trade laws have been violated. If a special investigator finds cause for action Lesh will confer with the Federal authorities and ask their co-operation in legal action which will be instituted.

## Majority of Tire Makers Oppose Mileage Guarantee

NEW YORK, Nov. 29—Eighty-six tire manufacturers representing more than 90 per cent of the total production in this country have given their approval to the recommendation of the executive committee of the tire manufacturers' division of the Rubber Association of America for the elimination of mileage guarantees and the substitution of the new form of warranty.

There has been considerable speculation concerning the probable course of the B. F. Goodrich Co., which was one of the pioneers in the mileage guarantee movement but this company is one of those which have approved the warranty plan and the elimination of guarantees.

## Plant Used by Packard for Testing to Be Sold

DETROIT, Nov. 30—The plant formerly occupied by the Packard Motor Car Co. for testing Liberty engines will be sold at auction to-day together with a large store of materials and complete power house equipment. The plant consists of three one-story, concrete buildings containing 60,000 sq. ft. of floor space and 200,000 sq. ft. of concrete-paved yard space with a loading platform on the Michigan Central Railroad. The material to be offered includes a large quantity of steel of various kinds.

## Says Lincoln Owes \$4,500,000 Taxes

Government Files Claim Growing Out of Manufacture of Airplane Engines

DETROIT, Nov. 28—Through the collector of internal revenue in Detroit, the United States Government has filed in the office of the clerk of the United States District Court, in which the Lincoln Motor Co. receivership proceedings are pending, the claim of the Government for \$4,500,000 additional income and excess profits taxes.

Ralph Stone, president of the Detroit Trust Co., receiver, explains that this claim is based upon profits of the Lincoln Motor Co., a Michigan corporation, arising out of the manufacture of Liberty airplane motors during the war. The Lincoln company already has paid to the Government \$4,126,000 taxes on these profits, this sum having been arrived at by agreement with the War Department.

### Expect Deductions Allowed

However, the Treasury Department reopened the case, says Stone, "and without admitting the settlement made by the War Department, is making claim for these additional taxes without reference to the allowance for amortization of the plant and other property agreed to by the War Department.

"Subsequently, the Lincoln Motor Co. of Delaware was organized to enter the automobile manufacturing business, and took over the property of the old company and assumed its debts. It is the position of the present Lincoln Motor Co., and likewise its receiver, that the matter of the government profits tax is settled and adjudicated and that the agreement with the war department is binding.

"A few days ago the receiver and its attorney made representations to the commissioner of internal revenue and his solicitor in Washington and arranged for a hearing in the matter, which will be held as soon as the present appraisal of the property by appraisers appointed by the United States District Court is finished.

"The receiver believes that when the facts respecting the value of the property in 1918 and at this time are laid before the commissioner, the treasury department will allow the deductions admitted by the war department and that the present additional claim will then be practically wiped out. The receiver also takes the position that whatever claim is finally established, if any, is a general claim against the assets of the present Lincoln Motor Co."

### Ancillary Receiver Named

WILMINGTON, DEL., Nov. 28—William H. Joyce of Dover, Del., and the Detroit Trust Co. of Detroit, Mich., have been appointed Delaware receivers for the Lincoln Motor Co. of Detroit, a Delaware corporation. The appointment was made in the United States District Court on the application of William H. Murphy, a stockholder, and indorser of the company's paper.



## Hoover Outlines Department Plans

### Meets with Business Paper Editors—Discusses Government Publications

WASHINGTON, Nov. 28—Plans of the Department of Commerce to increase its usefulness to American business were outlined to-day by Secretary of Commerce Hoover and Dr. Klein, head of the Bureau of Foreign and Domestic Commerce at a conference of these officials with members of the National Conference of Business Paper Editors, of which AUTOMOTIVE INDUSTRIES is a member.

Forty-six business paper men, including a number of publishers, spent several hours in conference with Secretary Hoover and his commercial assistant and also with Fred M. Feiker, assistant to the secretary. Discussion centered on *Commerce Reports* and *Survey of Business*, two publications of the department.

*Commerce Reports*, which formerly contained reports from United States consuls and commercial attachés in various parts of the world, is being steadily improved in its usefulness to American business by getting better field reports from the department representatives abroad and by technically editing these reports when they are received. Circulation of this publication is now about 12,000 a week and it is desired to build it up to 25,000 or 30,000.

#### Editors Make Suggestions

*Survey of Business*, which has been coming out monthly with indexed tables of conditions in various business and industrial lines, is to be given more of an editorial than a statistical character from now on except that each third issue will carry for a quarterly period the statistical information previously carried every month.

The editors made a number of suggestions for improving both *Commerce Reports* and *Survey of Business* and Secretary Hoover and his assistants agreed to carry them out.

Secretary Hoover gave some interesting information about the activities of the commodity chiefs of the department appointed under the new administration to study American industrial and commercial conditions and co-operate with industrial and commercial leaders in improving them. These commodity chiefs are spending fully half their time in the field conferring with and assisting men in industry.

As an evidence of the demand for assistance from the Government in directing individual business affairs, he said that trade inquiries are now averaging 1000 a day.

#### COLLEGE STARTS COURSES

LANSING, MICH., Nov. 28—The department of farm mechanics of the Michigan Agricultural College will give four

truck and tractor courses this year each of which will be divided into four units of one week each. The subjects taken up will be gas engines, tractors, ignition and electricity, and trucks. Two hours a day will be devoted to lectures and discussions and five hours to laboratory work. The dates for the courses follow: Nov. 28 to Dec. 23, Jan. 9 to Feb. 3, Feb. 6 to March 3, March 6 to March 31.

### Wetmore-Reamer Sells Controlling Interest

MILWAUKEE, Nov. 28—The principal owners of the Wisconsin Tool & Supply Co. have acquired the major interest in the Wetmore Reamer Co. and consolidated offices and operations at the Wetmore plant in this city. The merged concerns will continue under the name of Wetmore Reamer Co. Officers are: President and general manager, Edward J. Waltzer; vice-president, Charles G. Forster; secretary, Charles F. Puls, Jr.; treasurer, Carl A. Forster; general superintendent, Edward D. Johnson.

The Wetmore company will continue to specialize in the production of expanding reamers for high speed and quantity output work, adding a line of expanding machine reamers under 1 in. which have been developed under the new management within the last six weeks. The manufacture of tools, dies, jigs, fixtures and thread gages will be continued as well, with additions to the line developed by the Wisconsin company's engineers, who remain associated with the enterprise in its consolidated position. The Wetmore company is about to undertake an aggressive sales campaign in all automotive and machinery manufacturing centers of the United States.

### Conditions Spotty in Chicago District

CHICAGO, Nov. 28—Business conditions in the automobile industry in the Chicago territory, including the northern half of Illinois and a section of Indiana, Michigan, Iowa and Wisconsin vary widely.

Conditions in Illinois are dependent upon the banks, some of which have plenty of money and are backing the dealers. Banks in the villages appear to be loaded up with paper and are not in position to finance farmers regardless of how well secured they may be. In the northern end of Illinois, where dairying is the chief industry, conditions are unusually good.

City conditions are especially encouraging. There are many instances where dealers are entirely sold out, while there are others where dealers have a number of used cars on hand.

#### MAIBOHM SALE POSTPONED

TOLEDO, Nov. 29—The reorganization sale of the Maibohm Motors Co., which was to have been held to-day, has been postponed until Dec. 12 because of the filing of a Federal tax claim.

## Fisher Body Plant Opens in Cleveland

### New Unit of General Motors Represents Outlay of \$10,000,000

CLEVELAND, Nov. 29—What is generally regarded as one of the most important developments of the year in the automobile industry here came with the announcement that production had been started in the mammoth plant of the Fisher Body Ohio Co.

This mammoth plant, which is controlled by the General Motors Co., has been in course of construction for many months and it represents the expenditure of approximately \$10,000,000. The plant is situated in the eastern part of the city, near the big plants of the Chandler Motor Co. and the Cleveland Co.

The actual delivery of bodies will start this week. The week also marks the formal entry of General Motors as a production unit in Cleveland. The first completed body to come out of this plant will arrive on Wednesday, Nov. 30, and the management says that it will come through on scheduled time. The body will be delivered to the Chandler Motor Car Co., which is only two blocks away.

#### Working on Chevrolet

Chandler bodies until the present time have always been built in the Detroit plant of the Fisher Body Co. From now on they will be built in the Fisher plant here. So will all bodies for the Cleveland Co. The bodies delivered by the Fisher company will be upholstered in Chandler and Cleveland plants. These companies will require a month or so in the finishing process so that the Fisher company deliveries are scheduled to commence a month ahead of the actual 1922 schedules.

It also is understood that the Fisher plant has commenced work on the 1922 schedule of the Chevrolet company.

New departments of the big establishment are being opened every week, and it is expected that the entire plant will be tuned up for steady production by the middle of January or a little later. Actual work in the plant commenced in October and workmen were turning out material that could be supplied and for which there was urgent need. Since the time work was started material has been assembled until now all is ready for the production of bodies for the 1922 schedule.

It was learned, however, that the new plant starts out with many orders on the books and with prospects that are exceedingly bright. On account of the advantages of railroad distribution which this city offers, it was stated that bodies for cars made in cities more accessible to Cleveland than to Detroit will be transferred to this city and the Detroit plant will handle contracts on which deliveries can be made more expeditiously and with less expense than from here.

## New American Prices May Affect British

Questioned, However, If Corresponding Drop Can Be Made in View of Conditions

LONDON, Nov. 18 (*By Mail*)—Estimates of attendance at the recent Olympia and White City Motor Show vary, but there is reason to believe that it exceeded last year's attendance by about 35 per cent. On the most crowded day it was reported that 70,000 people had passed the turnstiles.

In view of the dissatisfaction resulting from holding the show in two sections it would not be surprising if a show next year were abandoned. If such a decision is made it will probably be the prelude to an alternative show every second year. Such a policy has many more supporters now than when first broached.

### Optimism Continues

Now that the show is over and people are able to estimate its results the fact is emphasized that while the dealers ordered freely actual sales to the public were relatively few. The optimism apparent at the show continues but it is more indicative of activity in outside trade than of anything that immediately attaches to the automobile trade itself.

The reason is obvious for the automobile trade reflects the state of other industries and of the national trade at large, a fact testified to recently by the failure of the truck show to elicit orders; such few as did pass being mostly from municipal and public service bodies. Reports from the car makers in the Midlands inclusive of Birmingham, Coventry and Wolverhampton point to an expectant revival of demand early in the New Year. There is the further reason for not expecting an indication of renewed activities in the trade, in the fact that makers, due to past experience, have become cautious concerning the stability of dealers' orders.

### Anticipate Overseas Demand

The great factor looked for, however, is revival of the overseas demand, and as this trade will begin to declare its value after the turn of the New Year, it is probable that the rate of exchange will then have so risen as to affect the competition of America in these markets, as well as in the British home market. To-day the Chevrolet four-five seater at £260 is the cheapest competing car in Britain, and with the present rise in the dollar-pound value, obviously it stands to gain appreciably. The effect must tend to pull down British car prices, though probably there will be little change before the season opens about the middle of March.

If American importers mark down their cars corresponding to the improved exchange, possibly this step will be hastened even before the British output is

scheduled, but considering the tight financial state of the bulk of British firms, it is a problem if a retaliating move by way of a corresponding price drop can be possible. The hoped-for reduction of the automobile license fee and the new concession as to dating a license actually from the period it is taken out no doubt will help the home situation, but far more depends on the portents of better trade in the industries on which the car side of the industry depends for its prosperity.

## Places Responsibility on Truck Manufacturer

NEW YORK, Nov. 29—F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, has sent a bulletin to members informing them that the Connecticut highway and motor vehicle authorities have ruled that any person desiring to register a commercial motor vehicle for an increase over its rated capacity must obtain from its engineering department a certificate to the effect that in the opinion of the manufacturer such vehicle is capable of being safely operated under all conditions at all times when loaded to the increased capacity. The bulletin says:

"It is possible that the granting of such a certificate would constitute a warranty against possible mechanical failures in the motor vehicles resulting from the overloading authorized. Moreover, in case of accident arising from the operation of such an overloaded vehicle, the manufacturer issuing such a certificate might be liable for any injury to persons or damage to property.

"Members should further realize that by issuing such certificates they place themselves in the position of sponsoring or even fostering the overloading evil which the truck committee has been steadfastly opposing."

## Production Is Doubled on New Jordan Model

CLEVELAND, Nov. 29—The announcement of the new Jordan model, it is stated at the factory, has doubled production at the plant in this city.

The Jordan company is regulating production to meet the requirements of distributors, thus preventing an accumulation of finished cars. The production for October and November will exceed by 30 per cent the total production of the third quarter of the year. Confirmed orders from distributors indicate that production for the fourth quarter will be about twice that of the third quarter.

### POSTPONE BETHLEHEM HEARING

PHILADELPHIA, Nov. 28—The hearing in the application of Calvin E. Woods, receiver for the Bethlehem Motors Corp., for permission to sell the plant at Allentown, Pa., before Judge Dickinson in United States District Court this morning, was postponed until Dec. 7, at 10 o'clock. In the meantime, it is expected that there will be a meeting of creditors of the corporation in Allentown.

## Milwaukee Industry Shows Few Changes

While There is Tendency Toward Decline Some Manufacturers Increase Sales

MILWAUKEE, Nov. 28—"Although the general tendency during the last three to four weeks has been toward a falling off in production and sales, one Milwaukee concern making motor vehicle power plants reports a 20 per cent gain in sales in this period, and another making automotive parts a smaller increase for the period, but a gain of 133 per cent over the corresponding period of 1920." says the current issue of *Business and Financial Comment*, issued monthly by the commercial service department of the First Wisconsin National Bank, Milwaukee's largest bank. It continues:

"The manufacturing and business situation in Milwaukee presents few important changes since last month. The number employed in the metal trades, 25 firms reporting, decreased from 9935 in September to 9541 in October, but in November there has been a gain of 2 to 3 per cent. A slight improvement has taken place in iron and steel castings.

"The number of men employed in metal working industries other than iron and steel increased 21 per cent, indicating that a substantial improvement is going on here. It is quite apparent from a survey of Milwaukee industries that the stocks being carried by manufacturers are within the limits that the volume of sales warrants. Makers of iron and steel products are carrying stocks averaging three to four times current monthly sales, which is a normal proportion for the industry."

### Weather Affects Sales

Retail sales were unfavorably affected in the last week to ten days by the first prolonged spell of freezing temperatures this winter, which was accompanied by light snows. As usual, this has been discouraging to many prospective buyers, for in previous years, when the season was open until December, November sales were always of fair proportions, while reactions, such as this year, invariably followed similar climatic conditions.

Enclosed car business is holding up well and sustaining former ratios to open car trade. The effect of enclosed car week is abiding. Trade admittedly is quiet, but generally speaking, dealers express themselves as satisfied because activity is of greater proportions than most of them had expected.

### TO USE SEVERIN INVENTORY

KANSAS CITY, Nov. 28—The Metropolitan Motors Corp., organized to take over the assets of the old Severin company, has decided to use the inventory on hand in the manufacture of cars. It is understood there are on hand enough parts to make 300 cars which will be sold for about \$900 cash.

# Parts Makers Join in Service Plan

## Will Open Stations Early in New Year

### Cost of Maintenance Will Be Borne by Manufacturers Who Participate

DETROIT, Nov. 29.—A combined parts service plan will be inaugurated soon after the first of the year by the leading unit parts makers. The preliminaries of the plan have been practically completed and definite steps are being taken to locate satisfactory service stations in the larger cities of the country.

Uniting in the plan will be at least one manufacturer of each important unit entering into the construction of a motor vehicle. A second manufacturer of any unit can join in the movement only with the consent of the first company to accept the plan. The cost of maintaining the stations will be borne proportionately by those participating.

### To Carry Complete Stocks

The purpose of the plan is to provide general parts for all replacements and to supply them with the least possible delay. Stations and substations will be so located that any unit will not be more than six hours distant from any place in the United States. Each station will carry a complete stock of all parts used in motor vehicles with particular attention to those subject to the hardest wear.

Prices on the parts will be fixed by the factories and will be uniform in all sections except for differences resulting from shipping costs to points far removed from the factories. Field men will keep in constant touch with the stations to see that stocks and prices are maintained as required by the factories.

The principal stations will number about 40 and each will have six substations. This would mean a total of 280 stations in operation under the plan. Each will be locally owned and operated except for the conditions as to prices and stocking set up by the unit parts makers.

In planning the inauguration of the new service system, the factories are working in close co-operation with the manufacturers in specialized unit vehicles.

### DODGE ESTATE REDUCED

DETROIT, Nov. 30.—Taxes and unpaid bills will reduce the estate of the late John F. Dodge from an approximate value of \$26,000,000 to \$15,000,000, according to Edward A. Barnes, a trustee,

who testified before Judge Richter in connection with the settlement of the estate.

The court declared legal the settlement of the protested will which had been agreed upon by the heirs outside of court. By this agreement, John Duval Dodge will receive \$1,600,000 in cash. Payments of \$1,000,000 each will be made to Mrs. Matilda Dodge, the widow; Winifred Dodge Grey, Isabel Dodge Sloane, Frances Matilda Dodge and Daniel George Dodge, either in cash or property.

## Manufacturers Prepare for Post-Show Business

(Continued from page 1086)

It is becoming apparent that buying is less on a hand-to-mouth basis than it has been for some time. This bespeaks confidence in the future, but it means primarily a belief that prices of most of the materials which go into the manufacture of motor cars are as low as they will go for some time, at least. The stronger manufacturers have liquidated much of their past due merchandise indebtedness and are discounting current bills.

The feeling is growing that the industry is getting pretty well shaken down. Companies in a comparatively strong position soon will go ahead while those which are weakest will succumb. It is likely another year will see a material reduction in the number of companies in the field. This applies both to passenger car and truck makers. Several are in a precarious position at present. While there will be failures, there also will be combinations and consolidations.

Bankers are practically unanimous in their contention that there are too many companies in the field. They have unkind things to say about the business acumen of the industry. It will be harder in future than it has been in the past to get bank backing for new automotive enterprises. Pooling of resources will be fostered by bankers both in the automobile and tire fields. They see ahead a period of exceedingly keen competition with a survival only of the fittest.

### BRAENDER RECEIVERSHIP LIFTED

RUTHERFORD, N. J., Nov. 28.—Judge Charles F. Lynch in the United States District Court has discharged the receivership under which the Braender Rubber & Tire Co. has been operating. The company has been incorporated for \$1,100,000 and is increasing its tire production 66 2/3 per cent and tube production 400 per cent.

## Receiver Appointed for Gary Motor Truck

### Petition Charges Company Is Insolvent—Plant May Be Reopened Soon

GARY, IND., Nov. 30.—G. H. Semmes of this city has been appointed receiver of the Gary Motor Truck Co. upon a petition filed by William H. O'Donnell, owner of 125 shares of preferred stock valued at \$12,500. The receiver was named by Judge Crites of the Hammond Superior Court. His first official act was to close the plant here and announce that it will remain closed until he can "get a line on the business."

The company, which was incorporated in Indiana in 1915, has a capital of \$1,000,000 in common, of which \$615,000 has been issued and \$75,000 in cumulative preferred. The capacity of the plant is 10 trucks a day.

The petition charges that no dividends have been paid for a year, that the company is insolvent and that it is unable to pay insurance or taxes. The books show a loss of \$80,000 from Jan. 1, 1921, to Oct. 31. It is asserted that the company is unable to pay its debts and that \$50,000 is due on a mortgage. The company made six trucks in October and sold only eight.

Frank Dawson is president of the company.

Notwithstanding the court order, it is believed here the plant will reopen in a short time. F. R. Schaaf, bank president and president of the Gary Chamber of Commerce, has announced that his organization will support the company officials in efforts to resume operations.

## Robert McLaughlin Dead: Founded Carriage Company

DETROIT, Nov. 30.—Robert McLaughlin, founder of the McLaughlin Carriage Co., Ltd., at Oshawa, Ont., which later became the nucleus of the General Motors of Canada, Ltd., is dead at his home in Oshawa.

The carriage business was founded in 1869 and in 1907 the McLaughlin Motor Car Co., Ltd., was formed with R. S. McLaughlin as president and G. W. McLaughlin as treasurer. Both are sons of the pioneer carriage builder, who was a director of the company. In 1915 the carriage business was sold and the Chevrolet Motor Co. of Canada was formed with G. W. McLaughlin as president and his brother as treasurer. This company became a unit of the General Motors of Canada in 1919.

# Willys Corp. Consents to Receivers

## Concurs in Petition to Conserve Assets

Purpose to Split Corporation into  
Parts—Willys-Overland  
Not Involved

(BULLETIN)

NEWARK, N. J., Dec. 1—Federal Judge Bodine late to-day removed C. O. Miniger and Frank P. Kennison of Toledo as receivers for the New Jersey property of the Willys Corp. He continued Clifford J. Voorhis, an attorney, appointed by him Monday to serve with the other two, and appointed James Kerney, publisher of the *Trenton Times*, in place of the ones removed.

Removal of Miniger and Kennison was demanded by attorneys claiming to represent 95 per cent of the bank and merchandise creditors. They contended that John N. Willys was attempting to dominate the receivership. Judge Bodine decided that both Miniger and Kennison had a direct personal interest in the affairs of the company and for that reason would be unable to serve impartially.

NEW YORK, Nov. 30—The Willys Corp., which has been more or less of a football for conflicting interests for months, has been placed under the protection of the courts in the hope that a reorganization and refinancing plan can be worked out which will be equitable for everyone concerned.

The Willys-Overland Co., which is an entirely separate corporation, is not involved in the receivership in any way, although 30 per cent of its stock is owned by the Willys Corp. Willys-Overland is in a stronger position than it has been at any time in two years.

### Hostile Action Averted

Court action which resulted in the simultaneous appointment of the same men as receivers by Federal judges in this city and Toledo, was taken last Saturday. It was based on a friendly proceeding undertaken by the Ohio Savings Bank of Toledo, which has a claim for \$100,000. The petition was filed with the knowledge and consent of the directors of the corporation through President John N. Willys. All the directors may be said to be representative of the Willys interest. They feel that under a receivership reorganization plans can go on without being subjected to the hostile in-

## OVERLAND BUSINESS GOOD, SAYS WILLYS

NEW YORK, Nov. 30—The following statement regarding the Willys-Overland Co. was made by President John N. Willys to-day:

"The current orders received at the factory last week were the largest in number and in dollars and cents for several weeks. Our retail sales reports show that the sales by our branches and dealers all over the country were the best last week for the last three weeks, although the week included a holiday.

"Particularly gratifying are the results already secured by our wholesale sales organization in signing up dealers for the new year. In only three weeks of effort, two-fifths of our dealer representation has been signed up and \$70,000,000 worth of cars for next year contracted for with shipping orders attached.

"Yes, business is good with Willys-Overland."

fluences of individual creditors and others.

One purpose of the receivership was to conserve the assets and avert hostile action by disgruntled creditors. Action became necessary when mechanics' liens aggregating \$500,000 were filed against the big new Chrysler plant at Elizabeth. It is understood that other creditors also contemplated drastic steps.

Committees representing bank and merchandise creditors, first and second preferred stockholders, have been struggling vainly for months to hit upon some plan of reorganization which would be mutually satisfactory. This task has been complicated by the provision in the first preferred stock that the consent of 75 per cent of the holders must be obtained before any lien can be placed on the assets of the company.

The corporation has been virtually in the hands of its creditors for months. The most powerful group has been that of the banks, headed by E. R. Tinker of the Chase National of New York. This committee has made no secret of its belief that a receivership was inevitable unless the preferred stockholders agreed to the issuance of some form of bonds or notes.

It had been understood that Kuhn, Loeb & Co. were about ready to loan \$15,000,000 with the Elizabeth plant as the main part of the security. Negotiations had progressed so far that it was

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## Start Conferences for Reorganization

Receivers Meet With Federal  
Judges Relative to Adminis-  
tration—Bond Fixed

NEW YORK, Nov. 30—Receivers Miniger and Kennison of the Willys Corp. arrived here Monday to confer with Federal Judges Knox and Bodine concerning the administration of the receivership. Their bond has been fixed at \$50,000 by the Ohio court. Guy W. Kinney, a Toledo attorney, has been appointed a special master to marshal claims against the corporation. Clifford J. Voorhis of New York has been appointed one of the ancillary receivers in this State to handle the affairs which may develop within the southern district of New York.

The receivers already have begun what probably will be a long series of conferences with the officers and directors of the corporation as well as the bank and merchandise creditors to determine upon a plan of reorganization which will be satisfactory to all the interests concerned and which it is hoped will place the finances of the company on a substantial foundation.

### Elizabeth Plant at Fault

The Auto-Lite Corp. and the New Process Gear Corp. have not been closed at any time since the depression began and each of them is understood to have returned a substantial profit. President Miniger announced only a few days ago that the Auto-Lite Corp. would increase its force to 2100 soon after the turn of the year. Approximately 1400 workers are now employed. It is probable there will be no change in the plan of closing the plant for inventory Dec. 17, but it is expected to be idle only a short time. There has been a very material improvement in the business of the corporation recently and a large volume of orders for future business has been booked. The Auto-Lite supplies several other companies as well as the Willys-Overland Co. with starting and lighting appliances. Its sales have more than doubled in the last 90 days.

The Elizabeth plant is the cause of all the difficulties of the corporation. It was built at a cost of \$8,000,000, and was expected to employ 8000 men. After buying the former Duesenberg factory, which was almost new, the Willys Corp. gave a contract to the American Concrete Steel Co. for the demolition of the Duesenberg plant and the building of the new factory. Much of the work was done on a cost plus basis during the

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# Action Is Independent of Bankers

## Tired of Bickering, Willys Acts Himself

### Failure of Conflicting Interests to Agree on Reorganization Real Reason

(Continued from page 1094)

stated only three weeks ago that production of the Chrysler "six" would begin in the near future. There evidently was an unexpected hitch in the negotiations, however.

The bank creditors' committee, headed by Tinker and representing a very powerful financial group, had no knowledge of the proposed receivership petition, and regarded it as a defiance of them by Willys. They were taken completely by surprise and vigorously protested to Judge Knox on Monday against appointment by him as receivers of C. O. Miniger, president of the Electric Auto-Lite Corp. as well as a vice-president of the Willys Corp., and Frank P. Kennison of the Ohio Savings Bank, who were named also by Judge Killets at Toledo. Judge Knox has reserved decision on this motion by the bankers, but he announced to-day the appointment of Col. Francis G. Caffey, former United States District Attorney, and entirely disinterested, as a third receiver.

The real cause of the receivership action, it is said, was to dissociate the paying properties from the burden of carrying the plant at Elizabeth which, because of the business depression, never began production and therefore has no assets.

Judge Bodine signed an order in Federal court at Newark, N. J., to-day, directing all those concerned in the receivership to show cause why the receivership should not be vacated. One of the allegations of the persons who object to the receivership is that the Willys Corp. loaned the Willys-Overland Co. \$6,000,000 with Willys-Overland stock as security.

An involuntary petition in bankruptcy, which is not regarded very seriously, was filed against the Willys Corp. yesterday by three small creditors with claims aggregating \$1,500.

The outcome of the receivership action, it is believed, will result in the sale of the Elizabeth plant, thus reducing materially the operating expenses of the Electric Auto-Lite Corp., the New Process Gear Co. and the United States Lighting & Heating Co., and the complete divorcement of each of the component parts will follow, allowing each to operate independently.

The unlimited development of the Electric Auto-Lite Corp., which is declared by those interested in the case to

be one of the most successful and most profitable plants of its kind in the United States, is assured under the receivership. Even now, in the face of business readjustment, it is being operated at a large profit.

### Appeals to Stockholders

The following statement in reference to the receivership was made by Willys:

"The receivership proceedings brought against the Willys Corp. at Toledo should be regarded by all classes of creditors and stockholders as protective of their interests. It is, of course, much to be regretted that a receivership should be deemed necessary at all. These proceedings against the Willys Corp. do not affect the Willys-Overland Co. in any way. The Willys-Overland Co. is one of the best known automobile companies in the country and its position is sound. Its business is satisfactory under the conditions of to-day and is showing constant improvement."

"In view of the inability of the protective committee representing the creditors and stockholders of the Willys Corp. to get together on a plan of reorganization satisfactory to all, and on account of daily increasing danger of hostile action by individual creditors or others, the board of directors has deemed it best not to oppose the application of the Ohio Savings Bank & Trust Co. for a receiver. A plan of reorganization which will be fair to everybody can now be worked out under the protection of the court."

"The embarrassment of the Willys Corp. came about when it was overtaken by the business depression a year ago with its new automobile plant at Elizabeth, N. J., in an unfinished condition. I feel confident that in the remaining large value of its assets and in the proven power of its operating units it has resources with which, if given reasonable time, the corporation can take care of all its creditors and preserve substantial equities for all classes of stockholders. I particularly urge the stockholders not to sacrifice their investments, but to have patience and hold on while the situation is being worked out. The return of normal business conditions will see a great improvement in the condition of the corporation."

## Conferences Started for Reorganization

(Continued from page 1094)

war when wages and material costs were at their peak. Machinery has been installed and it was reported only a fortnight ago that production of the Chrysler Six would be started in the near future. The company had intended to bring out this car more than a year ago, but the plan was frowned upon by bankers who were heavy creditors, on the ground that the time was inauspicious. The car has been thoroughly tested and while no details concerning it have been made public, it is said to have been entirely satisfactory. This development work has cost more than \$1,500,000.

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## Overland Exports Doubled in Quarter

### Increase May Reach 175 Per Cent —December Anticipated as Record Month

TOLEDO, Nov. 28—The last quarter of this year will see a total increase of between 100 and 175 per cent in the export sales of Willys-Overland cars, officials of the John N. Willys Export Corp., now located here, believe. They base their figures on the results obtained in October and the large increase of overseas business in November. December is looked forward to as a record month for that field.

Figures at the close of the year will show that about 60 per cent of foreign business has been done in the last three months of the year.

Better international trade relations are noticeable and it is believed that this is due in no small measure to the efforts toward limitation of armaments now going forward at Washington.

"The revival of business throughout the world will not come with a rush," said John N. Willys, president of Willys-Overland, "but it may be counted upon that any reduction in armament means that more money will be released for trade. I feel sure that a successful conference at Washington will bring to Willys-Overland a wonderful increase in export trade."

### Domestic Trade Improves

Most of the recent orders have come from England, Australia, Brazil, Belgium, the West Indies and India. Most other countries showed increase in demand for automobiles.

The domestic distribution is also picking up. The company has the largest number of unfilled orders on its books for enclosed models in its history, and the 1922 orders booked for Willys-Knights show that production in these models will exceed the combined total for 1920 and 1921.

Willys announced that orders on hand will call for production of 150,000 cars next year and mean employment of 12,000 men in the plant here.

## Price of Ford Tractor Reduced \$87.50 in Peru

LIMA, PERU Oct. 31 (By Mail)—The outstanding automotive event of the month just closing is the reduction in the price of the Fordson tractor from £325 to £300. This reduction at the present rate of exchange is roughly \$87.50 in American gold. The reduction may be followed by similar decreases in various makes of automobiles, trucks and tractors.



## Willys Receivers Start Conferences

### Corporation's Attorney Appears Before Court and Consents to Receivership

(Continued from page 1095)

The complaint in the proceedings here was filed by Charles A. Frueauff of Frueauff, Robinson & Sloan, 67 Wall Street, attorneys for the plaintiff. The complaint sets forth that the Ohio Savings Bank & Trust Co. holds a 90-day note of the Willys Corp. for \$150,000, dated Oct. 12, 1920, on which the bank claims \$100,213.90 is due and payable with 6 per cent interest since Jan. 10.

#### Indebtedness \$10,000,000

The complaint puts the aggregate indebtedness at not less than \$10,000,000 and not in excess of \$14,000,000. On account of the present general financial depression and particularly by reason of the condition of the automobile industry, the plaintiff says, the defendant is unable to operate its factories except to a limited extent, there being no outlet for the entire production capacity, and that the defendant having on hand a large inventory of raw, partly manufactured and finished product, has not sufficient cash to meet its liabilities as they mature, although the fair value of the assets is greatly in excess of the total amount of liabilities.

The complaint asked that the same receivers appointed for the property in Ohio be appointed here, and that they be authorized to continue the operation of the company's plants and business at the orders of the court. It also asked that, pending the suit, the officers, employees, stockholders and creditors of the company be restrained and enjoined from interfering with the management.

#### Includes Various Interests

The Willys Corp. was organized in August, 1919, under the laws of the State of Delaware. It was formerly known as the Electric Auto-Lite Corp., and in addition to its own plants acquired the business of the New Process Gear Corp. of Syracuse and the Duesenberg Motors Corp. of Elizabeth, N. J.

The corporation also owns practically all the stock of the United States Light & Heat Corp. of Niagara Falls, which manufactures U.S.L. batteries. Miniger is president and general manager of this company as well as Auto-Lite. In addition, the corporation owns a large block of the capital stock of the Fisk Rubber Co.

Estimated balance sheet, as of March 1, 1921, showed total assets of about \$18,500,000. Of this approximately \$23,000,000 was considered current, and included \$11,064,000 securities of other companies. Among these securities were \$1,000,000 par value Fisk Rubber common stock, \$1,000,000 par value Federal Rubber preferred stock, and approximately 730,000 shares of Willys-Overland common carried at \$8 a share. At current prices, around \$5 a share, the shrinkage in

value of Willys-Overland holdings approximates \$2,000,000. Other current assets included \$7,220,000 inventories, and \$3,800,000 notes and accounts receivable. Property account aggregating \$16,000,000 showed the Elizabeth project carried at \$10,214,000, Syracuse plant at \$2,640,000, and Toledo works at \$3,213,000. Good will and patents were valued at \$890,000.

Current liabilities totaled \$14,432,000. They comprised \$11,235,000 notes payable; \$1,362,000 accounts payable; \$1,456,000 acceptances payable and \$379,000 of miscellaneous current liabilities.

Officers of the corporation are J. N. Willys, president; W. P. Chrysler, J. R. Harbeck, J. A. Smith and C. O. Miniger, vice-presidents, and E. P. Decker, treasurer. The directors include J. N. Willys, J. R. Harbeck, C. O. Miniger, J. E. Kepperley, C. B. Mertz, S. A. Strom and W. P. Chrysler.

Several protective committees were formed months ago to look after the various interests in the corporation. C. B. Page of Brooklyn heads a merchandise creditors' committee; E. R. Tinker of the Chase National Bank is chairman of the bankers' committee; Howard Bayne heads a first preferred stockholders' protective committee, and Arthur O. Choate a second preferred stockholders' protective committee.

### Crossley Motors, Ltd., to Produce Bugatti

LONDON, Nov. 22 (By Mail)—The recent report that Willys-Overland-Crossley, Ltd., had taken over the manufacturing rights for the Bugatti cars in Great Britain was based upon misapprehension. The manufacturing rights for the Italian car have been obtained by Crossley Motors, Ltd., of Manchester. It is understood the two present Crossley models will be continued and that the Bugatti four merely will be added to the line. The English price of the small car, which it is hoped will satisfy the demand for a small car above the average, will be considerably below that of the imported Bugatti.

### Shipments Will Exceed Those of November, 1920

NEW YORK, Dec. 1—Preliminary reports received by the National Automobile Chamber of Commerce indicate that shipments of passenger cars and trucks for November will materially exceed those of November last year but will show a seasonal falling off as compared with last month. The showing is considered gratifying because November is the first month of the year to show a gain as compared to the same period in 1920.

#### WESTCOTT BUSINESS HOLDS UP

SPRINGFIELD, OHIO, Nov. 28—"Business is holding up fairly well," General Manager H. G. Root of the Westcott Motor Car Co. states concerning November trade. "November was equal to October and it was an average month."

## Say Parts Contracts Are Still Violated

### Manufacturers Complain That Many Car Makers Assume Indifferent Attitude

(Continued from page 1087)

manufacturer that he must abide by same. The world has condemned the term 'mere scrap of paper' but unfortunately many are applying that principle to their business policies."

There is a growing feeling also that the time is coming when drastic action should be taken against the comparatively few companies which have failed after many months to reduce their obligations, either in the form of commitments or past-due paper. Some material suppliers take the position that if these companies have been unable up to this time to meet their obligations they never will be able to do so.

#### Keener Competition Expected

The fear also is growing that in the numerous reorganizations contemplated by companies in financial difficulties, some of them will make an effort to "freeze out" merchandise creditors notwithstanding their disposition at all times since the depression began to follow a constructive policy.

The thoughts of parts makers as a whole in regard to the problems of the industry at this time are running along virtually identical channels. The general belief is that the volume of automobile sales in 1922 will not greatly exceed that of 1921, although there probably will be some improvement, particularly in the truck field, because of better general business conditions. The result will be much keener competition for their business.

#### Service Grows in Importance

There also is a feeling that parts manufacturers should profit by their experience of the past 18 months and select their customers carefully instead of letting customers select them. Automobile concerns which are not amply financed and in a position to fight hard for their share of business by giving purchasers good value, are likely to fall by the wayside.

Parts makers expect the coming year, beginning with the New York and Chicago shows, to develop a trend toward lighter, lower priced cars, with a return to pre-war quality and greater fuel economy, to sell at the lowest possible price consistent with a profit based on efficiency and economy of operation.

#### FORD TO HELP UNEMPLOYED

DETROIT, Nov. 28.—Thousands of idle building trades workers in the city will be given employment this winter through the plans of the Ford Motor Co. for extensions and building improvements. Edsel B. Ford, president of the company, made such a statement to Mayor Couzen's unemployment conference.

## Distribution Costs Sought in Inquiry

### Congressional Committee to Obtain Data on Transportation Facilities

WASHINGTON, Nov. 29 — Investigation into costs of distribution by motor trucks and cars will be undertaken immediately by the Joint Commission of Agricultural Inquiry of Congress. Chairman Sidney Anderson to-day announced that a committee, representing these shippers, would be appointed at an early date as one of the 44 committees of shippers named in conjunction with the executive traffic committee of railroads for the purpose of obtaining data on marketing and transportation facilities. These groups represent 95 per cent of total tonnage of land and water carriers.

In addition to inquiry into motor haulage costs, the commission wants information as to comparative freight charges from electric and water carriers. These committees have been asked to report by Jan. 1, when their work will be reviewed and analyzed by an advisory committee of 12 members. F. E. Todd, vice-president of Deere & Co., Moline, Ill., represents the agricultural implement industry.

Undoubtedly, if the commission adheres to its present policy the inquiry into motor haulage will involve costs of trucks under pre-war, war and post-bellum conditions, costs of repairs and average earnings of fleet operators, as well as individual owners.

The commission explained its attitude, as follows:

"Every phase of distribution is being investigated in relation to transportation. This investigation involves physical property, transportation service, the economic relation of transportation to agriculture, and industry, and the administration of transportation to the analysis of State and Federal laws, applying to transportation.

"A study is being made of the relation of car service and supply and the successful distribution of products, with particular reference to the condition of equipment. It can be conservatively stated that 15 per cent of the equipment of the railroads is in poor condition."

#### Believes Changes Necessary

The purpose of this inquiry, which was authorized by a special act of Congress last spring, is to apply four standard tests in an effort to measure the condition of agriculture, as compared with other industries. The inquiry will reach the purchasing power of the farmers' dollar; the absolute price of agricultural products as compared with prices of other commodities; quantity production of agriculture, as compared with quantity products of other industries; and the rewards for capital invested and labor employed in agriculture, as compared with the rewards for capital invested and labor employed in other industries.

## CONDITIONS ADVANCE STEADILY TO NORMAL

WASHINGTON, Nov. 30 — Encouraging indications of progress toward normal conditions in November are noted by the Federal Reserve Board in its review of the business and financial situation. The board says:

"The general situation of trade and industry is unmistakably more hopeful and is improving as steadily as can be expected in view of the slowness of economic progress in other parts of the world, particularly in western Europe. Another handicap to complete readjustment continues to be the failure to bring about a proper co-ordination and mutual relationship of prices.

"This is responsible for no small part of the slowness of economic recovery in certain branches of business. On the whole, the best opinion now looks to the steady, even if locally interrupted, progress back to normal conditions although no immediate or sudden expansion or boom is now in sight."

It is significant to note that the commission has found that little evidence of unreasonable breadth exists between producers' and consumers' prices. In a statement to-day, Chairman Anderson said:

"The costs of distribution were increased slowly but steadily prior to 1913. So far as we can ascertain, they have about doubled since 1913, and to-day the costs of distribution represent about one-half of prices which the final consumer pays. These increases in costs do not occur in any one place in the line of distribution. They occur as a part of the price of every element of service performed in connection with the distribution of the product, all along the line.

"This means that the spread between the producers' and consumers' prices must, for the most part, be reduced by more efficient methods of distribution; by reducing unnecessary transportation hauls; by more efficient merchandising methods; by more closely relating output to market; by speeding up turnover; by reducing unnecessary stocks, and otherwise shortening and speeding up the steps between the producer and the consumer."

#### OFFER MADE FOR PARTS PLANT

CLEVELAND, Nov. 30—The receivers of the Standard Parts Co. have received an offer of \$300,000 for the Canton, Ohio, forging plant which it was decided some time ago to place on the market. The offer is understood to have been made by Chicago interests. It will come before the Federal Court in a few days.

#### E.-B. TO SELL PLANT

WAYNESBORO, PA., Nov. 30—Plans of the Emerson-Brantingham Co. for the sale to a new \$1,000,000 company of its plant here are said to be maturing.

## METAL MARKETS

**A**UTOMOTIVE consumers are beginning to display sufficient interest in covering their steel requirements for the first quarter of 1922 to engender a steadily growing attitude of reserve on the part of producers. Beneath the surface of this jockeying of buyers and sellers for a position which later developments will bear out to have been correct, there prevails, however, considerable uneasiness on the part of producers lest too stiff a posture result in the loss of urgently needed business to more eager competitors.

Especially in the sheet market is there evidence of efforts to lift selling prices to higher levels. Undismayed by the failure which attended recent attempts to advance sheet prices, some of the leading sheet rollers seem to have concluded that what was impossible a few weeks ago will be easy of accomplishment, now that the seasonable moment for broadened demand is about to come. That the argument of prevailing market levels being lower than cost of production should once more be trotted out in support of this movement is only natural.

In the case of some mills it is undoubtedly true that the margin of profit at present sheet prices is a precarious one, but there has been ample evidence in the last year that the steam roller of economic readjustment is no respecter of the difficulties which some mills experience in paring their costs. That there should be in the steel industry, like in all others, those who believe that 1922 will be so much more prosperous a year than 1921 that they are reluctant to commit themselves on the basis of prevailing prices is a psychological condition little to be wondered at.

The nearer, however, draws the date on which we will write 1922 instead of 1921 the more forcibly is brought home the fact that a mere change of the calendar year will not bring a change in fundamental conditions and that the steel market of the first quarter of 1922 will fall heir to the ills that now beset it, at least, to most of them. Gratifying improvement continues to be maintained in the rate of steel mill operations over the 1921 low point and sane optimists in the trade are confident of further progress in the direction of normal peace-time activity. Whether such progress can be translated with impunity at this time into higher market levels is, however, a moot point not only between consumers and producers but also between the more conservative and advantageously situated producers and those whose lack of productive and financial facilities compels their seeking solace in the hope of rising prices. That the latter are pinning their faith on a quagmire is obvious.

**Pig Iron.**—Automotive foundries are sounding the market, but tonnages involved in contracts placed are light, consumers still being in a hesitant mood.

**Steel.**—Somewhat improved demand for steel bars comes from tractor manufacturers. There is still talk of 1.50c., Pittsburgh, for soft bars and 2.00c. for cold-drawn, but most of the business is for small lots carrying slightly higher prices. Strip steel demand has tapered off, but some automotive interests who have contracts at 2.00c. for the hot-rolled and at 3.75c. for the cold-rolled are specifying more freely. The sheet market is floundering.

**Aluminum.**—Small lots of imported metal are again changing hands at considerably below 18c., but the market for representative import business holds firm.

## INDUSTRIAL NOTES

**Super-Traction Truck Co.** of Fox Lake, Wis., incorporated a year ago with \$300,000 capital to build six-wheeled motor trucks, is negotiating with the new industries bureau of the Association of Commerce of Fond du Lac, Wis., with a view of establishing the permanent factory and offices in that city. The company is now operating a small shop at Fox Lake and has been effecting a limited production. A feature of the truck is the patented device by which the dual set of rear wheels is coupled.

**Mutual Truck Co.'s** plant and equipment at Sullivan, Ind., will be offered at public sale by the receiver Dec. 22. The sale will include 12 acres of land with siding to the C. & E. I. and Illinois Central railroads; a large modern brick building with steel truss roof; heating plant, machine tools, drawings, blue prints and a miscellaneous stock of materials and parts for building a 2½-ton motor truck. The First National Bank, Sullivan, is the receiver and E. D. Maple the trust officer in charge.

**Fort Smith Body Co.**, Fort Smith, Ark., with a capitalization of \$100,000, has been formed to take over and operate the Johnston Commercial Body Co. plant in that city. Incorporators are Ben Johnston, president; I. H. Nakdimen, secretary and treasurer, and J. B. McDonough. The plant manufactures truck bodies for all makes of automobiles. The company was purchased recently by I. H. Nakdimen at a sale of the assets.

**Deere & Co.**, Moline, Ill., has added small crews to its present working force, establishing a three-day-a-week shift, giving favor to old employees. The new force, it was said, is to handle some immediate work without indication that the company will return to a large production schedule.

**Hubbard Pressed Steel Co.**, Youngstown, Ohio, has obtained a contract from Durant Motors for all general stamping for its four-cylinder and six-cylinder cars. The contract involves \$500,000 and will require several thousand tons of light steel plate, blue annealed sheets and strip steel.

**Kalamazoo Tire & Rubber Co.**, established recently by L. W. Coppock, production manager for the Kalamazoo Motors Corp., is working on a production schedule of 1000 tires a month. The small force now employed will be increased early next year.

**Gold Seal Battery Co.**, Green Bay, Wis., has made permanent its informal organization of six months ago by incorporation with an authorized capitalization of \$100,000. A plant has been established and is now in production on storage batteries.

**Lance Mfg. Co.**, New York City, has opened a Pacific coast branch in San Francisco, where a warehouse has also been established. All shipments of goods for points west of the Rocky Mountains will be made from that branch.

**Kelly-Springfield Motor Truck Co.** has added to its force at the Springfield, Ohio, plant, due to increased orders. Orders received recently have been mainly from the large cities, especially from the eastern section of the country.

**Dayton Rubber Mfg. Co.**, Dayton, Ohio, reports that its 1921 business will amount to more than twice the volume transacted in 1920 and anticipates an increase next year.

**Anderson Electric & Equipment Co.**, Chicago, is now controlled by A. I. Appleton of the Appleton Electric Co., Chicago, who purchased B. J. and O. E. Grigsby's stock in it.

Lovejoy Mfg. Co. announces its removal from 1040 Commonwealth avenue to 39 Brighton avenue, Boston.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

While the trend of call money during the past week has been irregular, time money has shown an undertone of greater ease. Funds appeared to be abundant and a fairly good turnover of business was reported. Call money ranged from 4½ per cent to 5½ per cent as compared with 4 per cent to 4½ per cent in the previous week. The rate for all fixed-date maturities from 60 days to 6 months remained unchanged at 5 per cent to 5½ per cent. Prime commercial paper was again quoted at 5 per cent to 5½ per cent.

The Federal Reserve statement as of Nov. 23, 1921, showed a further increase in the total reserve ratio from 71.8 per cent to 72.3 per cent. The net gain in total reserves was \$8,760,000 as a result of an increase of \$11,328,000 in gold reserves and a decrease of \$2,568,000 in other cash reserves. Total bills on hand increased \$8,218,000, while Pittman certificates decreased \$1,500,000. United States bonds and notes increased \$359,000, while other bonds and notes decreased \$13,428,000. As a result of the foregoing changes, total earning assets showed a contraction of \$6,351,000. There was also a decline of \$8,308,000 in the amount of Federal Reserve notes in circulation.

The total gold reserves of the New York institution increased \$2,028,000 during the week. Total earning assets increased \$19,178,000 and Federal Reserve notes in circulation \$2,956,000.

During the past week the bond market was characterized by further activity and strength. A large number of transactions was reported and in many cases quotations closely approximated or exceeded previous high records. It was the experience of several investment houses that the demand for high grade bonds exceeded the supply available. On Nov. 22 an issue of 4½ per cent highway bonds of the State of Pennsylvania was sold to a syndicate of New York bankers at 104.31, this price representing a new high for the year for securities of this class.

The publication last week of price indices reflects a slight downward trend of commodity prices after a short period of relative stability.

## VICTOR PRICES REVISED

**SPRINGFIELD, OHIO, Nov. 28**—The Victor Rubber Co. has reduced its prices on cord tires 30 per cent and on fabric 22 per cent. Prices have been reduced from 3 to 10 per cent on tubes.

## DORRIS INCREASES PRICES

**ST. LOUIS, Nov. 28**—The Dorris Motor Car Co. has increased the price of its seven-passenger sedan from \$6,690 to \$7,190, effective immediately.

Truck Possibilities  
Noted in Argentina

## Foreign Manufacturers Are Already Advertising Products and Pushing Sales

**WASHINGTON, Nov. 30**—While there are at present probably not more than 2000 motor trucks in Argentina, of which 1023 are registered in Buenos Aires, as soon as business conditions begin to improve that country will offer a field with great possibilities for the sale of motor trucks of all sizes from the light delivery cars to the heaviest trucks for long hauls with heavy burdens, says a report made to the Bureau of Foreign and Domestic Commerce by Trade Commissioner George S. Brady, Buenos Aires.

## Wide Field for Use

Trucks of from 3 to 7½ tons capacity especially should find an extensive sale in the vast pampas country for hauling the grains and wool to the stations, and in the Andean foothills for hauling mica, manganese, tungsten ore, and other exportable minerals to the railroads. American passenger automobiles now almost monopolize the Argentine market, and the same will be true of the Argentine motor truck market if the American manufacturers will put forward sufficient effort at this stage, it is stated.

## The report continues:

"The present price advantage of European truck manufacturers due to exchange, and the general depressed tendency of the market has caused some American manufacturers to withdraw from the field while others have stopped their advertising and restricted their activities. This is allowing the European trucks to gain an advantage at a critical time when the public mind is actually being formed to accept truck transportation. English, German, and French trucks are being advertised and pushed at the present time. American manufacturers should make every effort to keep their trucks before the Argentine public and be content with small sales and small profits for a time in order to get a few of their trucks in the service of this country.

## Prices of Foreign Products

"With a well planned start the resulting sales in the next few years will well repay the effort as the coming market for motor trucks in Argentina will undoubtedly be very large. The present price competition to be met with by European trucks in Argentina can be judged by the following prices of European cars in Buenos Aires. To this price the American manufacturer should add freight charges and a duty of 32 per cent. The peso may be taken as equivalent to 31 cents United States currency.

	Pesos*
Dennis 2-ton.....	12,000
Dennis 3½-ton.....	14,800
Dennis 5-6-ton.....	16,000
Renault 2-3-ton.....	11,500
Renault 7-ton.....	17,000
Dixl 2-ton.....	8,400
Dixl 3-ton (chain).....	8,500
Dixl 3-ton (differential)...	9,200
Dixl 5-ton.....	10,500

\*Retail price in Buenos Aires.

## MEN OF THE INDUSTRY

Arthur C. Brauer, for the past four years assistant chief engineer and chief inspector of the Saxon Motor Car Corp., has been promoted to factory manager in charge of production, engineering and inspection. Brauer has been connected with the industry in engineering and production work since 1907, having been with the Thomas Motor Co., Ford Motor Co. and Studebaker Corp.

Gaylord A. Hoyt has been appointed assistant sales manager of the H. H. Franklin Mfg. Co., Syracuse, succeeding Ernest P. Johnson, who has resigned. Hoyt has been with the organization since the first of the year and has acted as a district manager with unassigned territory. Since April 1 he has been calling on Pacific Coast dealers.

Robert F. Brown has been appointed treasurer of the Dayton Rubber Mfg. Co., Dayton, Ohio. He has been actively engaged in the financial field for sixteen years and most recently was connected with Well, Farrel & Co., Boston, as manager of its New York branch.

E. P. Weber, former general sales manager of the Bergougnan Rubber Corp. of Trenton, N. J., has resigned from that organization, effective Jan. 12. This action is taken in anticipation of his entrance into the manufacturing tire field.

Paul Runyan has resigned as advertising manager of the Westcott Motor Car Co. and opened an insurance office in Springfield, Ohio. He is succeeded by Karl A. Heinzen, who has been acting as publicity man for the company.

Charles Addams, formerly a sales engineer with the Standard Roller Bearing Co. of Philadelphia, has become associated with the Bearings Co. of America as sales engineer in the Eastern territory.

R. R. Zimmer, formerly chief engineer of the Dupont Motors, is now connected with the Lawrance Aero-Engine Corp., as engineer, in charge of the engineering department.

Morgan Douglas, formerly manager of the Portland, Ore., Chevrolet retail branch has been appointed assistant to the zone sales manager at the Chevrolet factory in Flint.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, will address the Dealers Association at Washington, D. C., Friday night, Dec. 2.

L. H. Earle, eastern sales manager, engine division, for the Buda Co., has moved his office from 1216 Aeolian Hall to 30 Church Street, New York City.

Wm. B. Hoyle has been appointed manager of Cole Motors, Inc., of California.

Wayne Company Purchases  
Water Softening Business

FORT WAYNE, IND., Nov. 30—The Wayne Oil Tank & Pump Co. of this city has bought the Borromite Co. of America, Chicago, for the sum of \$500,000 and has also acquired the Warriner Mfg. Co. of Fort Wayne, which is putting on the market an apparatus for softening water. The Borromite company is also a manufacturer of water softening and purifying apparatus.

As soon as possible the machinery and equipment of the Chicago company will be moved to this city. Additional fac-

tory buildings will be erected on the company's seventeen acre site and the work of manufacturing the apparatus will be pushed with all possible speed.

In addition to securing the factory and business of the Chicago concern the purchase also gives to the Wayne oil company the control of zeolite mines in New Jersey. Homer G. Tate, president of the Borromite company, will join the Wayne oil company to assume charge of the water purifying apparatus here.

## FINANCIAL NOTES

Pierce-Arrow will probably show a small profit in the current quarter with profit and loss surplus, which at the close of last year was \$4,500,000, likely to be less than \$500,000. The improvement is due to the betterment of the inventory situation, which aggregates \$14,000,000, compared with \$16,500,000 on Jan. 1, to the absorbing of the cost of the new line and to a reduction in the overhead. It is not probable that there will be an appreciable reduction in bank loans, which now total about \$7,000,000. Business is considerably better than was to be expected at this time of the year with passenger car sales in fairly good volume and truck trade holding up.

Erie Tire & Rubber Co. receiver has asked the court for authority to collect \$278,404 unpaid subscriptions for preferred stock and to obtain payment for \$1,029,986 common stock, chiefly issued as bonus to preferred purchasers. This action has been recommended by the creditors' committee, consisting of F. B. Peterson, David Kuble, H. H. Whitman and Z. P. Zollinger.

Gaeder Paeschke & Frey Co., Milwaukee, manufacturer of steel stampings, sheet metal goods, enameled utensils and other ware and also the exclusive maker of the Maxim silencer, has increased its authorized capitalization from \$1,000,000 to \$2,000,000 for the general accommodation of the growth of its plant and business.

Kelley Tire & Rubber Co.'s plan calling for a survey of the company's property with a view to reorganization, as advanced by the stockholders' protective committee, has been approved by Judge Keeler in New Haven.

Earl Motors, Inc., directors have authorized the issuance of 200,000 additional shares (no par) to stockholders of record Nov. 22, 1921, at \$10 a share to the extent of 100 per cent of holdings. The offering expires Dec. 2.

Ford Motor Co. of Canada has 1200 stockholders, mostly Canadians. Of the stock 18 per cent is owned by Henry Ford. The company has exclusive manufacturing and selling rights for Ford cars in Canada.

Advance-Rumely Co. has declared the regular quarterly dividend of 75 cents a share on the preferred stock, payable Jan. 3 to stock of record Dec. 15.

Franklin Automobile Co., Syracuse, announces that from Jan. 1 to Nov. 1 it has sold direct to the public capital stock to the amount of \$2,515,700.

## HARVESTER REOPENS FOUNDRY

SPRINGFIELD, OHIO, Nov. 29—Owing to the booking of good sized orders for motor trucks and castings, the Springfield works of the International Harvester Co. has opened its foundry and will operate it all winter.

G. M. Export Trade  
Improves Steadily

## October Best in Year with November Probably Exceeding That Month

NEW YORK, Nov. 30—Current orders received during October by the General Motors Export Co., covering all the lines of passenger cars, were in excess of those received during any month since October, 1920. November orders are continuing this improvement or exceeding it. The present business is chiefly on the Buick and Chevrolet lines and comes principally from Australia, although other countries of Latin-America and elsewhere are numbered among the purchasers.

The general impression among exporters here is that the export market again is on the upgrade and the announcement to-day by General Motors shows to what an extent this trade has bettered. Heavy shipments of cars during the last months of 1920 and the early months of 1921, it is explained, were made on old orders that were not filled during the earlier rush of domestic sales, and the fact that the orders now being received are at such volume shows definitely that the export markets will take an appreciable percentage of the American production.

General Motors, it is stated, has not yet begun any general foreign sales on the new Buick four, further than to supply a few of its older dealers with demonstration cars. Shipments of this line are expected to begin early in 1922, export sales on the Buick being confined until that time to the six-cylinder models.

Hearne Wins Los Angeles  
Race, Making No Stops

LOS ANGELES, Nov. 30—From the mechanical end the Thanksgiving Day race on the Beverly Hills Speedway showed practically no developments. Six of the cars had Duesenberg power plants, four Frontenac and two Miller, the latter built in Los Angeles. Hearne, the winner, who covered the 250 miles at an average of 109.7 m.p.h., drove one of the eight-in-line Duesenbergs. He had absolutely no troubles of any kind going through the entire contest without a stop.

Several of the cars had to replenish their water supply, which is unusual in such races.

## ORDERS NEW OWEN SALE

WILMINGTON, DEL., Nov. 28—Federal Judge Morris has set aside the sale of the personal property of the Owen Magnetic Motor Car Co. and has ordered a new sale on the ground that the original order of the court was not complied with and that the price was inadequate.

# Calendar

## SHOWS

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.  
Jan. 7-13—New York, National Automobile Show, Grand Central Palace, Auspices of N.A.C.C.  
Jan. 9-14—New York, Motor Car Body Exposition, Automobile Body Builders Association, Twelfth Regiment Armory.  
Jan. 28-Feb. 4—Chicago, Automobile Salon, Hotel Drake.  
Jan. 28-Feb. 4—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.  
Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

Nov. 26-Dec. 3—Shanghai, China, Automobile Show.  
Nov. 28-Dec. 3—London, Motorcycle Show.  
Dec. 3-14—Brussels, Belgian International Automobile Show.  
March, 1922—Santiago, Chili, Annual Automobile Show.  
May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador, Automotive Section.  
Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Asocioao Automobilista Brasileira.

## CONVENTIONS

Dec. 6-8—Chicago, Second Annual Meeting of American Petroleum Institute.  
Dec. 10—New York, American Institute of Mining and Metallurgical Engineers.  
Dec. 20—Philadelphia, American Society of Mechanical Engineers.  
Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.  
Jan. 17-20, 1922—Chicago, American Road Builders Association.  
Jan. 30-31—Chicago, Fifth Annual Convention, N. A. D. A., La Salle Hotel.  
Jan. 30-Feb. 2—Boston, Sixth Annual Conference of the

International Delivery Association, Copley Plaza Hotel.

June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

Detroit, Dec. 23, Feb. 24, Mar 24, April 28, May 26.

New York, Jan. 10-13, 1922—Annual Meeting.

Chicago, Feb. 1

Minneapolis, Feb. 8-9—Annual Tractor Meeting.

## Ford Maintaining Output Schedule

### Maxwell Expanding Production Program—Hupp Building Fifty Cars Daily

DETROIT, Nov. 30—Shipments of the Ford Motor Co. for November will approximate the 75,000 vehicles for which the schedule called at the beginning of the month. Business in December is expected to reach about the same proportions. There is a steady demand from practically all branches, but manufacturing at the Highland Park plant will be on a somewhat smaller scale than in recent months, although it is declared there will be no shut down before the inventory period which begins Dec. 25.

Production of the new Maxwell models is being increased steadily to fill the orders which are coming to the factory from all parts of the country. Output is being expanded slowly so that the high mechanical standard will not suffer. Production of the new car has been averaging higher than 100 cars a day.

The plant of the Hupp Motor Car Corp. is running on a basis of 50 a day and will build 1300 cars in November. A steady business is looked for in December and the factory will not close for inventory as this was taken late in the summer. The American Gear Mfg. Co., a subsidiary of Hupp at Jackson, Mich., has resumed work with 350 men after a six weeks' shut-down.

## Georgia Business Varies with Size of Counties

ATLANTA, Nov. 28—An interesting feature is noted in an analysis of automobile sales in Georgia for the first eleven months of 1921, according to the number of licenses issued by the Secretary of State, in that every large county in Georgia shows an increase in the number of sales as compared with the first eleven months of 1920, while every small county shows a decrease.

The larger counties include those in which are located such cities as Macon, Savannah, Augusta, Columbus, Rome and Atlanta. The total increase in these larger counties is well over 5000, the increase in Fulton County alone, in which Atlanta is located, being almost 4000 to date. Total registration for the whole State, however, is less than the same period in 1920.

With the exception of Fords, sales in the Atlanta territory during November have declined slightly as compared with October.

## Used Car Sales Increase in Texas Over October

DALLAS, TEX., Nov. 28—With the exception of used cars, there appeared to be a decrease in the automobile business in Dallas and practically all Texas for the first half of November when compared with the first half of the preceding month. In actual retail sales reported in Dallas this decrease was about 10 per cent. The wholesale trade was about on the same basis.

But for used cars there was an increase in business of 40 per cent over the used car business of the first half of October. This probably made the number of cars actually sold at retail equal to the number sold during the first half of October.

Generally, dealers do not expect business to decrease materially during the remainder of the year.

## REVENUE FROM INDUSTRY LESS

WASHINGTON, Nov. 28—Slackened production in the automobile industry during the latter part of 1920 and the early months of 1921 is reflected in the annual report of the Bureau of Internal Revenue, showing that excise taxes from that source fell off \$38,538,121.72 as compared with the previous year. A decrease of \$812,579,486.07, or 15 per cent in the total of excise taxes is reported for the fiscal year ended June 30, 1921, as compared with 1920. The income and profits tax collections declined \$728,798,329.85.

## Reimportation Duty Opposition Lessens

### Senate Expected to Adopt Resolution Adding Tax to War Material

WASHINGTON, Dec. 1—With the convening of the regular session of the 67th Congress Monday, the National Automobile Dealers Association and other organizations are hopeful that the Graham resolution, which would impose a special duty of 90 per cent on surplus war material reimported into this country, will be passed in the Senate. Reports have been received showing that groups of American speculators have been rushing automobile trucks and other motor equipment into American ports in efforts to avoid these heavy assessments.

Senators who objected to this resolution when it was reported favorably from the Senate Finance Committee have been advised of the situation and as a consequence have indicated that they will not oppose the resolution. It is becoming increasingly apparent that this protection must be accorded the American automotive industry now.

## Detroit Steam Motors Will Make \$1,000 Car

DETROIT, Dec. 1—The Detroit Steam Motor Corp. has been incorporated in this State to manufacture a steam automobile in this city. The car will follow the best practices in steam car experience up to this time with several refinements in mechanical features and design.

O. C. Trask will be president and treasurer of the company. He is a member of the firm of Trask, Kennedy & Co., Michigan distributor of the Stanley steam car. The new car will sell in the \$1,000 class. It will weigh between 1500 and 2000 pounds, will have a 110-in. wheelbase and will be built in four body styles. The first showing will be at the Detroit show.



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Number 23

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Three dollars a year

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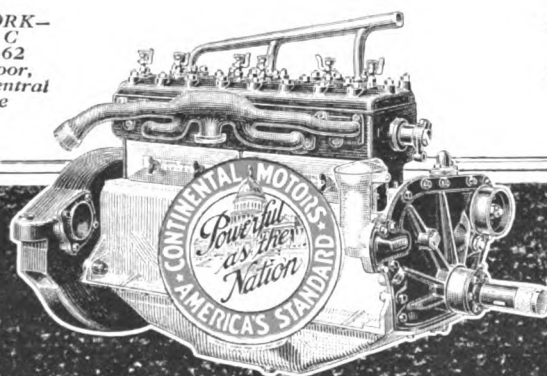
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# **Continental Motors**

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, DECEMBER 8, 1921

No. 23

## Executives Should Foster Use of Standards

Proper use of standard specifications, fittings and dimensions tends to eliminate waste, save time and cut expenses. Engineers know the value of standards, but executives have, in general, failed to realize their importance and encourage their use.

By Herbert Chase

**E**XECUTIVES in the automotive industry know in a general way that standardization work has been going on in their industry for many years. They doubtless believe in it as a more or less desirable thing, but there are many evidences that they do not appreciate its value to them as a means of simplifying detail, saving time and waste and cutting the cost of their product.

These are days when economy counts, so it will pay every executive who is interested in minimizing expenses to ask himself the following questions:

1. Do the various departments of my business know about existing standards, and are they following and co-operating in the development of standards where no standards now exist?

2. Are standard specifications for material and parts, standard mounting dimensions and the like, employed to the fullest extent practicable in the engineering, purchasing, production, selling and service departments of my business?

3. Is there, in cases where non-standard material etc. is not being used, good reason for not following standard practice?

4. Am I encouraging my subordinates to study and employ standard practice wherever it is applicable?

5. If standard practice is not being employed, is the fault with my product, or with the standard?

If the first four questions cannot be answered in the affirmative, there is no time like the present to investigate and supply a remedy for the situation.

Executives who are not thoroughly sold in respect to the value of standardization, or consider the matter quite too intangible for serious consideration, are urged to read the following facts, for without some such concrete information the whole matter will remain too indefinite for its inherent benefits to be appreciated.

An analysis of estimates made by about 150 engineers and executives in the automotive industry shows that the saving resulting from the use of standards amounts to about 15 per cent of the retail price of the product. If the total value of automotive products produced in this country annually is taken at five billion dollars, the saving on this basis amounts to \$750,000,000, a sum sufficient to warrant consideration even by those who do a business of the proportions mentioned.

Steel manufactured to standard specifications can, in some instances, be had for one-third to one-half the price charged for special steel rolled to a special

gage, such as was often used before steel specifications were standardized, and is still used in some cases.

One manufacturer who supplies rubber goods to other automotive manufacturers states that standardization has enabled him to increase his production threefold with precisely the same equipment as was formerly used to produce one-third its present capacity.

There is almost universal recognition of the fact that standardization within a given plant results in economies which, if not realized, place the manufacturer in an unfavorable position to compete with other plants which realize economies through standardization. Can it be doubted that similar economies would result in plants from which a certain group of manufacturers purchase if these manufacturers would agree on a certain set of uniform specifications, providing a reasonable range for selection, but maintaining uniformity where the deviation is now inconsequential? The manufacturer who is arbitrary in making purchases, even when the quantity is large, is certain, in the long run, to pay more than he would for a standard article. The salesman may attempt to disguise the fact in his zeal to land the order, but if each customer of a given manufacturer demands a special article which involves special tooling and other unnecessary expense, these expenses are inevitably included in the price at which the product as a whole is sold.

A certain spring manufacturer recently stated that he is compelled to stock some 150 sizes and grades of spring steel. He formerly carried nearly double that number of sizes. There is now a standard for the width of spring stock, and the establishment of standards for thickness of leaves is in contemplation. This should result in considerable economies. In the meantime the car and truck manufacturer is, of course, paying the spring maker the cost of carrying a large stock of steel in a much greater number of sizes than there is any real need for having.

Makers of electrical apparatus who build lighting generators and starting motors for many car manufacturers state that the generator used for one car is seldom the same as that employed for another make, and the same is largely true regarding starting motors. The standard S. A. E. mountings are a step in the right direction. They are used quite generally for starting motors, but not so generally for generators.

#### Added Cost of Non-Standardization

Of course, each car manufacturer pays for special tooling and machine set-up in order to get the particular size and shape of generator or motor desired. This is probably a relatively small item in a large order, but it effectively prevents standardization by the electrical manufacturer on a few sizes and types, and the cost is necessarily higher. This fact may not bother one electrical manufacturer at all so long as competitors have to face the same conditions, for the car manufacturer pays the bill. The car builder, in turn, passes on the cost to the purchaser.

Now all this and hundreds of similar circumstances would not be so serious were it not for the fact that service becomes far more expensive than there is need for it to be, and this, again, places an unnecessary burden upon the car owner. The parts manufacturer is expected to establish service stations where stocks of spare parts are presumably maintained for ready replacement. Much money is tied up in these stocks and much detail is involved checking and keeping the stocks complete. Yet this is only one item out of scores which must ultimately receive attention in a complete servicing system. So complexity grows, and with it expense of

service increases. Is it any wonder that the user has ground for complaint?

Factors of this kind have received far too little attention on the part of automotive manufacturers. In days when the demand for cars was always less than the supply it was perhaps natural that they should be more or less neglected. Under present and future conditions first cost and maintenance cost are and will continue to be factors having a great bearing upon sales resistance. No sane manufacturer who contemplates remaining in business can afford to overlook them. They must be minimized, and one means to this end is standardization.

#### No Throttling of Initiative

The foregoing should not be interpreted as a plea for throttling initiative, or for making all cars so nearly alike that they differ only in name or in external appearance. Far from it. It is rather a plea for using individuality where it counts rather than in details which have no bearing whatever upon performance and but little upon external appearance. When designing an engine, why not use a standard size of exhaust pipe and provide for mounting a generator which is now in general use and giving good satisfaction? If a new gearset or axle is in contemplation, why not employ standard sizes of bearings already widely distributed, and standard sizes of splined shafts, for example? If new springs are to be fitted, at least select a standard width of stock and a leaf thickness which is easily obtained. A suitable combination can, no doubt, be used to give the desired riding quality without selecting an odd size of stock. The manufacturer who fails to do things of this kind is certain to pay the penalty in higher prices or in failure to give satisfactory service when conditions demand it.

Granting, now, that a case for standardization has been established, what is to be said regarding existing standards and of the means employed for bringing standards into existence?

There are in the automotive field to-day some 300 standards, most of which have been established as a result of painstaking endeavor on the part of the Society of Automotive Engineers. Many of these standards have been extensively used, and some of them have almost universal application. Others are, for various reasons, but little used. For many years the S. A. E. has maintained, largely at its own expense, an office organization which, under the direction of a Standards Committee, has done the great amount of routine and detail work required in the intelligent creation of standards and the dissemination of information regarding them. Hundreds of manufacturers in the industry have co-operated in this work, but on the whole there appears to be but slight appreciation of its great value. In any case the work has been carried forward more through the initiative of the society than as a result of a spontaneous demand on the part of the industry.

As compared to the manufacturer, the designing engineer has but little to gain from standardization. It saves him time and annoyance over details which would otherwise require his attention, and thus leaves him freer to concentrate on other problems; but it is the manufacturing and purchasing departments which profit most. Strange to relate, but little pressure for standards has come from this quarter.

Aside from their convenience there is but little incentive for the engineer to employ standard practices. The economy they effect is not always apparent on the surface, and he is too seldom given credit for such economies. The manufacturer should furnish the necessary



incentive. He should, in fact, encourage the use of standards from the very inception of the design.

Standards should not be regarded as fixed practice which cannot be changed as conditions change, for such is not the case, so far, at least, as the term applies to standards adopted by the S. A. E. Standards require change from time to time, and there is adequate machinery for this purpose which is easily set in motion when there is a demand for it. Hence the fact that some existing standards may be open to just criticism is no excuse for general criticism of standardization work. If any group of manufacturers find existing standards unsatisfactory, they can easily initiate a reconsideration of the standard with a view to bringing it up to date or in closer harmony with existing conditions.

In one or two instances certain groups of manufacturers have taken a dog-in-the-manger attitude regarding standardization—they have insisted that they were the only group which should presume to set standards, and yet have then failed to establish standards that are admittedly needed.

The creation of standards requires much painstaking work and must not be lightly considered. It matters but little who does the work so long as it is well and thoroughly done, but since the S. A. E. has had long and creditable experience in this direction, is impartial and has a well-trained organization in the field, there would seem to be every reason to encourage and support the work it is doing. The strange fact is that encouragement to date has been more or less passive or sporadic rather than active and continuous.

Probably no single thing would be more helpful to automotive manufacturers in their efforts to minimize production and service expense than to appoint a committee which would make it its business to see that the standardization work of the S. A. E. is encouraged by all possible means and, if possible, carried forward on a much more extensive and intensive scale than ever before.

Standardization is an important factor in foreign trade, perhaps even more than in domestic. Germany has recently awakened to this fact and is planning to apply it fully in her efforts to regain the foreign commerce she lost during the war. Her plans, in fact, indicate that she means to carry standardization much further than it has been carried heretofore. The British also are awakening to the possibilities of the situation and have much commendation for the great progress which standardization has made in this country and the important influence which it has had on the rapid growth of the automotive industry here. Having achieved so much it is important that we maintain the advanced position which we now hold. It is no time to let the grass grow under our feet.

Several divisions of the S. A. E. Standards Committee will present reports at the annual meeting of the society to be held in New York during automobile show week. Engineers and other representatives of manufacturers are welcomed at the Standards Committee meeting on Jan. 10, whether they are members of the society or not. A summary of the reports to be presented at this meet-

ing is given on the following pages, and the full reports are printed in the December number of the journal of the society. Manufacturers should manifest interest in the work by having their engineering and production departments scrutinize the reports and discuss them.

## REVIEW OF STANDARDS REPORTS

**Tachometer Drive (Aeronautic).**—Experience having shown that the driving element of the present recommended practice is not strong enough to prevent binding in the tubing, due to the tendency of the flexible shaft to untwist, it is recommended to change the diameter of the driving shaft from 0.152 to 0.187 in., and the drill size for the hole for the shaft from No. 20 to No. 11, the tolerances remaining the same.

**Annular Ball Bearing Tolerances.**—Upon complaint of a user that the tolerances on the bores of inner races were too great to permit accurate fits in all cases, a subcommittee investigated the practice of the ball bearing industry and found that the actual dimensions of these bores are usually between nominal and two-thirds the minus limit, and very seldom on the plus side of the nominal dimension. It is felt that the tolerances now specified in the S. A. E. standards can be reduced without hardship on the ball bearing industry, and it is suggested

to eliminate the plus tolerances entirely and make the minus tolerances 0.0004 in. for 4-25-mm. bores, 0.0005 in. for 30-55-mm. bores, 0.0006 in. for 60-80-mm. bores, 0.0007 in. for 85-110-mm. bores and 0.0008 in. for 120-210-mm. bores.

**Roller Chain Sprocket Cutters.**—A table of dimensions of these cutters is presented, giving the pitch, cutter bore, outside diameter and keyway dimensions for cutters for sprockets of different pitch and roller diameters. The following extension to the present

S. A. E. standard for such cutters is recommended: "Two straddle cutters shall be used, an A cutter having an average pressure angle of 23 deg., for use where the arc of contact between the chain and the sprocket is fairly large, and a B cutter having an average pressure angle of 17½ deg., for use only where the arc of contact is small.

"All cutters shall be marked with the pitch, roller diameter and the range of the number of teeth for which each cutter is designed."

**Roller Chain Breaking Strengths.**—It is recommended that the minimum breaking strengths as given by the following formula be specified:

Min. Breaking Strength in Pounds =  
105,000 (Pin Dia.)<sup>2</sup> — 700.

It is also recommended that the thickness of center plates for double, triple and quadruple chains shall be equal to twice the thickness of the inside plates in standard single roller chains.

**Insulated Cable.**—It is recommended to substitute carbon tetra chloride for caustic alkali solution as a cleansing medium for the copper wires of insulated cables, as the latter leaves the wire in a condition where it is likely to be attacked by the sulphur in the rubber insulation, and is, therefore, not used. It is further recommended that the strength of the sodium poly-sulphide solution be definitely specified as of a "specific gravity 1.142 at 70 deg. Fahr.

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**THE** unanimous verdict of those who have investigated the facts is to the effect that standardization pays. The executive who is not encouraging the use of standards in his own plant is overlooking possible economies which existing conditions demand. Ten minutes spent in reading this article should convince him of the facts. Standardization is not an abstract thing of doubtful value. It is a modern economic necessity yielding many concrete advantages. Put it to work on your behalf.

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**Generator Flange Mounting.**—A slight change in the dimensions of the length of the shaft end from the hub to the center of the cotter pin hole, and of the overall length of the shaft end is recommended, the object being to make the length of the threaded portion of the shaft end practically the same for both No. 1 and No. 2 flanges and permit using the same shaft end in either size of generator.

**Starting Motor Flange Mountings.**—It is recommended that the drill holes for the holding bolts be made 7/16 in. instead of 13/32 in., which will permit the use of a more common drill size, increase the clearance for the bolts and facilitate assembling on the engine.

**Flexible Steel Conduit.**—The present specifications are to be revised to conform to the revised standards for insulated cable adopted last July. The table of dimensions, which now covers sizes from 3/16 to 1 in. inside diameter, is extended to cover sizes up to 1 1/4 in. The table also includes additional columns covering limiting inside diameters, approximate net weight per 100 ft., minimum tension and minimum radius for bending test. In addition to the galvanizing test in the present specifications the new specifications give tests for insuring mechanical quality, directions for installation and general information.

**Non-Metallic Conduit.**—A new recommended practice covering the use of this material for automobile wiring is suggested. The table of dimensions is uniform with that for flexible metallic conduit. General information and rules for installation are given, as well as specifications for insuring quality.

**Carburetor Flanges.**—It is recommended that the flange size for 1/2-in. carburetors shall be the same as that now specified for 5/8-in. carburetors, and that for 3/4-in. the same as now specified for 7/8-in., the object being to reduce the number of flange sizes by two.

**Engine Numbers.**—In order to make it difficult for thieves to obliterate or change engine numbers the following system of numbering engines is suggested:

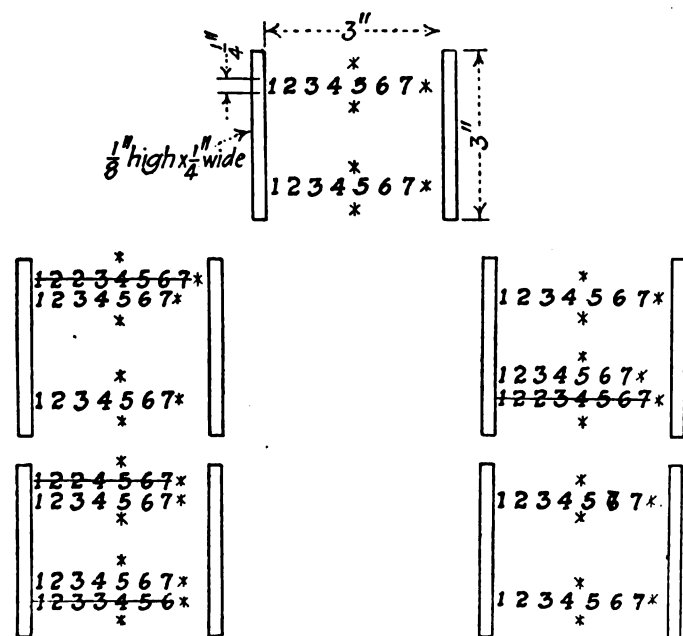


FIG. 1—METHODS OF NUMBERING ENGINES

The arrangement in the single view at the top is correct and the numbering in the upper pair of drawings is acceptable, only one number having been corrected in each case. The lower pair of drawings show two cases that are not permissible; in the drawing at the left both numbers have been corrected or changed, while in the other drawing a single digit has been corrected by stamping a second digit over the original one

"The engine serial or identification number shall be placed near the top of the right-hand side of the crankcase proper in a position in which it can be read easily. It shall be between two vertical ribs or beads 1/4 in. wide, 1/8 in. high, 3 in. long and 3 in. apart, as shown in the single drawing at the top of Fig. 1. The surface of the casting between the ribs shall be left rough as cast and unpainted on the finished engine. The numbers shall be evenly stamped in the casting 1/32 in. deep and shall be 1/4 in. high and of script form. The first digit shall be stamped close to the left-hand rib and the last digit shall be followed by a large star or other character to prevent adding digits. A star or other character also shall be stamped immediately above and below each number to prevent adding another number. The numbers shall be stamped twice on each casting, as illustrated, to permit correcting any errors made in stamping either number. No other number or character shall be placed within the space provided.

"If an error is made in stamping one number it may be crossed out and the correct number stamped in immediately above or below, as shown in the upper pair of drawings in Fig. 1. In no case shall both numbers be crossed out, as shown in the lower left corner, and new ones stamped, and more than three numbers must never appear, one wrong number crossed out and two correct numbers."

#### Reduction in Theft Insurance Premiums

Assurances are said to have been received from the underwriters that a reduction of 7 1/2 per cent in theft insurance premium will be granted if the engine numbering is in accordance with underwriters' requirements, and 20 per cent if both the engine and frame are numbered in accordance with these requirements, which are to be based on the work of the committee.

**Fan Belts and Pulleys.**—Heretofore only flat belt drives for fans have been standardized, but the Engine Division now presents an extension of the recommended practice covering both flat belt and Vee belt drives, fan pulley spindles for both solid and slotted brackets and pulleys for flat and V belts. The distance between the rear face of the collar on the spindle and the center of the pulley and that between the center of the pulley and the rear face of the radiator are to be standardized.

**Engine Testing Forms.**—Some minor additions to the data to be entered on these forms are suggested, and it is also to be proposed that results be corrected to a temperature of 60 deg. Fahr. and 29.92 in. mercury by using the formula:

$$B. Hp_c = (B. Hp_o \times P_s) \div (P_o \sqrt{T_o/T_s}),$$

where

B. Hp<sub>c</sub> = corrected brakehorsepower

B. Hp<sub>o</sub> = observed brakehorsepower

P<sub>s</sub> = standard barometric pressure in inches of mercury

T<sub>o</sub> = observed absolute temperature in degrees fahrenheit

T<sub>s</sub> = standard absolute temperature in degrees fahrenheit

**Mufflers.**—Nine sizes of cylindrical mufflers are recommended for standardization, and diameters of exhaust pipe and tail pipe are given for each. The length of the exhaust pipe from the manifold to the muffler is to be not less than 5 ft. Muffler mountings are to be standardized later if it seems desirable.

**Running Board Brackets.**—A design of pressed steel running board bracket for passenger cars is presented. The length of the horizontal portion of the bracket is left open and three heights, from the top of the horizontal portion to the center of the two lower rivet holes, are provided for; namely, 4, 6 and 8 in.

**Iron and Steel Specifications.**—A very lengthy report

has been prepared by the Iron and Steel Division which revises all of the work ever done by this division and brings it up to date. The standards for which this division is responsible are also better systematized. Charts of physical properties are issued for the first time for the 3200, 3300 and 3400 series of steels (nickel-chromium). Emphasis is laid on the fact that the values given in these charts are conservative for sections from  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. in diameter or thickness, and it is stated that similar charts for sections above the upper of these sizes will be prepared later.

### Eight Types of Heat Treatment

All heat treatments are reduced to eight types, and in order to obviate confusion with the older heat treatments, which were designated by capital letters and are specified in this way on many blueprints, the new heat treatments are designated by Roman numerals. The temperatures for use in connection with these heat treatments are not fixed generally, but are given in connection with the composition of the steel to which the heat treatment is to be applied. As the same type of heat treatment is used for a number of different steels, this plan makes it possible to specify temperature limits more suitable for the particular steel to which the treatment is to be applied.

The S. A. E. system of code numbers for identifying grades and types of steel is continued. The first figure indicates the class to which the steel belongs: thus "1—" indicates a carbon steel; "2—" a nickel steel, and "3—" a nickel-chromium steel. In the case of the alloy steels, the second figure generally indicates the approximate percentage of the predominant alloying element. Usually the last two or three figures indicate the average carbon content in "points" or hundredths of 1 per cent. Thus 2340 indicates a nickel steel of approximately 3 per cent nickel, 3.25 to 3.75 and 0.40 per cent carbon, 0.35 to 0.45; and 71360 indicates a tungsten steel of about 13 per cent tungsten, 12 to 15, and 0.60 per cent carbon, 0.50 to 0.70. The basic numerals for the various qualities of steels specified are:

Carbon steels .....	1
Nickel steels .....	2
Nickel-chromium steels .....	3
Molybdenum steels .....	4*
Chromium steels .....	5
Chromium-vanadium steels .....	6
Tungsten steels .....	7
Silico-manganese steels .....	9

The complete data regarding each grade of steel, such as the code number, the composition, certain notes descriptive of the steel and the heat treatments that will apply for such composition and charts showing the physical properties that may be developed by the recommended heat treatments will probably appear on the same page or on opposing pages of the final report and of the data sheets.

Part I of the report, which follows an introduction, deals in a general way with the numbering system and the specifications and notes on heat treatments and physical properties. Part II covers specifications for automotive steels, including manufacture, chemical properties, finish, inspection and rejection. In Part III are given the chemical compositions of all of the S. A. E. steels. Part IV deals with steel castings and Part V with malleable iron. Part VI gives definitions of metallurgical terms (for general information only). Part VII covers test specimens and is a revision of the present

standard, and Part VIII deals with general heat treatments.

The physical property charts, of which 25 are given, are now arranged somewhat differently than formerly, and in connection with them the following explanations are given:

"The charts have been made as valuable as possible to the engineer by indicating what can be expected as the average product of a given composition when treated in the specific manner in  $1\frac{1}{2}$  in. sections. Generally on sizes larger than  $1\frac{1}{2}$  in. lower values will prevail, and on sizes smaller than  $1\frac{1}{2}$  in. higher values will prevail. At the same time the data for the charts have been chosen so as to protect makers of heat-treated stock and parts from unreasonable demands.

"For the sake of simplicity it has seemed advisable to use only average minimum figures for tensile strength, yield point, reduction of area and elongation, based on the following considerations, heat treatment being constant:

- (1) The lowest yield-points and tensile-strengths are produced with steels at the bottom of a given range in carbon.
- (2) The lowest reductions in area and elongations are produced with steels at the top of a given range in carbon.

"Thus, for Steel 1035, the average minimum yield points and tensile strengths are given as of a steel containing 0.30 per cent carbon; average minimum reductions of area and elongations as of a steel containing 0.40 per cent carbon.

"The figures for hardness are conventional averages for the whole range of compositions within any given specification.

### Charts on Steel Tests

"The charts include treatments and conservative physical tests on all S. A. E. steels for which such charts have been prepared. For these charts the following applies:

- (1) They indicate the physical properties which may be expected of a standard 0.505 x 2-in. test-specimen machined from rolled bars of  $1\frac{1}{2}$ -in. diameter or square.
- (2) Heat-treatments given in the charts apply to rolled bars that were normalized or otherwise treated prior to heating and quenching as shown on individual charts.
- (3) Test-bars 0.505 in. in diameter and 2 in. long, machined from rolled bars after final treatment and tested under normal commercial conditions.
- (4) Brinell and scleroscope readings were taken at a distance from the center equal to half the radius and are not to be compared with surface readings on heat-treated bars or parts.

**Water Pipe Flanges.**—Dimensions for water pipe flanges are recommended, a drawing and table being given similar to the standard on carburetor flanges. This is to supersede the present recommended practice that standard two- and four-bolt types of carburetor flanges be used for motor boat water pipe flanges. The type of flange now recommended is believed to be satisfactory for general automotive use.

**Lock Washers.**—A new table of standard dimensions for lock washers is presented which differs from the old table mainly in making the washers somewhat lighter. The old table was adopted in 1911 and the revision conforms to advances in lock washer practice since that date. The new table is largely the outcome of a request made by the Motorcycle Division for the formu-

\*This numeral has been agreed upon as the index to the Molybdenum group but no specific compositions have as yet been recommended by the Iron and Steel Division.

lation of a series of extra light lock washers for use on motorcycles.

**Passenger Car Door Handles.**—In order to permit interchangeability of handles and locks it is recommended that the square portion of the externally threaded type be made 5/16 in., with a 1/4-in. 28 S. A. E. thread 3/8 in. long, with a 45-deg., 1/32-in. chamfer at the outer end; and the internally threaded type with a 5/16-in. square portion, drilled with a No. 21 drill 3/4 in. deep and counter drilled with a 13/64-in. drill 1/8 in. deep; the drill hole to be tapped with a No. 10 32-in. thread of a usable length of 5/8 in., the pitch diameter limits being 0.1713 and 0.1718 in.

**Passenger Car Doors.**—The following clearances are recommended for all types of body and are to be measured from wood to wood or metal to metal before painting. Door flange widths are to be 5/16 in. on the hinge pillar side and 1/2 in. minimum on the lock pillar side and on the bottom:

PROPOSED DOOR-FIT CLEARANCES

Location	Clearance, in.
Hinge side .....	1/8, $\pm$ 1/32
Lock side .....	3/16, $\pm$ 1/16, — 0
Bottom .....	1/4, $\pm$ 1/16, — 0
Top .....	1/8, $\pm$ 1/32
Jamb .....	3/16, $\pm$ 1/16, — 0
Bead .....	3/32, $\pm$ 1/32, — 0

**Rubber Bushings.**—The Passenger Car Body Division recommends the following for adoption as recommended practice: Where holes are punched in sheet metal for carrying grommets or bushings, particularly when these are made of rubber, it is recommended that the holes be necked.

The reason for this recommendation is that when bushings for electric wiring or conduit are inserted in plain holes punched in sheet metal they are quickly cut by the sharp edges, and it is relatively simple and effective to form a neck to the hole when punching.

**Wiring for Beads.**—To economize in the number of sizes of wire used in the manufacture of parts of beaded construction, such as fenders and splash guards, it is suggested that for engine hoods up to and including 36 in. long, top hinge rods shall be 5/16-in. diameter, and side hinge rods shall be 1/4-in. diameter. For fenders, aprons and splash guards the wire used for beading shall be No. 11 B.w.g. bright basic steel wire.

**Pressure Gage Connections.**—Three diameters of tubing are provided for, 1/2 in., 5/16 in. and 3/8 in., the first two being used on passenger cars and the last on trucks. The size of aperture recommended is the same for all three sizes of connection, as the area of this opening need not vary for different tubing sizes. As the aperture is frequently drilled in a plug that is screwed into the connection, and as plugs fitting a hole tapped with No. 10-32 thread are usually used, the specification of this thread is included in the recommendation. A 1/8-in. pipe thread connection also is sometimes used, and is recommended as an alternative construction.

**Pneumatic Tires and Rims.**—It is proposed to revise the present list of standard sizes of pneumatic tires and rims by eliminating the 32 x 3 1/2, 33 x 4, and 33 x 4 1/2-in. rim sizes and the corresponding regular and oversize tire sizes, and by adding the 30 x 3 1/2-in., straight-side rim and the 31 x 4-in. oversize, straight-side tire.

#### No Immediate Discontinuation

Particular emphasis is laid on the fact that this recommendation is not intended to call for immediate discontinuation of all other tire or rim sizes. Non-standard sizes will of necessity continue in production on a de-

creasing scale until those automotive vehicles now in service which are equipped with non-standard rims and tires are finally discarded.

A review of the standardization of pneumatic tires shows that the original list of sizes which was first adopted by the Association of Licensed Automobile Manufacturers nearly 15 years ago has been changed at very frequent intervals, additions generally being made until during the latter part of the recent war a definite schedule for eliminating certain sizes by groups at stated intervals of time was approved. The standard, however, instead of becoming more effective, was more or less disregarded by many car and tire manufacturers for use on new equipment. This condition was one of the influences that led to a lack of co-operative effort and the differences of opinion among the groups interested.

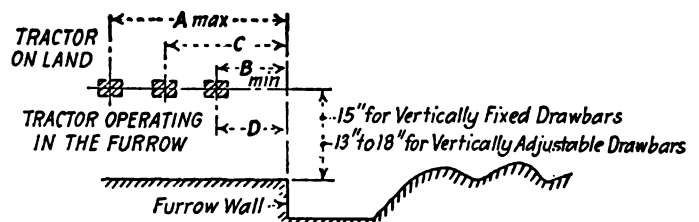
#### The Cleveland Conference

As the result of this situation a conference was held in Cleveland in November, 1920, which was attended by tire, rim and automobile manufacturers and at which a resolution was passed that the society should appoint a special committee representing the National Automobile Chamber of Commerce, the Rubber Association of America and the Society of Automotive Engineers for the purpose of carefully studying the existing conditions and preparing a recommendation which would meet with the approval of the industry and the national organizations representing its various branches.

The committee thus appointed conferred with the automobile and tire manufacturers and carefully analyzed the situation. The division recommends that the proposed list be used by passenger car and motor truck designers to select tire sizes for apparatus not yet in production, or at such a time as a change to a recommended size can be conveniently made.

It is also recommended that for figuring speedometer gear ratios and fender and wheel housing clearances the actual tire widths and outside diameters be measured on the tires to be used.

**Tractor Drawbar Height.**—The following extension to the present recommended practice is proposed:



PROPOSED TRACTOR DRAWBAR HEIGHTS

Plow	Two-Bottom		Three-Bottom		Four-Bottom	
	12-in.	14-in.	12-in.	14-in.	12-in.	14-in.
A	30	30	32	32	40	40
B	15	15	20	20	24	24
C	17	20	23	26	28	32
D	15	15	20	20	24	24

A—Maximum position for good operation, ordinarily the best possible position.

B—Minimum position for good operation with the tractor operating on the land.

C—Proper or best average position when the tractor operates on the land.

D—Minimum hitch position when the tractor operates in the furrow.

**Transmission Tire Pump Mounting.**—It is suggested to cut back the inside edges of the large mounting pad so as to allow more clearance for the idler pinion car-

rier. The two long sides are to be cut away  $3/16$  in. between bolt holes.

**Clutch Facings.**—In order to reduce the number of sizes of clutch facings used and thus gain the advantages of the resulting economy, two tables of dimensions are presented, one for multiple disk and the other for single disk clutch facings. The tables specify thickness, inside and outside diameters, with tolerances on all dimensions. It is also planned to standardize rivets and their location, but this will require further study. The clutch facing sizes are intended for use on new designs only.

**Three-Joint Propeller Shafts.**—Diagrams and tables are given for three types of shaft end, viz., square, tapered and splined.

**Bases, Sockets and Connectors.**—Limits of 0.306 in. and 0.312 in. are added to the distance from the end of the plunger sleeve to the top of the locking slot, the limit of 0 to  $1/64$  in. for the distance from the top of the plunger when extended to the bottom of the locking slot is eliminated and a footnote referring to the locking pins and slots of the bases, sockets and plugs is to be added, to the effect that the variation from the center line shall not be more than 0.003 in.

**Lamp Glasses.**—It is recommended that in the standard for lamp glasses the dimensions for four locking notches be specified, which are required to prevent the turning of other than plain glass lenses in their mountings. These notches are to be  $17/32$  in. wide and  $3/32$  in. deep.

**Tail Lamps.**—Tail lamp mounting dimensions are recommended. Two  $1/4$ -in.-20 mounting studs are to project from the rear of the lamp housing a distance of  $5/8$  in., these studs being on the horizontal axis 1 in. from the vertical axis each. The tail lamp glass diameter is to be 3 in. plus 0, minus  $1/32$  in. The projection of the socket from the lamp shell is to be  $1\frac{3}{4}$  in.

**Non-Ferrous Metal Specifications.**—The same as the Iron and Steel Division, the Non-Ferrous Alloys Division has revised the specifications for which it is responsible and has added to them particularly specifications of solders. As far as possible the new specifications

have been drawn up to accord with the specifications of the American Society for Testing Materials. Specifications Nos. 1, 2, 3 and 4 cover solders; No. 14 covers babbitt; No. 43, manganese bronze; No. 44, cast brass to be brazed; No. 45, brazing solder; No. 70, commercial brass sheet; No. 71, copper sheet; No. 73, naval brass (Tobin bronze) rod; No. 76, naval brass (Tobin bronze) tubing; No. 80, brass spring wire; No. 81, phosphor bronze spring wire; No. 88, brass forging rod.

**Rod Ends.**—The following is to be incorporated in the standard on this subject:

- (1) Specify dimension *K* as the diameter of the pin-bosses on the drawings for the adjustable and plain yoke-rod-ends, the same as now specified for the pin-boss of the eyerod-end.
- (2) Change dimension *K* in the table for the  $3/8$ -in. size from  $1-13/16$  to  $1-11/16$  in.

**Taper Fitting for Plain or Slotted Nut.**—A footnote is to be added to the effect that the center line of the cotter pin hole shall be 90 deg. from the position of the keyway, as shown on the drawing. This recommendation is made merely with the object of insuring uniform practice.

**Body Nomenclature.**—The Passenger Car Body Division submits a list of names for different body types. In selecting the names the committee bore in mind the derivations of the several terms, their application to their now more or less obsolete horse-drawn prototypes and the accepted European or international usage. The most radical change as compared with present usage is the proposal to use the term phaeton for what is now generally known as touring car. The principal reason for suggesting the change is that the term touring body has lost its significance as applying to any particular type of body, as all types are used for touring. The term "phaeton" is used extensively in Europe and to a considerable extent in America in connection with passenger cars; it is the name of a horse-drawn prototype; touring body is inelegant and in a technical sense is not distinctive of any particular type of motor vehicle body. The committee distinguishes 15 types of body and gives illustrations of all, but as yet has not decided on a name for two of them.

## Tractors for South Africa

A REPORT recently received by the National Bank of South Africa, Ltd., from the British Trade Commissioner at Capetown on conditions affecting the working of motor tractors in that territory gives some interesting data on the type of machines required for agricultural purposes there. The loss of power in internal combustion engines, due to the high altitudes met with in South Africa, is to some extent modified by the lower average temperature at higher altitudes; but nevertheless, the difference is considerable, approximately 10 per cent. at 4000 ft., and well worth consideration from the designer's point of view. Engines should be sturdily built, and able to give their full-rated power at less than 1000 r.p.m. It would be better if their general rate were nearer 600. The reduced speed of an engine working under these conditions leads to a very great increase in the working life of the engine, and makes it altogether a smoother running engine. The South African soil after a drought becomes very hard, and even in what is considered easy soil, hard patches are met with. Very little easily-broken soil is found

in the country. Under certain conditions clouds of dust are raised in the operation of ploughing, and this is of a particularly fine penetrating type. The effect of dust on the engine can be readily imagined. The farmers of South Africa in considering the merits of plows usually insist on land being plowed in its hardest condition, for the reason that it would have to be plowed by oxen under similar conditions, and if a tractor will not do it the tractor is of no use to them. The South African farmer does not usually employ a skilled mechanic ready to tune the engine to suit the varying temperatures. A machine that requires nursing is not desirable. The machine which is required is one that is capable of being overdriven and overworked in order to get the work done, and as soon as the machine has proved its worth the cheapest kind of labor will be employed to be put in charge of the tractor. Furthermore, a cheap lubricating oil is likely to be used regardless of the possible effect on the tractor. The tractor to be sold in South Africa must be capable of doing well under the worst conditions.

# Design Variations Feature British Light Cars

Widest possible divergencies occur throughout the range, which runs from 60 cu. in. twin-cylinder air-cooled two-seaters to overhead valve fours of 140 cu. in. capacity selling at \$3,600. This article contains descriptions of several of these light cars that have come so much to the fore.

By M. W. Bourdon

THE light car movement, owing to the entry of several of Britain's most important motor manufacturers into this line of production, has assumed more importance than ever. Daimler, through its associated concern, the B. S. A. Co.; Armstrong-Siddeley, Humber, Wolseley, Standard, Rover, Calthorpe, Singer, Austin, Vulcan, Belsize, Star, Sunbeam and a score of other firms of more or less renown are now producing, or exhibited at Olympia, two-seaters and four-seaters which belong to this class.

The lowest priced of the light cars produced by the firms mentioned is the two-seated, 8-hp., horizontal, air-cooled, twin-cylinder Rover, which has dropped in price from £300 to £220 during the year. The most expensive is the Sunbeam, which has a four-cylinder engine of approximately 118 cu. in. and sells at £725 with four-passenger body.

In between the above is almost every imaginable variation in price, cylinder number, cylinder arrangement and cooling. Some are sold with a regular two-seated body, others with a two-seater with double dickey; the remainder (with one exception) have optional bodywork, i. e. two-seater with double dickey or four-seater. The exception is the Armstrong-Siddeley production, known as the Stoneleigh utility car, which has a three-seated body of reversed clover-leaf pattern; driver's seat, steering and controls are central, with the rear two-passenger seat removable to provide space for up to 250 lb. baggage.

The most notable development during the past twelve months has been encouraged by the success of the 8-hp. Rover (described in AUTOMOTIVE INDUSTRIES of Sept. 1 last). It has sold quite freely and deliveries at several periods during the year were a month or so behind orders, despite an output of 120 per week, which is the largest of any one British model. The little Rover, when it was first put forward, was the cause of considerable ridicule directed at its makers; having done well with their 12-hp. model (still continued) they were held to be adopting a policy that would lower their prestige. But the Rover company has shown foresight rarely exhibited; it has almost created a demand, and the popularity of the 8-hp. two-seater has, without question, been entirely responsible for the introduction of the B. S. A., 7-hp. Wolseley and Stoneleigh. However, only the Stoneleigh—which is not yet in production—offers attractions comparable to those of the Rover, and the latter at the moment appears to be threatened but very slightly. Primarily, it scores over its would-be competitors in price (except the Stoneleigh at £225), for the B. S. A. and Wolseley are offered at £340 and £310 re-

spectively, though admittedly both of the latter are worth more than and possibly almost as good value as the Rover. But their price takes them out of the range of the Rover appeal, for the man who has £300 or so to put down can get and usually prefers a four-cylinder light car.

The light car movement, as distinct from the early cycle car boom, started with a four-cylinder engine of under 67 cu. in., and a number of firms, such as Singer, Calthorpe and Swift, are still concentrating mainly on this. Standard originally was in this field, and then got out of it with an engine of approximately 100 cu. in., though still continuing to offer both the two-seaters and four-seaters of 11 hp. as "light cars." Calthorpe was first to offer one of the smaller four-cylinder types with a four-passenger body, after having increased engine capacity to 76 cu. in.; this four-seater, however, is more of a "sporting" type, with passenger accommodation hardly likely to be appreciated by elderly aunts and similarly staid individuals. But Standard has now gone back to the original size of engine, though retaining the larger model after increasing its engine and chassis dimensions for 1922. The new model is designated an 8-hp., though its engine dimensions are identical with those of the pre-war two-seater rated at 10 hp., the displacement being 66 cu. in.; and yet it is offered with a comparatively comfortable four-passenger body as an option to a two-seater with double dickey. Wolseley retains the 10-hp., four-cylinder model (76 cu. in.) and also offers bodies for two or four adults.

Next in point of engine size comes the biggest variety of all, the type so prominent at the 1920 show, and having an engine displacement of approximately 90 to 100 cu. in., with chassis designed for two-seated and four-seated bodies. The Morris is one of the most popular examples of this type, with a four-cylinder,  $2\frac{3}{4} \times 4$ -in., water-cooled motor; it sells at £446 with four-passenger body and at £340 with reduced equipment and less elaborate finish. With two-passenger bodies prices are £400 and £300 respectively—the latter a reduction of 30 per cent since last year.

Above the Morris class in point of engine size (or chassis dimensions) come the new 12-hp. Austin (100 cu. in.), the 11-hp. Humber (the 10-hp. of the 1920 show enlarged to 106 cu. in.), the 11-hp. Standard enlarged to 118 cu. in., the 14-hp. Sunbeam, also 118 cu. in., and numerous others.

All of these cars, from the 61-cu.-in. Rover to the 118-cu.-in. Standard, except the Humber, Austin and Sunbeam, are offered as light cars, and their makers are annoyed if anyone suggests that they are not light cars.



## Features of British Light Cars

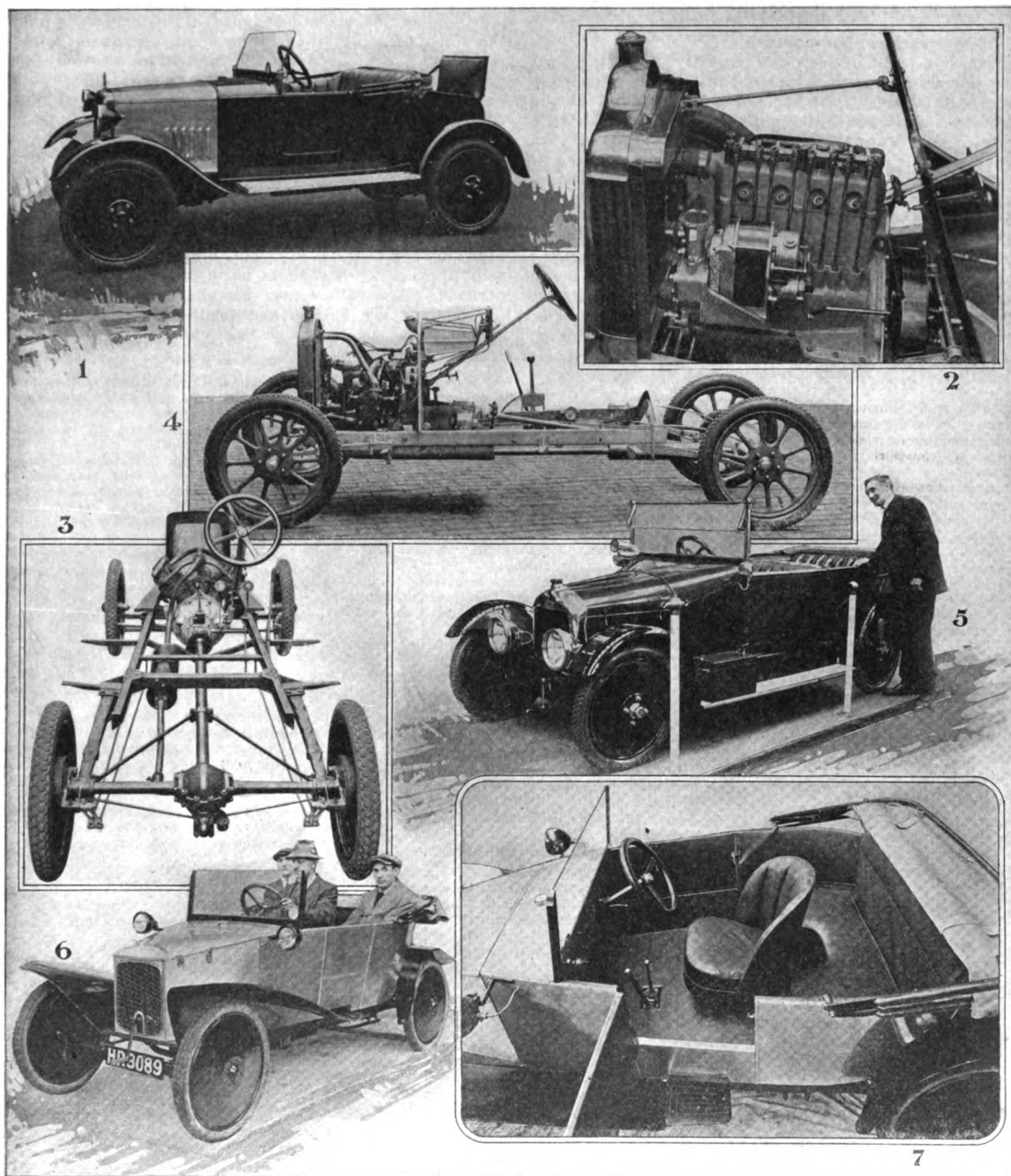


Fig. 1—New B. S. A. two-cylinder air-cooled runabout. Fig. 2—Overhead valve engine of new 8-hp. Standard. Note combined magneto and lighting dynamo. Production model will have battery ignition. Fig. 3—Rear view of new two-cylinder (65 cu. in.) air-cooled B. S. A. chassis, which is offered with two-passenger body at \$1,700. Has three speed gearset, Lanchester worm drive and full electric equipment. Fig. 4—Chassis of new 7-hp. (60 cu. in.) Wolaeley two-cylinder water-cooled engine. Fig. 5—10-hp. (67 cu. in.) Singer with four-passenger body with attendant alongside to give the idea of size. Fig. 6—New 9-hp.  $3\frac{3}{4}$  x  $3\frac{1}{2}$  two-cylinder air-cooled Stoneleigh (Armstrong-Siddeley). Occupants indicate seating arrangement and general dimensions. Fig. 7—Inverted clover leaf body on new Stoneleigh (Armstrong-Siddeley) air-cooled two-cylinder chassis

One maker who has increased his engine dimensions, giving the car a rating by the usual formula considerably above what it was last year, has reduced the "catalog horsepower" to a lower figure than last year, fearing that otherwise his productions would no longer be looked upon as light cars by potential purchasers, and that he would lose sales in consequence.

From one point of view the majority of British light cars sell at prices which are absurdly high when compared with those of the Ford, Overland, Chevrolet and even the Cubitt, the latter a British production with a  $3\frac{1}{8} \times 5\frac{1}{2}$ -in., four-cylinder engine, four speeds, 126-in. wheelbase and full-sized, five-passenger body, selling at £442. These high prices can only be accounted for by high quality in the chassis, bodywork and equipment.

But first cost is not considered so important as operating costs by the majority of British buyers of light cars. They are willing to put up with the frequent gear-shifting accompanying the small engines if by doing so fuel economy will result. They far prefer the Morris, for instance, capable of running 30 to 35 miles per gallon (Imperial gallon) to the Cubitt doing 16 to 20, though

both can be bought at approximately the same price and the engine of the first has only 94 cu. in. displacement, as compared with 170 cu. in. for the second. Not that the Cubitt is unpopular in its sphere, but it does not make so extensive an appeal as the light car.

Reverting to the smallest types, in the writer's opinion the policy of using two-cylinder engines is one of which the wisdom may be doubted when prices are not kept down to somewhere about the Rover level (£220). While these motors, especially the horizontally opposed type, run quite nicely at all except very low and high speeds, and certainly pull better on hills than many of the high-speed fours of similar cubic capacity, they have been accepted so far merely because the buyers feel they must sacrifice something in making their demands for low price and low operating costs. But if, as in most cases, they approach closely the price of the corresponding four-cylinder chassis, it is difficult to see what inducement they offer—beyond in some cases a better finish, perhaps, and a rather more complete equipment.

Following are outline specifications of a few examples of each type of British light cars:

### 11 Hp. A. C.

**Engine**—Four cylinder, detachable L head cylinders,  $2\frac{1}{2} \times 3\frac{1}{4}$  in., 91 cu. in. displacement, aluminum pistons, three bearing crankshaft, pressure lubrication, magneto ignition.

**Transmission**—Dry single plate-clutch, gearset unit with rear axle, three speeds, right-hand lever, enclosed propeller shaft, top worm final drive, 4.5 to 1 ratio, full floating rear axle.

**Chassis**—Quarter elliptic springs, brake on final drive shaft and internal brakes on wheels, worm and worm wheel steering, disk wheels,  $28 \times 3\frac{1}{2}$  in. tires; weight: 1550 lbs. two-seater with dickey.

**Equipment**—Two-seated body, electric lighting and starter, £550. Four-passenger body optional.

### B. S. A.

**Engine**—Two cylinders at 90 deg., air cooled, integral heads, overhead valves,  $3\frac{1}{2} \times 3\frac{1}{2}$  in., 65 cu. in. displacement, aluminum pistons, ball bearing crankshaft, roller bearing big-ends, circulating splash lubrication, magneto ignition.

**Transmission**—Single plate clutch with cork inserts. Gearset unit with engine, three speeds, central control, enclosed propeller shaft, Lanchester bottom worm final drive, 4.8 to 1 ratio, non-floating rear axle.

**Chassis**—Quarter elliptic springs, both brakes within rear wheel drums, rack and pinion steering, disk wheels,  $28 \times 3\frac{1}{2}$  in. tires; weight of complete car 1,350 lb., wheelbase 96 in., track 48 in.

**Equipment**—Two-seated body with single dickey seat, electric lighting and starting, £340.

### 10 Hp. Calthorpe

**Engine**—Four cylinder. Integral L heads  $2\frac{1}{8} \times 3\frac{3}{4}$  in., 76 cu. in. displacement, aluminum pistons, plain bearing crankshaft, trough and pressure lubrication, magneto ignition.

**Transmission**—Dry single plate clutch, amidships gearset, three speeds, right-hand lever, open propeller shaft, spiral bevel final drive, 4.3 to 1 ratio, full floating back axle.

**Chassis**—Half elliptic springs, internal brake on gearset, internal shoes on wheels, worm and segment steering, pressed steel hollow spoked wheels,  $28 \times 3\frac{1}{2}$  in. tires; weights: chassis, 1350 lb., two-passenger complete car, 1650 lb., four-passenger car, 1700 lb.; wheelbase 99 in., track 45 in.

**Equipment**—Two or four-passenger bodies optional, electric lighting and starting, price £355 with two-seated body.

### Crouch

**Engine**—Two cylinders at 60 deg., water-cooled, overhead valves in detachable heads,  $3\frac{1}{2} \times 4\frac{1}{4}$  in., 75 cu. in. displacement, cast iron pistons, crankshaft supported at rear end only on ball and roller bearings, roller bearing big ends, circulating splash lubrication, magneto ignition.

**Transmission**—Dry single plate clutch, gearset unit with front end of propeller shaft casing, three speeds, central lever, enclosed propeller shaft, spiral bevel final drive, 4.5 to 1 ratio, no differential, non-floating rear axle.

**Chassis**—Quarter elliptic springs duplicated at the front, both brakes within rear wheel drums, rack and pinion steering, detachable wire wheels,  $28 \times 3\frac{1}{2}$  in. tires, weight: chassis 900 lb., wheelbase 114 in., track 45 in.

**Equipment**—Two-seated body, electric lighting, starting by usual crank but engaging with camshaft, automatic decompression device, price £275.

### 11 Hp. Humber

**Engine**—Four cylinders, detachable L heads,  $2\frac{1}{4} \times 4\frac{1}{4}$  in. 104 cu. in. displacement, aluminum pistons, three-bearing crankshaft, white metal bearings, trough and pressure lubrication, magneto ignition.

**Transmission**—Inverted cone clutch with leather facing running in oil, unit gearset, four speeds, right-hand lever, open propeller shaft, straight bevel final drive, 4.3 to 1 ratio, full floating rear axle.

**Chassis**—Half-elliptic springs, external brake on gearset and external brakes on rear wheels, worm and worm wheel steering, pressed steel wheels,  $30 \times 3\frac{1}{2}$  in. tires; weight: chassis 1260 lb., two-seater with double dickey 2100 lb., four seated 2200 lb., wheelbase 105 in., track 55 in.

**Equipment**—Two-seater or four-seater optional, electric lighting and starting; price £620, four-passenger.

### 12 Hp. Morris

**Engine**—Four cylinders, detachable L heads,  $2\frac{3}{4} \times 4$  in., 94 cu. in. displacement, cast iron pistons, three bearing crankshaft, white metal journals and big-ends, trough and pressure lubrication, magneto ignition.

**Transmission**—Double plate clutch with cork inserts, gearset unit with engine, three speeds, central lever, enclosed propeller shaft, spiral bevel final drive, 4.75 to 1 ratio, semi-floating rear axle.

**Chassis**—Half-elliptic springs at front, three-quarter elliptic at rear, both sets of brakes internal on rear wheels, worm and worm wheel steering, hollow spoked steel wheels,  $28 \times 3\frac{1}{2}$  in. tires; weight: chassis 1200 lb., two-seater car 1800 lb., four-seater 1900 lb., wheelbase 102 in., track 48 in.

**Equipment**—Two or four-passenger bodies optional, electric lighting and starting, prices from £300 (with electric lighting only and two-passenger body) to £446 with full outfit and four-passenger body.

### 8 Hp. Rover

**Engine**—Two cylinders, air-cooled, set at 180 deg., detachable L heads,  $3\frac{1}{2} \times 3\frac{1}{2}$  in., 61 cu. in. displacement, cast iron pistons, roller bearing crankshaft, roller bearing big-ends, circulating splash lubrication, magneto ignition.

**Transmission**—Dry single plate clutch, gearset unit with engine, three speeds, central lever, open propeller shaft, bottom worm final drive, 4.8 to 1 ratio, semi-floating back axle.

**Chassis**—Quarter elliptic springs, brakes both internal on rear wheels, rack and pinion steering, disk wheels,  $28 \times 3$  in. tires; weight: chassis, 700 lb., car complete, 1000 lb., wheelbase, 88 in., track, 46 in.

**Equipment**—Two-seated body with a small boot for spares, extra wheel and tire, dynamo lighting. Price, £220.

### 10 Hp. Singer

**Engine**—Four cylinders in pairs, integral L heads,  $2\frac{1}{8} \times 3\frac{3}{4}$  in., 67 cu. in. displacement, cast iron pistons, three-bearing crankshaft, white metal journals and big-ends, trough and pressure lubrication, magneto ignition.

**Transmission**—Inverted cone clutch, gearset as unit with front of propeller shaft casing, three speeds, right-hand lever, spiral bevel final drive, 4.5 to 1 ratio, semi-floating rear axle.

**Chassis**—Quarter elliptic springs, both brakes internal on rear wheels, worm and segment steering, disk wheels,  $26 \times 3$  in. tires; weight: two-passenger car complete 1430 lb. wheelbase 96 in., track 48 in.

**Equipment**—Two-seated body with single dickey, electric lighting and starting, price £400. Four-passenger car, £420.

### 8 Hp. Standard

**Engine**—Four-cylinder water-cooled overhead valves push-rod operated,  $2\frac{1}{4} \times 3\frac{1}{4}$  in., 67 cu. in. displacement, aluminum pistons, ball bearing crankshaft, plain bearing big-ends, circulating splash lubrication with thrower disk on crankshaft in place of pump, battery ignition.

**Transmission**—Single plate clutch, gearset front end of propeller shaft, three speeds, right-hand lever, enclosed propeller shaft, bottom worm final drive, 5.1 to 1 ratio, semi-floating rear axle.

**Chassis**—Quarter elliptic springs, internal wheel brakes, worm and worm wheel steering, disk wheels, 28 x 3 in. tires, wheelbase 102 in., track 48 in.

**Equipment**—Four-passenger body or two-passenger with double dickey optional, electric lighting, mechanical hand starter from seat, price £324 with either type of body.

### 9 Hp. Stoneleigh (Armstrong-Siddeley)

**Engine**—Two cylinders, air-cooled, at 90 deg., integral heads, overhead valves,  $3\frac{1}{2} \times$

$3\frac{1}{2}$  in., aluminum pistons, plain bearing crankshaft, articulated connecting rods, phosphor bronze big-end, pressure lubrication, magneto ignition.

**Transmission**—Single plate clutch, gearset unit with front end of propeller shaft, three speeds, central lever, enclosed propeller shaft, spiral bevel final drive, 5 to 1 ratio, no differential, non-floating rear axle.

**Chassis**—Quarter elliptic springs, brakes internal on rear wheels, worm and segment steering, disk wheels, 28 x 3 in. tires; weight: complete car, 1200 lb., wheelbase 8 ft., track 4 ft.

**Equipment**—Three-seated body, inverted clover leaf pattern, driver's seat, steering wheel and controls central, electric lighting, crank starting, price £225.

### 7 Hp. Wolseley

**Engine**—Two cylinders, water-cooled, 180 deg., integral L head cylinders,  $3\frac{1}{4} \times 3\frac{1}{4}$  in., 60 cu. in. displacement, aluminum pistons, plain bearing crankshaft, circulating splash lubrication, battery ignition.

**Transmission**—Inverted cone clutch, gearset unit with engine, three speeds, right hand lever, open propeller shaft, spiral bevel final drive, 5.1 to 1 ratio, non-floating rear axle.

**Chassis**—Quarter elliptic springs, rear ones supplemented by single thick leaf,

secured above frame to assist in taking torque and drive; both brakes internal on rear wheels, worm and worm wheel steering, pressed steel wheels, 26 x 3 in. tires; weight: chassis 800 lb., complete car 1050 lb., 97 in. wheelbase, 44 in. track.

**Equipment**—Two-seated body, electric lighting, mechanical hand starter from seat, price £310.

### 10 Hp. Wolseley

**Engine**—Four cylinders, overhead camshaft,  $2\frac{1}{2} \times 3\frac{1}{4}$  in., 76 cu. in. displacement, aluminum pistons, plain bearing crankshaft and big-ends, trough lubrication, battery ignition.

**Transmission**—Multiplate clutch in oil, amidships gearset, three speeds, right hand control, semi-enclosed propeller shaft, bottom worm final drive, 5.25 to 1 ratio, semi-floating rear axle.

**Chassis**—Quarter elliptic springs, internal wheel brakes, worm and worm wheel steering, hollow spoked steel wheels, 28 x  $3\frac{1}{2}$  in. tires; weights; chassis 1000 lb.; two-passenger car, 1550 lb.; four-passenger, 1770 lb., wheelbase, 99 in., track, 46 in.

**Equipment**—Two or four-passenger bodies optional, electric lighting and starting, price £525 with four-passenger body, rear seats very cramped for two normal sized adults.

## A New Self-Locking Differential

**A**MONG the earliest types of that form of differential gear having provisions made for so much internal friction that it is impossible for the car to be stalled by one of the driving wheels losing traction, was that patented in England in 1911 by Gavin C. Goodhart. Goodhart's early design was quite effective but was discarded as being too expensive to manufacture. The main difficulty of the problem is to obtain surfaces sufficiently large and durable to absorb the friction and withstand the high pressures within the limits of size available. At the same time the device must be simple, easy to manufacture, cheap and effective.

Goodhart has recently developed another design which he claims overcomes the difficulties met with in his earlier model. This new differential has been tried out by the Vulcan Motor Co. on a 2-ton worm-drive truck and by H. G. Burford & Co. on a  $2\frac{1}{2}$ -ton internal gear drive truck.

The Goodhart differential is of the ordinary bevel type with certain modifications. The side gears are made in two parts, viz., the gear itself, which has a ring of conical depressions on its back and is not fixed to the axle directly; and the coupling piece, fitted directly on the axle

in the ordinary way and carrying on its front face a ring of depressions similar to those on the back of the gear and registering with them. Steel balls are placed in these depressions between the two parts of the sun wheels.

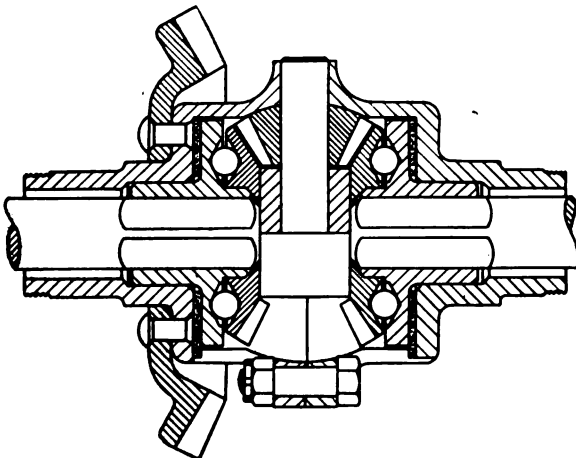
These balls transmit the drive, and in so doing try to climb up the sides of the conical depressions, thus causing considerable axial thrust, which is taken on disks of "Ferrobestos" fitted between the flange of the coupling piece and the inside of the housing. The inward thrust, which is somewhat less than the outward thrust due to the outward thrust of the bevel teeth having to be subtracted, is taken on a hardened steel thrust block in the center, which prevents the gear teeth being forced into mesh too deeply.

The aggregate friction thus set up restricts differential action to such an extent that it only takes place when required, while at all other times the gear works as though the axle were divided.

## Belgian Engineers Want Tariff Changed

**A**HIGHER measure of protection against foreign competition is being asked by the general engineering industry of Belgium. Five hundred manufacturers, including all those in the automobile industry, have petitioned the Financial Department in favor of a higher tariff, particularly against German products, and either a greater degree of protection or reciprocity with France. The Belgium automobile import duty is at present 20 per cent, while the French duty is 45 per cent; as a consequence French makers can sell automobiles in Belgium, but it is very difficult for Belgians to compete on the French market. Germany, by reason of the low value of the mark, is becoming a very dangerous competitor on the Belgian market, while the sale of Belgian automobiles in Germany is almost impossible.

It is believed that an arrangement will be arrived at whereby the import duty against German goods will be increased and the French duty dropped to the level of that of Belgium.



Sectional view of Goodhart differential gear

# Refinements in 1922 Handley-Knight

Changes made in the new model include stiffening of frame, lighter and more easily operated controls, substitution of metal for fabric joints and improved battery mounting. Two new closed bodies are added to line.

By J. Edward Schipper

**F**OR 1922 the Handley-Knight chassis has been somewhat changed and refined and two closed bodies, sedan and coupe, added to the line. The touring body remains the same, but the new chassis is used for this as well as for the two new closed bodies, these three body types comprising the line.

The changes in the chassis are largely concerned with giving greater durability through a stiffer and more substantial structure and to increase the convenience of the driver by making the control pieces lighter and, consequently, more readily handled. Some of the changes also have to do with appearance.

The changes in the control system include a rearrangement of the braking mechanism so as to give a greater leverage and, consequently, a lighter pedal action. The gearshift lever is also more conveniently located and operated. Another change on the control is an improvement and rearrangement of the brake equalizing mechanism to give more complete equalization.

The entire propeller shaft assembly has been redesigned and a heavier propeller shaft employed, and in place of the fabric universals Spicer joints are now employed. The Handley-Knight engine has not been altered in any detail except the ignition, which is now the Auto-Lite system.

The structural changes include a stronger tire carrier and a stronger battery box, the latter being supported by two heavy brackets. For greater durability the wiring system has been completely inclosed in conduits and the wiring has been rearranged and simplified.

The changes which have been made for better appearance include wider, deeper and heavier fenders. Thicker running boards, which are now covered with aluminum instead of linoleum. There is now an aluminum cast trim

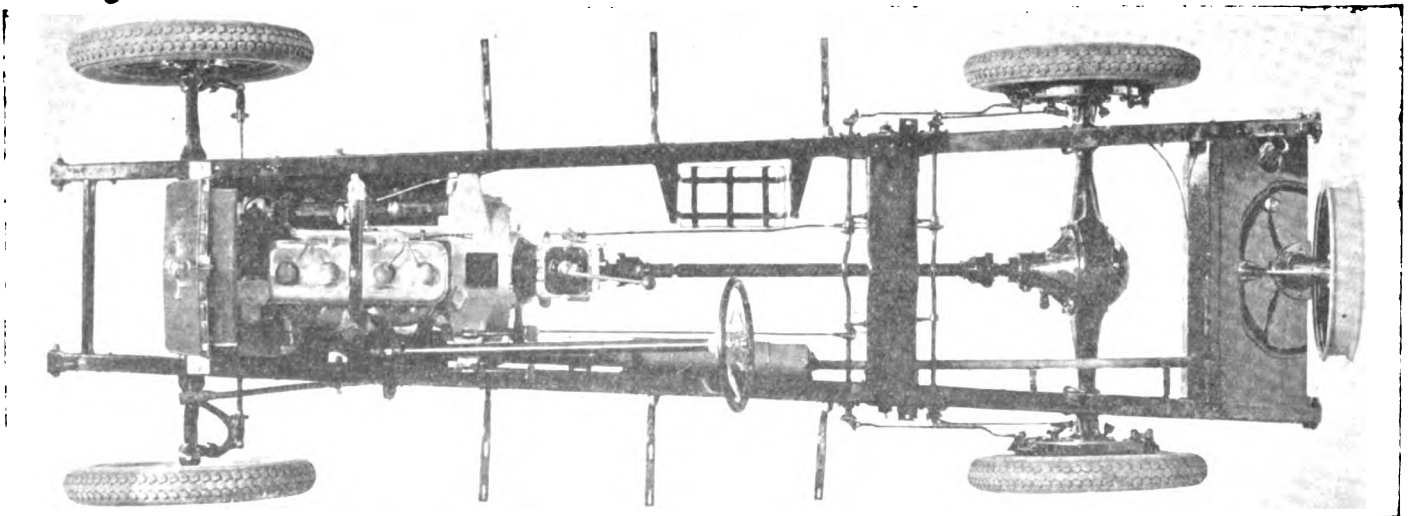
rail running along the sill at the hood line from the end of the cowl to the radiator. The chassis is now lubricated by the Empress oiling system, which employs a high-pressure oil gun.

The two new closed bodies are the sedan-coupe, which seats four or possibly five, and the sedan, which seats seven. The sedan-coupe justifies its name in its appearance, as it is longer than a coupe body and shorter than a sedan. The seating arrangement is of course, controlled by the two-door body. There are individual chairs at the front, with the seat beside the driver tilting forward, leaving a passageway to the rear. The rear seat is continuous and provides room for two passengers readily and three in an emergency.

The seating in the sedan is the regular seven-passenger layout, with two continuous seats in the front and rear compartments and extra folding seats for two passengers. The seats in both models are tilted at an angle and are all supported by extra heavy cushion springs, deeply padded.

One of the features of the sedan-coupe is the large luggage space available. This is reached by lifting the back of the rear seat, disclosing the entrance to the compartment under the rear deck. With this arrangement the baggage can only be reached from inside the body, which assures protection for the baggage when the doors of the body are locked.

The fundamental specifications of the car have not been altered. The engine is a Handley-Knight sleeve-valve type with  $4\frac{1}{8}$ -in. bore and  $4\frac{1}{2}$ -in. stroke. This engine is cooled by thermosyphon and is equipped with Auto-Lite starting, lighting and ignition; Timken axles with Hotchkiss drive and a Gemmer steering gear are employed. The wheelbase is 125 in.



Plan view of new Handley-Knight chassis. Note heavy cross member and substantial mounting of battery container

# A Dutch Passenger-Carrying Monoplane

Fokker machine now in this country carries six passengers or pay load of 1,000 lbs. with fuel enough for 500 miles. Employs internally braced, veneer covered wing and 200 hp. B. M. W. engine in aluminum sheet covered compartment. Comfortable accommodations for passengers.

By P. M. Heldt

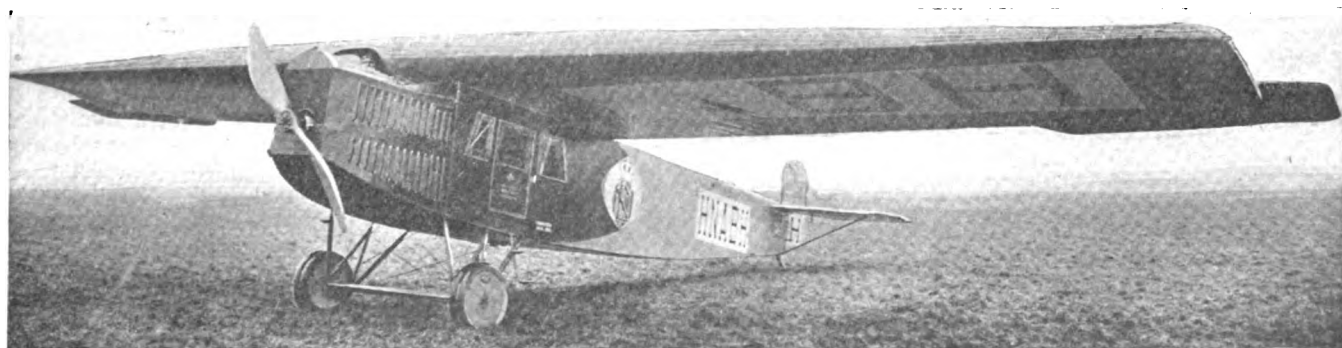
THE remark has often been made that airplanes designed primarily for war purposes are unsuitable for commercial uses. On the one hand, it is impossible with these machines to provide comfortable accommodations for passengers, while, on the other, they are designed mainly for speed and other characteristics that are paramount in war, but without regard to economical operation. It is this factor of economical operation that will mainly determine the success or failure of any enterprise established to carry passengers through the air, assuming that the matter of safety has been given due consideration.

It is a rather surprising fact that whereas there are numerous aircraft passenger services apparently in successful operation in Europe, in this country, where distances are, on the whole, much greater, such services are rare or non-existent. Some of the European lines make use of Fokker monoplanes built by the Netherlands Aircraft Mfg. Co., and of these there are several in this country. This machine is referred to as a six-passenger limousine monoplane, and its outstanding features are comfortable accommodations for the passengers and economy of operation.

A machine carrying six persons with their baggage must necessarily be of considerable size, and would ordinarily be associated with a very powerful engine. But evidently owing to the form of wing construction with internal trussing used in the Fokker, which does away with all struts and truss wiring, the aerodynamic efficiency of this machine is very high, and the engine fitted is a B. M. W. of only 200 hp. output. The Fokker F-3, as this particular model is known, when carrying a full complement of passengers and fuel sufficient for a 5-hours' flight, consumes about 10 gal. of fuel per hour and develops a speed of about 105 m.p.h., thus giving it a flying radius of 500 miles with a 5-hours' fuel supply.

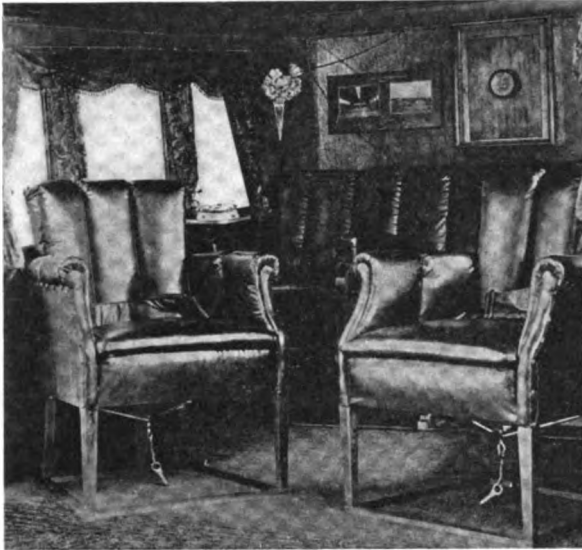
In the location of the fuel tank special attention has been given to the factor of safety. The tank is located between the big spars in the wing and feeds the carburetor through a single pipe by gravity. Being high up, the fuel tank is not likely to be damaged by a bad landing. The tank is so well separated from the passenger compartment that passengers may be allowed to smoke. The radiator is installed in the nose of the fuselage and in cold weather the pilot can regulate its temperature by means of shutters. The engine mounting is of tubular construction and is so arranged that the engine is easily accessible and can be quickly removed when required. For the sake of safety from fire, the whole engine compartment is enclosed with aluminum sheet. Next to the engine is located the pilot's cockpit, which is entered through a door in the side. In this way the pilot has the engine under observation at all times, and another advantage of this location of the pilot is that the engine controls can be mounted directly on the engine and need not be disconnected when the engine is to be removed.

The fuselage is constructed of steel tubing, a system with which Fokker has been very successful. The passenger compartment is roomy and well fitted up. There are easy chairs for five passengers, of which three are fixed and two movable, all facing forward. There are three large windows in each side, two of which can be let down for ventilation. Besides a clock and an altimeter, the usual fittings of a high class limousine are provided. On regular air lines a map of the route and air photographs of towns and points of interest along the route may be fixed on the front wall. The cabin is entered by a full sized door two steps from the ground. Baggage space is provided between the back of the fixed seats and the rear wall of the cabin. Owing to the absence of a lower wing the view from the cabin is particularly free and unobstructed.



Fokker six-passenger limousine monoplane





Interior view of cabin

The wing is of the thick internally braced type; it has a span of 52 ft. 9 in. and is 25 in. thick at the center. It comprises two strong box spars to which solid three-ply ribs are secured with corner pieces. The whole wing is covered with three-ply wood, thus doing away with the rather perishable canvas covering. The calculated safety factor of the spars is said to be 7, but load tests have shown it to be even higher. The whole wing is fixed directly to the top of the body by means of four steel bolts which are calculated for a factor of safety of 14. Ailerons, elevators and rudder are balanced. The control cables for the ailerons are carried through the wings and the pulleys are accessible through inspection doors.

The weight of the machine empty is 2650 lb. and the load capacity is given as 1750 lb., which gives a very high useful load factor.

A neat arrangement is provided for the replenishment of the fuel supply. There is a hand pump located adjacent to the engine by means of which fuel can be pumped directly from the ground supply into the tank in the wing. This pump is fixed in position and is furnished with a length of gasoline hose.

## A New Electric Coupe

**A** NEW Detroit Electric, to be known as the Model 90, four-passenger coupe, has recently been brought out. It is considerably lighter than the brougham model which has been standard with this company for some time. The new car weighs 3385 lb. as compared with 3900 lb. for the brougham. The weight has not been removed from any particular part of the structure, but the car is lighter throughout, both in body and frame, resulting in a slightly higher maximum speed of 25 miles per hr., and a range per charge which has shown itself to be better than 75 miles in and around Detroit.

Three persons can be accommodated on the rear seat, and a fourth in a pullman seat in the right front corner. A removable seat, which is placed in the left front corner, can be used by a fifth person. The rear seat width is 49 in. and depth 18 in. The distance from the front to the rear window is 63½ in., and from the top of the cushions to the roof 38 in. The door opening is 24 in. The car is trimmed in whipcord with Turkish type of upholstery. The panels are painted either in Cobalt, dark blue with light blue stripes or Brewster green with light green stripes. The front and rear hoods, top, upper body structure and fenders are black. Wood wheels are painted

to match the panels. Wire wheels, when ordered, will be painted white, cream, red, blue or green.

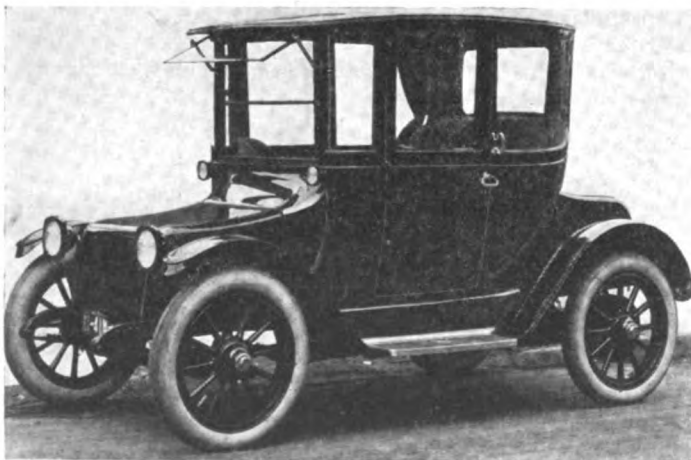
The battery equipment is a Philadelphia Diamond grid, 42 cell, 13 plate. There are five speeds ranging as follows: 6, 10, 15, 20 and 25 miles per hr. The tires are Firestone pneumatic cord size 32 by 4 in. The equipment consists of two headlamps, two body parking lamps, one rear signal lamp, interior dome light, electric Klaxette horn, Hanlon rain vision shield, Warner speedometer, volt and ammeter, charging plug and tools.

## Utilizing Wood Waste and By-Products

**A** SYSTEMATIC survey to determine the possibilities of more complete utilization of by-products, low-grade material and wood waste has recently been undertaken by the newly reorganized Industrial Section of the Forest Products Laboratory at Madison, Wis.

An important part of the survey will include the location and development of new markets for material heretofore considered as waste or unsuitable for a particular branch of work. It is felt in many forestry circles that many wood-using industries are consuming valuable material for making various products in which a cheaper grade of wood could just as well be used. The service will include an exchange which is intended to bring producers and consumers in contact with each other in order to effect a more complete utilization of this material. The service of this exchange will be free to the public. It will include two reports, one on opportunities to buy waste and the other on opportunities to sell waste. The first will contain names and addresses of lumbermen and factories having such material to sell, together with a detailed description of the character, quality and quantity of such material. The other will contain names and addresses of factories in the market for wood waste and the sort of material they desire. With these reports will be furnished, from time to time, suggestions for new markets and new uses for waste material.

The Forest Products Laboratory will make a special study of wood-using industries with a view to determining to what extent cheaper grades of wood can be used in each particular field.



The new 4-passenger Detroit electric coupe

# Details of Body Design at the New York Salon

Close coupled bodies equipped with trunk racks at the rear feature most inside driven cars. The stationary windshield has become popular while devices on the shroud and top provide ventilation. The leather or fabric visor was also much in evidence. Disc wheel losing favor. Designs in the cars exhibited offer an indication of trend in future production work.

By George J. Mercer

**A**CAREFUL and thorough investigation of the motor car bodies exhibited at the New York Salon held last week, brings to light many features of interest to the men in the industry. The advances made in body design may be taken, in a certain sense, as an indication of the trend of designs that will later be used for manufacturers who build in large quantities.

As stated in a general survey of the salon in last week's issue of *AUTOMOTIVE INDUSTRIES*, there were about 60 bodies exhibited. This is not a large display, so far as numbers go, but it should be remembered that the salon represents the collective work of many of the best body style originators in the east. There were 13 body builders having space. Then, too, the industry has passed through a period of depression and this exhibition may mean much in the way of future business. Increased output is a universal desire and it can readily be seen that the best efforts have been put forward to make this show more distinctive than any that has been held for many years.

## Many Berlines Shown

The principal feature of this year's changes is the increased number of berlines. By this term is meant a body that has the appearance of a sedan but has a division between the rear and front seats, making it a two-compartment body. When the inside drive body was first introduced there was considerable hesitation on the part of manufacturers as to the number of doors and the necessity for having a division at the back of the driver. The small wheelbase car has been gradually evolved and its use does not permit such a division because the driver's seat extends too far back into the rear doorway. Consequently most sedan types have, in the past, been made with a single compartment. This show, however, demonstrates that the two-compartment body is required by many purchasers.

Another new feature was the enclosed drive cabriolet. This type of car is likely to be largely confined to the special body class of trade, since it does not lend itself to a production proposition as does the all metal body. As seen at the show it is a slight parody on its name, in that, while it has the appearance of being collapsible, in reality it has a permanent roof body. This body is an adaptation of the English body that has been used abroad for many years, but as shown now it has more practical use for the American market because the doors are full and there are less loose parts to rattle and get out of order than on a true collapsible type.

There is one advantage this type of body may have over other forms of enclosed cars in quantity production. Efforts are being made to get such jobs down to a minimum price and the use of fabric, which is used instead of leather or metal for the tops and sides is a step in that direction. Consequently if this high type of enclosed body can be produced cheaply the advance will be easier.

Another feature embodied in this type is the close coupled idea. The close coupled body has many advantages. It is more sociable; it brings the rear seat forward of the rear axle and therefore makes the riding easier; it makes a lighter body and offers a more pleasing appearance. There is a strong tendency to make bodies that are intended for only five passengers as short as convenient and thus take care of the wish of the owner to carry a trunk or suit cases at the rear. All the short bodies exhibited are fitted with these trunk racks. Their use to cover space left on the frame back of the body is sure to increase. It is the only way to provide carrying space at the rear that will give a well-balanced appearance. The lack of spare room in this section does not permit the use of a sensible looking luggage compartment, for length is necessary for such a design. A trunk rack, on the other hand, can be fitted over the short space and also extend over the gasoline tank. Several examples of the trunk rack are shown in the accompanying illustrations. One is made by the Fleetwood Body Company for Packard (Fig. 5), and another is by Winton (Fig. 3). The illustration of the lock body on a Mercedes phaeton (Fig. 2) shows the trunk attached. An interior of a Pease body on a Packard (Fig. 17) shows a provision made for carrying suit cases in the tonneau. This body, however, also has a trunk rack at the rear.

## Equipment and Interiors

As to the development of the interiors and appointments of inside driven cabriolets, the various makers have relied upon their individual tastes, as can be seen by the illustrations. Fleetwood presented one on the Lafayette (Fig. 27), with a slant front windshield. This is a gray painted job with a white stripe on the black moulding. The guards are also black. The equipment includes a leather visor and two-way windshield, the lower part being stationary. Ventilators are on the top and sides of the shroud and dash lamps are included in the equipment, as are dome and corner reading lamps. Seat pillows and foot cushions are provided and vanity cases are at the rear of the front seat. This location of

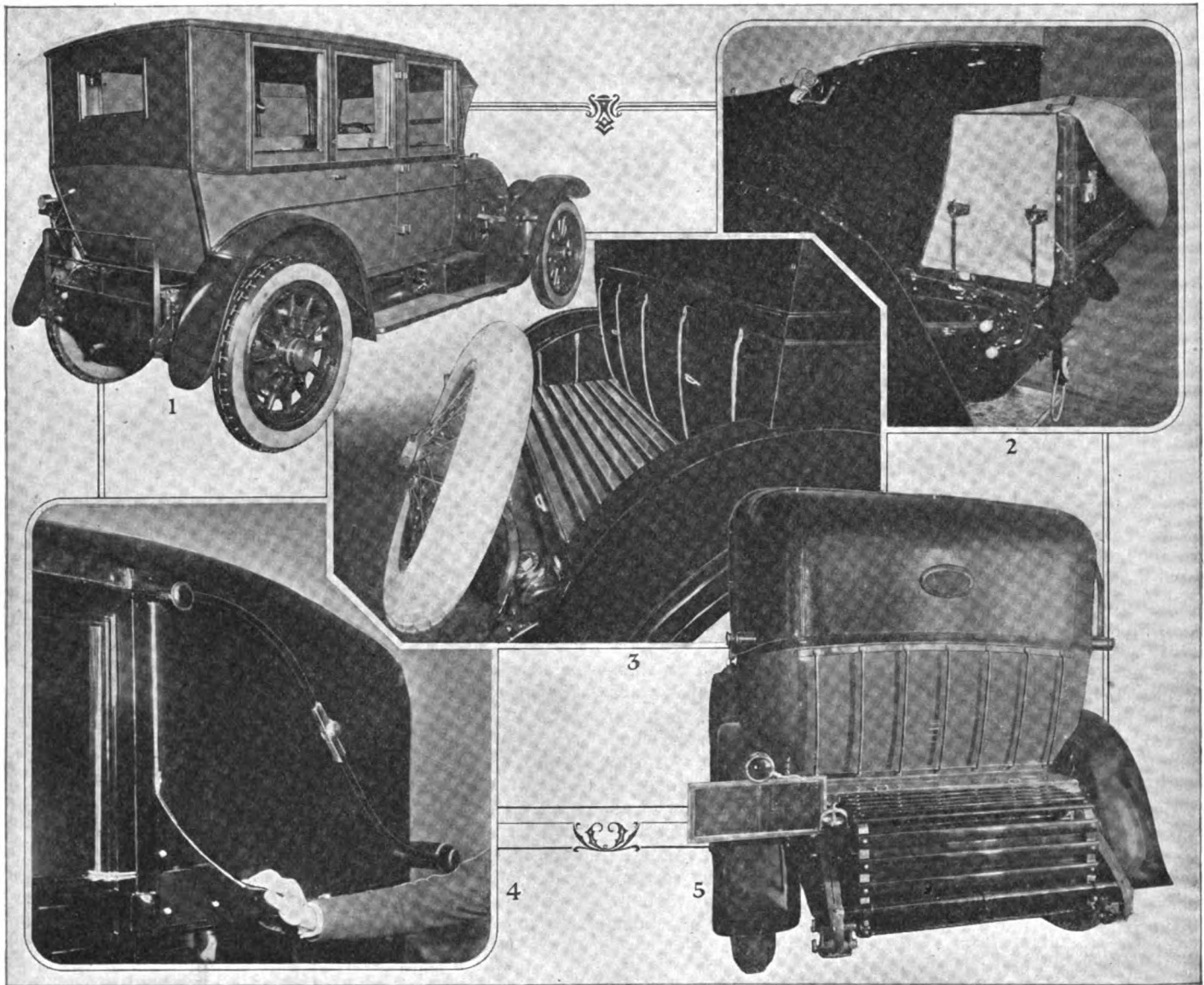


Fig. 1—Brewster berline showing new construction in which fabric panels are used for back and quarter. Fig. 2—The trunk rack and cover and method of fastening on a Mercedes. Fig. 3—Trunk carrying arrangement on a Winton close coupled sedan. Fig. 4—Daniels cabriolet showing joint covered with flap. Fig. 5—A protecting device for trunk and trunk rack on a Fleetwood-Packard cabriolet

these latter articles is an improvement over the side position. The robe rail is directly below these vanity cases. The interior is trimmed with gray granite weave worsted fabric. The doors are trimmed plain and the seats and backs with straight pleat.

The Smith-Springfield body on a Rolls-Royce (Fig. 23) is an example of the straight front style. This is a gray body with a black stripe and two hairline gold stripes. A ventilator is on the shroud and the trimming is in gray Bedford cord.

The Murphy body on the Lincoln (Fig. 25) offers an example of the extremely close coupled body of the same class. This body is painted tango with black mouldings. The trimming material is wool velour of tango color and this model also has the vanity cases at the rear of the front seat. Cycle guards and steps are a part of the equipment. The illustration shows the car with both doors open and the close coupled effect is self-evident.

Two other types illustrated are Healey bodies; one on a Pierce-Arrow and the other on a Falcon (Figs. 7 and 26). The first is a two-door body, although Healey also builds four-door models. These bodies represent an exclusively new feature in door pillars and front corner

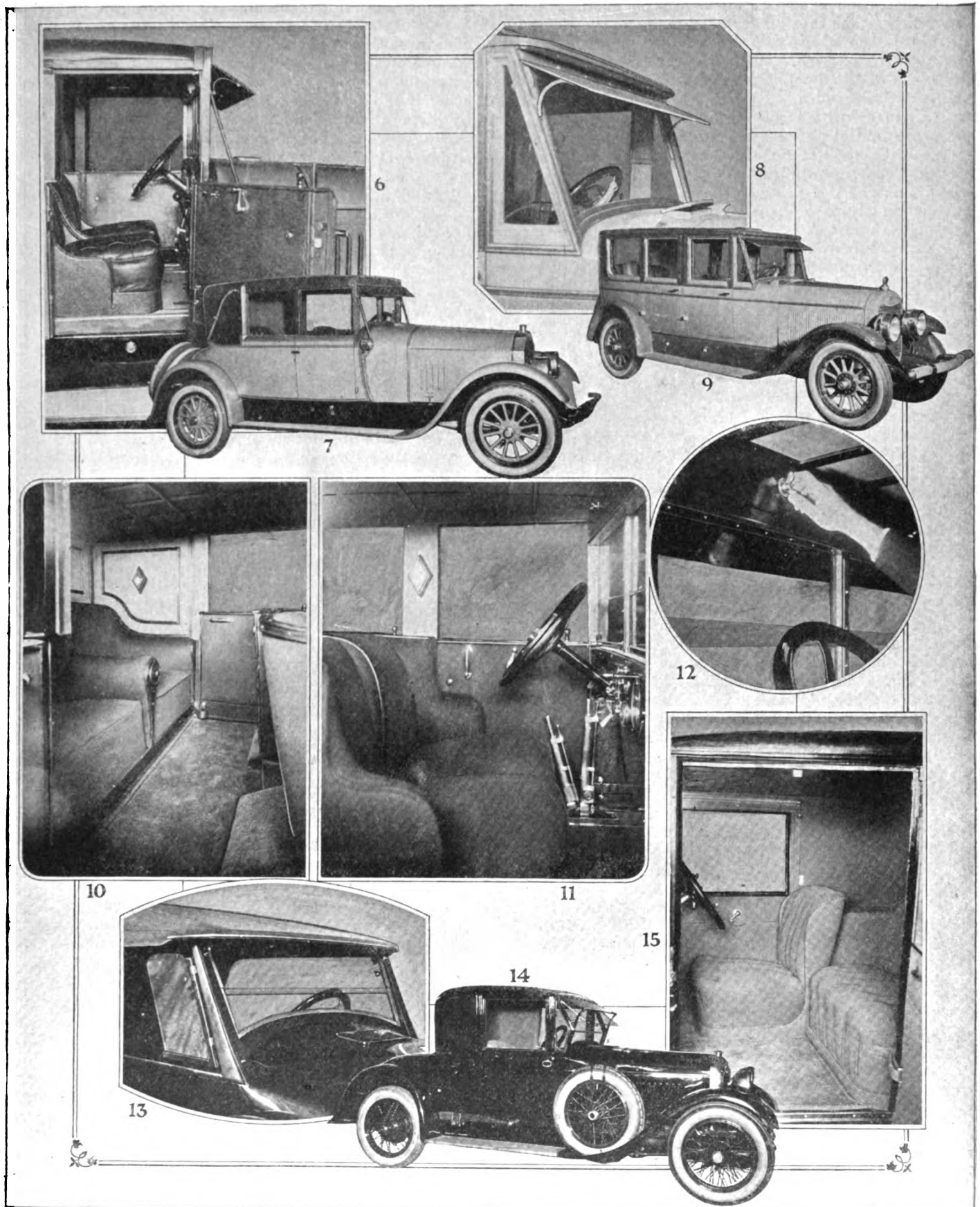
pillars. Close-up views of the four-door body show this feature more clearly.

The first body is painted in two-tone green, the lower part being similar to sea green and the upper much darker with close double white stripes. Spanish green leather is used for trimming and the roof is skeleton lined. The top of the seats and border wood is circassian walnut. This wood has been used largely for interior door handles and the casing for the curtain roller on this model is made of the same material.

The Falcon body is an unusually light and close coupled body and was the lightest and lowest car at the show. It is painted green with black mouldings and upper part.

The illustration of the rear view of the Brewster berline (Fig. 1) shows that the use of fabric is becoming established as a body panel material. Here the rear, side quarters and the roof are so covered. This fabric is secured under mouldings that are put on after the job is painted and the wood screws show plainly. This method detracts from the appearance and in time other and better means for fastening the fabric will be devised. This will be necessary as fabric is to be gener-

## Features of Some New Models Exhibited



Figs. 6 and 7—Healey-Pierce Arrow two door inside driven cabriolet showing small front pillars. Fig. 8—Lincoln inside driven cabriolet showing ventilator on shroud and leather visor. Fig. 9—Fleetwood-Lincoln berline. Fig. 10—Healey-Stevens Duryea inside driven cabriolet showing rear seat divided. Fig. 11—Healey-Stevens Duryea Inside driven cabriolet showing front seat arrangement. Fig. 12—Novel windshield attachment on a Healey-Pierce Arrow inside driven cabriolet. Fig. 13—Murphy-Lincoln close coupled phaeton showing novel side windshield. Fig. 14—Smith-Springfield-Minerva coupe exterior with Brewster windshield. Fig. 15—Smith-Springfield-Minerva coupe showing seating arrangement



ally used for panels. The body on this car is painted a bronze green with black mouldings and white stripes. The illustration shows handles, hinges, windshield and trunk rack. The interior is skeleton above the waist line and the fabric of the rear and the quarter panels is exposed on the outside. This gives the body an extremely light look and is no doubt the forerunner of other bodies using the same idea. The interior trimming is a gray wool texture with brown pin stripe. The trimming is in plain pleats and buttons to maintain the shape on cushions and backs. The use of buttons was quite general on other makes of bodies. It is an improvement over the plain pleat and it permits the natural shaping of the cushion and back to the position of the body. It is more expensive, however, and can be used only on high grade bodies. The body also has ventilators on the top of the shroud and two in the roof. Arm rests on the rear seat enclose the vanity cases and dictaphone. A dome light is located at the top rear above the back light. The front compartment is trimmed in leather. Pipe and point design is used and the doors and body pillars above the waist are skeleton.

#### Use of Visor General

The use of a fabric or leather visor was general among the models exhibited. There was not a single car at the salon having a colored or frosted glass visor. There were a few with the three-way shield with plain glass, but the majority used either fabric or leather over sheet metal or a frame. The illustrations show two examples of this, one on a Lincoln (Fig. 8) and the other on a Pierce-Arrow (Fig. 6). This type of visor has been seen about for popularity since its advent about three years ago. According to the use made by exhibitors this year indications point to a more general use of the material. It can be made for less money and lessens the glass cost in a three-way shield, hence its adoption presents no obstacles. In this connection it should be mentioned that the average extension of the roof beyond the front of the body tended to be short. The Lincoln was one of the longest on exhibit. It might also be mentioned in passing that the sloping windshield was used exclusively on all berlines. Last year the straight front was leading on all enclosed bodies, but this year the reverse is true.

Windshields on both open and enclosed bodies had the lower part stationary and all made use of the ventilator on the shroud. New features on windshields were not much in evidence, Healey having the only radical departure from customary designs. This is shown in a close-up view of their body on a Pierce-Arrow (Fig. 12). The position of the hand serves to illustrate how the glass is operated by turning the handle which raises and lowers the glass perpendicularly. The Brewster windshield has been used on several bodies other than their own.

A new form of side wing for open bodies is shown in the illustration of the Murphy in Fig. 13. The frame work of this is of wood and is somewhat bulky, but the side wing feature is good.

The operation of raising and lowering the door glass has been brought about in a new way by Healey, as shown in Fig. 6. This method is used by the builder on several bodies. On the one shown the top is collapsible and the channel slides with the glass, but on bodies with permanent tops the channel is stationary and the glass alone slides in the groove upon the same principle that the regulation door glass is operated. The advantage of this feature lies in the fact that the body pillar can be made lighter as will be seen from the illustration.

The exhibits, from the viewpoint of uniformity, showed,

on an average, a set that gives a fair indication of the future trend in design. This is true of both exterior and interior. For example, the larger part of the cars have nicked radiators, larger headlights of circular design, and these for the most part are nickel finish. The windshields were often thus finished and the general exterior appearance is brighter. Of course the color scheme at the show is not much of an indication as to the general trend, as show cars are usually dressed up for the occasion. Still there were no loud color schemes. Grays, soft greens and brown with red or maroon finish were popular. In nearly all cases striping was the rule. Much of the brightness at the salon seemed to be brought out by the use of nickel parts. In this connection the use of dash lamps was quite common and sometimes these were larger than the conventional bull's-eye type.

The shapes of the radiators reflected little that is new. Most of them, except those of foreign makes, are of standard design. However, if any indication may be gleaned from the combination of body and hood lines, the use of rounded lines will be the rule. Some few bodies have square rear corners, but not enough to show any leaning in this direction. There was an indication of the resurrection of some of the older forms of appointments, such as pillar lamps on broughams, loop handles on the doors and tee moulding. It would be difficult to say whether the use of mouldings has lost or gained. There were more bodies with mouldings at the bottom than last year and there was the usual proportion with flush doors. Holbrook brought out an innovation in making use of the recessed panel effect on both open and closed bodies. This panel separates the upper and lower body and is painted a contrasting color. On the open body this panel effect is continued through the hood to the back of the radiator, thus giving the long straight line effect that is sometimes attained by the bevel edge or moulding. The bevel edge was shown on but two cars at the salon and this in a modified form on the fore part of town car bodies.

#### Soft Roof Makes Gains

The soft roof made rapid gains this year. There were not more than two bodies in the show that had solid roofs. Some of the bodies have metal covering over the corners and the soft panel in the center. The skeleton roof was shown in several cases and with splendid effect. It gives a light appearance to the interior and is suitable for an all year body.

The use of the enclosed rear quarter has increased considerably. It is not to be expected, however, that the use of this type will become popular with the general public. It does, however, indicate the use of smaller rear quarter windows on close coupled bodies and it is believed this practice will become more general in production work. Some of the cabriolets shown have very small back windows. This is permissible for chauffeur-driven cars of the town car type where the driver is outside, but for utility and safety the large back window has an advantage.

Ventilators are the rule on all cars. As was stated before the stationary lower part of the windshield as used at the show necessitates the use of the shroud ventilator. This is generally used at both the top and sides of the shroud. The use of a ventilator in the roof was also quite common and is a necessity when the rear quarter is without a window as many of the new designs are made. In fact, increased use of the roof ventilator may be looked forward to. It has a decided advantage in ventilating and increasing the comfort of the car.

From the illustrations shown, and the tendency indicated that bodies with fabric sides will increase, the ap-



## Interior Features at the Salon

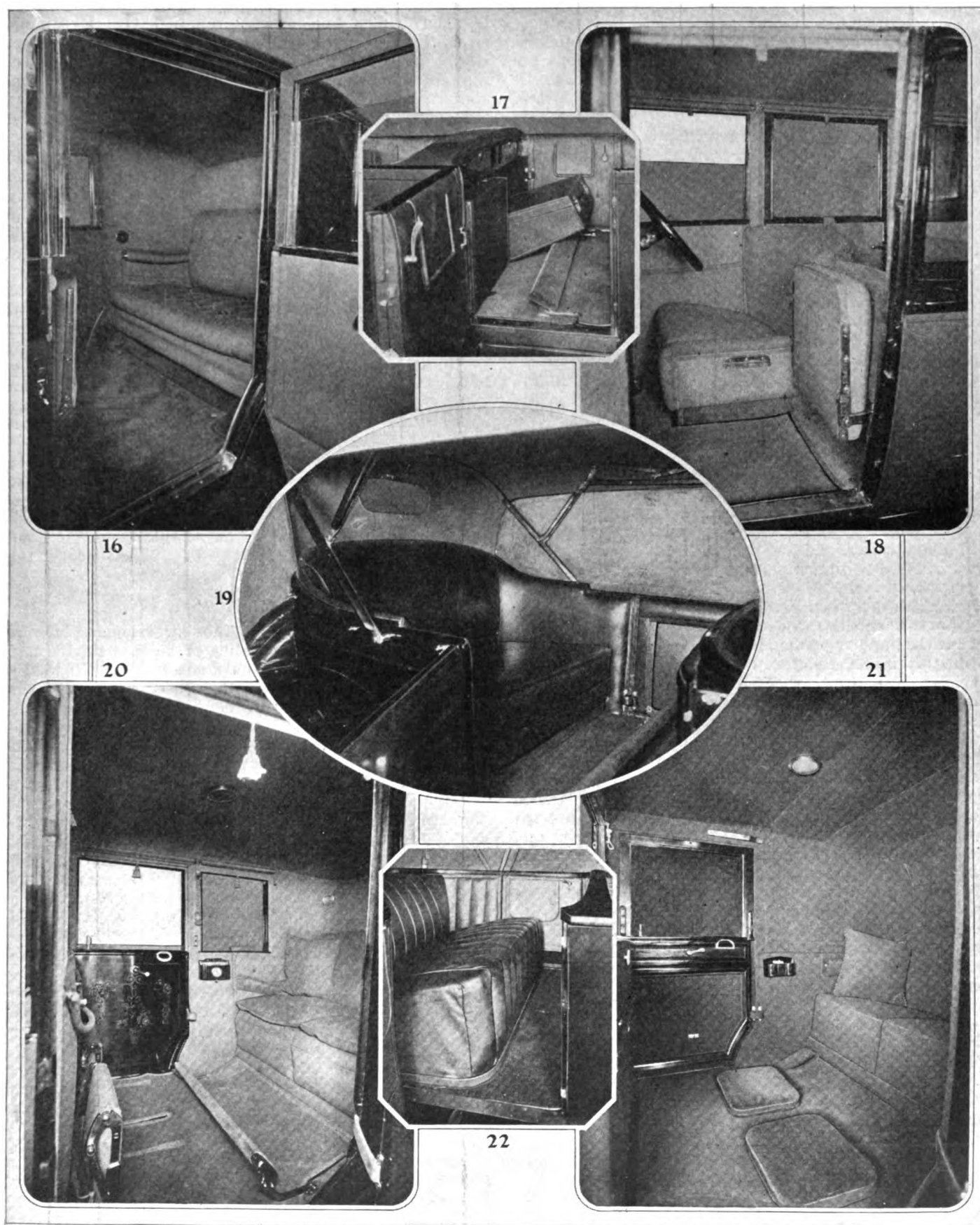


Fig. 16—Brewster cabriolet, showing interior trimmings. Fig. 17—Pease-Packard phaeton, showing arrangement of suit cases in tonneau. Fig. 18—Fiat inside driven two-door body, showing operation of folding seat. Fig. 19—Holbrook-Packard phaeton, showing trimming and wood bows of top. Fig. 20—Brooks Ostruk-Minerva cabriolet. Notice the natural wood finished interior. Fig. 21—Interior finish and seating of a Daniels cabriolet. Fig. 22—Rear interior of a Murphy close coupled phaeton

pearance of the roof will be thicker as viewed from the outside, because the corners will be more rounded to carry out the cabriolet effect that has been the parent of this new design.

The use of steps in place of running boards did not show any gain over other years. In fact indications are that the running board will hold its own because it shows a defined line that helps to emphasize the length of the car. At any rate the attitude of those who exhibited would indicate that the idea of replacing the running boards with steps had not met with much favor.

The mudguards that showed to the best advantage and those most in evidence, were the full crown shape, the rear following the contour of the wheel and well down at the back with a slight reverse curve and the front quite long before connecting with the running board.

#### Disk Wheel Losing Favor

The disk wheel did not have many devotees. Wire wheels were used to a considerable extent, and these, with the spoke wheel, made up the bulk of those shown. The carrying of the extra tire or wheel was fairly divided between the rear portion and on the side at the front. This does not mean much to the average car builder, because there has always been the proportion of cars in the larger cities that use the front position. The utility of the rear position, however, is well established for the majority of car users.

The correct method of hinging the doors on closed bodies does not seem to have been certified as yet. Doors were made to open in all ways possible. The safest way is to hinge them at the front, as most phaetons are made, but there is dissatisfaction with this method on the part of many as it is inconvenient for entrance or exit. Then, too, at times there is more or less mud on the rear guards and for this reason the door is best hinged at the back so that the handles of the two doors come together. This is illustrated in the picture of the Murphy inside driven cabriolet (Fig. 10).

Both the two and four-door variety of inside drive bodies were in evidence, but by far the larger number used the four-door model. Traffic on one way streets compels passengers to alight from the left side if they wish to alight on the left sidewalk. This is having its effect in bringing into favor the four-door body, therefore the close coupled body of this type is looked forward to by many as the body that will supersede the coupe. There was only one body of this miniature sedan shown. There was also but one coupe shown and there were only three conventional type sedans on exhibition. There were several two-door inside drive five-passenger bodies and one illustration of a Fiat (Fig. 18), shows the arrangement of swinging the seat to allow entrance to the rear while the Minerva (Fig. 15) shows the conventional coupe with hinged front seat and large entrance way.

#### Interior Trimmings

The interior hardware showed harmony in design and the dull silver finish prevailed. The dome light was the rule and this was placed in the center. For two compartment bodies one light was used on both compartments. Corner reading lamps have come back. In fact there was almost an ostentatious display of all that ever belonged in a body except the arm holders, and even these have come back to the extent that toggle grips were used in many cases. All the articles in this display have a use and they are of rich design and appropriate, but their arrangement was often such that their presence was exaggerated. For instance, grouped close together on many of the bodies, would be a natural wood

vanity case with silver contents, a silver telephone, a regulator handle and a pull to handle, all of silver finish. Some bodies had arrangements that made these less conspicuous by different grouping. As an example, on the close coupled bodies, the vanity and smokers set were arranged on the rear of the front seat. Then, too, the inconspicuous telephone or dictaphone helped in this way. Brewster used the front end of the arm rest to contain these while Healey made use of a natural wood locker to contain them.

The hardware on one body is of very sombre shade and this helps to minimize the appearance of too lavish display of jewelry. Healey has the handles and many of the parts circassian walnut with silver finish. The use of highly polished natural wood finish mouldings around the windows in place of the dull finish helped to improve the interior harmony.

A few of the bodies were finished with natural wood panels and strips similar to the custom in use several years ago. Four illustrations of this are shown. The Brooks-Ostruk (Fig. 20) shows the entire door panel; the Daniels (Fig. 21) shows strips on the doors and the two Healey bodies on Pierce-Arrows show circassian walnut trim on top of the seats and forming the arm-chair effect. This last was the most harmonious because it showed no sharp contrasts.

The dictaphone was placed on many of the bodies in an incorrect position, in that it was not convenient to make use of the instrument without bending one's body in a very uncomfortable position. It should be high enough and far enough forward so that when the hand is used to press the button the elbow will not cover the plate and virtually prevent its free use.

#### Fabrics Similar to Last Year

The fabrics used for the interior trimming of the closed bodies is the continuation of an idea started last year. Velour was used on only one body and partially used on one other. All the others used cloths with the exception of a few using leather. This latter was customary for trimming the front compartment of two compartment bodies. It is rarely used for the rear compartment as it is too cold. The predominating material was wool fabric. The color gray predominated with often a pin stripe of darker shade. Other shades were used, but they are few in number and the texture also was slightly different. The majority have the regulation short nap, but some using wool velour had the long nap that goes with this material. Broadcloths were also used to some extent as were Bedford cords and a few used a new material that has come out for this purpose called a granite weave worsted. The illustrations shown demonstrate the style of trimming. The interior of the Brewster cabriolet (Fig. 16) shows a plain pleat with buttons and the cushion made more like the old carriage cushion. The arm rests on most of the bodies have a pocket under them which is used as the receptacle for the telephone when not in use. The Brooks-Ostruk (Fig. 20) is also the interior of a cabriolet and shows pillows on top of the cushions, as well as the pillow at the back. Pillows were evident on many cars, one generally being placed in the corner and foot cushions were also general. The two views of the Healey show this body trimmed plain. The rear seat view also shows the locker in which the vanity case is stored and the shape of the foot cushions. The side lamps and the skeleton roof are also depicted and the view of the front seat shows in addition the narrow front pillar construction, the divided windshield and the side lamps.

As a rule all doors were trimmed plain and no welt used. At times a cord welt was used and some had a

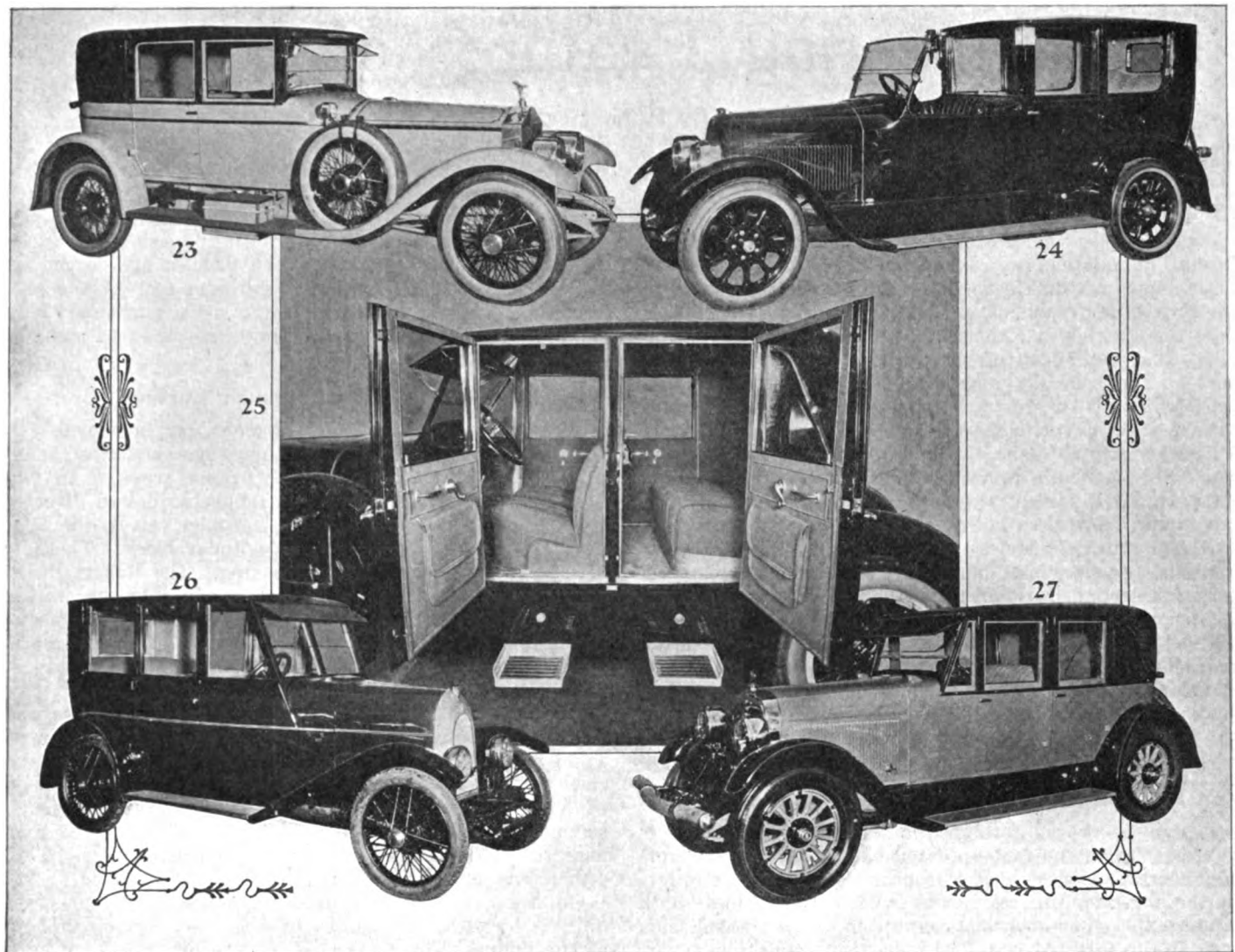


Fig. 23—Smith-Springfield-Rolls-Royce inside driven cabriolet. Fig. 24—Fleetwood-Flat brougham. Fig. 25—Murphy-Lincoln inside driven close coupled cabriolet showing interior and arrangement of vanity cases. Fig. 26—Healey-Falcon two door inside driven cabriolet with quarter window. Fig. 27—Fleetwood-Lafayette inside driven cabriolet

carpet line at bottom. Manufacturers who are showing new samples of cloths are also displaying narrow lace, anticipating that this will come back into favor.

As to styles on trimming, there is a tendency to use buttons to some extent with a pleat to shape the seat cushion and back. There were a few bodies that showed the pipe and point design, but in all cases the appearance was always in evidence of a very soft, flexible cushion and back rather low as compared to former years. The look sought by all is to keep the car down and this can only be obtained by minimizing the interior sizes.

The open bodies included a Holbrook on a Packard (Fig. 19). This body has the recessed panel all the way round the back and to the radiator. The interior seating shows plain trim design, while that of the Murphy body (Fig. 22) shows the pleat. This latter illustration also shows the close coupled body and deep cushion and wood trim on the top edge of the seat. However, as shown, the height for the back is not sufficient for comfort, although the trim as shown makes a clean cut design. Both these pictures show the top to some extent. Wood bows natural finish and nicked slat irons are used on nearly all tops. The fabric used is light in color and European custom has been followed on this part of the body. Foot rests are generally used as well as robe rails on all open bodies. The windshields on these bodies

have stationary lower part and nicked shields are popular.

Flush doors are the rule on open bodies. The future name for this type of body will be phaeton. The name "touring body" has lost its application as indicating the open body and the standards committee of the Society of Automotive Engineers have decided to adopt what is a more universal name, phaeton.

Roadsters were confined to one. This was exhibited on the main floor on the Richelieu chassis and was a large body for its class and had a seat outside the body on the right side and the step for entrance had an extra pad that provided foot room for the occupant. Cycle guards and steps were used.

**A**N engine bearing with large radiating flanges to help carry off the frictional heat has been placed on the market by the Bearing Engineering Syndicate. The bearings are similar in shape to regular bearings, but are provided with radiating flanges at both ends, which extend parallel with the crank arms. While the ordinary bearing is supported by the metal of the crankcase wall or its partitions, oil is likely to get into the joints and prevent the ready conduction of heat. It is claimed that as a result of the better heat radiating facilities the Radiated Bearing will last longer than an ordinary bearing.

# Engineering Features of Salon

By P. M. Heldt

**F**ROM a technical standpoint we never look for very much at the Automobile Salon that is entirely new.

Coming as it does directly after the great foreign shows, whatever there is of recent development among the foreign chassis has been exhibited at one or the other of these shows and has been covered by reports on them by our foreign correspondents. Leading American car makers, even though they may exhibit at the Salon, would hardly select that exhibition of comparatively narrow appeal to present any radically new designs. Novelties would be expected only from those manufacturers who cater chiefly to that select clientèle for whose benefit the Salon is held.

The one car to make its first appearance at the Salon was the Richelieu, a new assembled product from Asbury Park, N. J. It is typical of a class of car of which there are already several on the American market, having a powerful four-cylinder engine, a sporty type of body and high-class equipment. The engine is a Rochester Duesenberg four-cylinder  $4\frac{1}{4}$  by 6 in., 85 hp. Other parts and equipment include a Brown-Lipe clutch and transmission, Standard Parts front and rear axles, a Gemmer steering gear, Bosch magneto, Westinghouse electric equipment, Hartford shock absorbers, Romon lubricator, Fleetwood body and Houck wheels. The car has a 130-in. wheelbase and is made for the present in three and four-passenger open types.

## Unit Power Plants on Foreign Chassis

Looking over the foreign chassis at the Salon one is impressed with the fact—pointed out at once by our foreign correspondents—that European design tends strongly in the direction of rear axles with torque tubes, with either a forked or spherical connection to the transmission case at the forward end. The spherical connection apparently is much more prevalent than the other. At the same time Continental manufacturers have gone in quite strongly for unit power plant construction with three-point support. As many of them are using four-speed gearsets which overhang the engine supports on the flywheel bell housing a considerable distance, which supports are generally more or less hidden by the dashboard, and as the torque tube extends directly from the rear end of the overhanging transmission without any support from the frame at that point, this gives a chassis of unusual though very clean-cut appearance.

There are two eight cylinder-in-line engines at the Salon, the Duesenberg, which was fully described in a recent issue of *AUTOMOTIVE INDUSTRIES*, and the Isotta Fraschini. Both of these are chassis of exceedingly trim lines. The Isotta has a wheelbase of 146 in., which is probably the longest wheelbase passenger car that has ever been built. This car has a lock on the transmission. There are three finger levers on the steering wheel, for the spark advance, the throttle and the mixture adjustment respectively. All three are of the same design and are spaced evenly in a circle, but their uses are plainly marked on them. Many features are notable on this chassis that are adopted in the interest of clean chassis lines, for which Italian cars are so noted. Thus the timing shaft for the ignition distributor passes through the crankcase from one side of the engine to the other. The high tension ignition cables from the distributor do not extend directly to the spark plugs, but pass through an inclosed space at the side of the engine, so that the visible portions are com-

paratively short. The front springs are held to the axle by pressure plates which have four threaded studs forged integral with them. The rear underslung semi-elliptic springs are held to loose collars on the axle housing by U-bolts or saddle bolts for which saddles are forged on the collar, one in front and one in the rear of the axle housing. This is contrary to the usual practice where saddle bolts are used, where they are made to straddle the axle housing itself.

## Two Carbureters on Multi-Cylinder Engines

A new six-cylinder model of Benz car is shown. In this, as in the Isotta eight-in-line, there are two carbureters. The cylinders of the Benz six are cast in two blocks and each block has its carbureter bolted directly to it, on the side opposite from the inlet valves, the inlet passage extending through the cylinder block. There is a tire pump on the cam gear housing. The Robert Bosch electric system is fitted to this car. In this the starter motor is engaged with the flywheel gear ring by means of a sliding armature under the influence of the magnetic pull of the field frame, relative to which the armature is axially displaced by a spring. This is the system originally developed by Rushmore, whose plant and business was bought by Bosch about eight years ago. In order to avoid possible injury to the flywheel gear ring from the clashing action of the gears, the starter pinion is made of hard bronze and of comparatively small dimensions, so that its teeth are weaker than those of the driven gear and would break first in case of abnormal stress. This pinion is a cheap part and can be quickly replaced.

On the Benz the transmission, which is a four-speed unit, is mounted amidships, between two cross members of the frame. The cross shaft of the brake linkage with the equalizing mechanism is inclosed in the gear box, which tends to make the chassis layout cleaner. There is also a neat feature on the circulation pump. The inlet and outlet to the pump are in the form of a single casting of T shape, mainly above the pump proper. To the horizontal sections of the T the hose connections to the radiator and jacket are secured, bringing these two connections in line and making it appear as though the water passed from the radiator directly to the engine jacket. The Vee fronted radiator has led to the adoption of a rather peculiar-shaped fan. This fan is quite small, the large size of the radiator making much assistance from the fan unnecessary. It would seem that in the design of this Benz an attempt had been made to meet somewhat contrary requirements, namely, large size of car and economy in fuel consumption and upkeep, for the engine is very small in comparison with the space provided in which to lodge it.

Since the cars at the Salon are representative of the high grade product of the automobile industry, it is interesting to note the type of wheels on the models exhibited. Wood wheels are in the lead, but wire wheels follow closely, while the disk and pressed steel spoked types are used on a few models only. A rather remarkable feature is the strong representation of wire wheels, these being fitted on the following makes of cars: Benz, Isotta, Minerva, Hispano, Rolls-Royce, Cunningham, Winton, Lanchester, Daniels, Baker electric, Duesenberg, Rochambeau and Richelieu. Some exhibitors, like Winton and Daniels, show models with two or three different types of wheels.



# Marketing the Motorcycle

## Part II

Some phases of motorcycle selling are common throughout the industry. Others are individual to specific companies. The general phases are discussed in this second article. A broad vision of marketing, proper dealer organizations and co-operative research are among the topics treated.

By Norman G. Shidle

**M**ETHODS have been discussed regarding the determining of the potential fields for motorcycles in a given territory. When this has been done as accurately as possible, in view of the statistical and economic data available, the problem remains of actually selling machines to the largest possible number of those who comprise that possible market. Under present conditions it may as well be admitted that this possible market is not identical with the immediate probable market. Moreover, the total immediate probable market as a whole is not the immediate probable market for every individual motorcycle manufacturer.

The problem of the individual manufacturer, then, is to determine what part of that entire market constitutes a possible market for his type of machine and the proportion of that section of the entire market which he can hope to sell. It is scarcely sensible for any single manufacturer to expect to sell 100 per cent of the possible market in his class and to build up his production and sales organization accordingly.

These detailed factors can be determined only by a study of individual production and sales statistics, however, and are not included in the field of these articles.

There are certain general factors in regard to selling, however, which would appear to apply throughout the motorcycle field. Some of these have been discussed before, but they are so fundamental as to warrant repetition in considering the general problems of marketing the motorcycle.

The chief factors in motorcycle merchandising at present, perhaps, are as follows:

1. The dealer organization
2. The relationships of local rival dealers
3. The relationships of rival manufacturers
4. The human and psychological factors of the market
5. Relation of temporary actions to permanent progress

At the recent motorcycle show in Chicago motorcycle manufacturers are reported as showing more interest in dealers and prospective dealers than ever before. During the last few years, when demand exceeded supply, only large city dealers were supplied. Small town dealers were entirely neglected, with the natural result that these small town dealers are not responding very enthusiastically when called upon at the present time.

Manufacturers in general are apparently convinced of the ill effect of the current misuse of the motorcycle and, in establishing new dealer contacts, this factor is being considered. A definite effort will probably be made to establish the motorcycle socially.

The one new vehicle exhibited at the show is interesting from this marketing as well as from a mechanical point of view. Reports indicate that this new automobile-built motorcycle is to be sold on a basis definitely different from that of other motorcycles. It is to be sold as a utility transportation vehicle. Its speed is limited to 35 miles per hour. The following statement, made by

the publicity agents for this vehicle, is also of interest: "There have already been enough inquiries from automobile dealers to indicate that the logical sales outlet is through the automobile dealer."

This will be an interesting experiment. Some other motorcycle companies, as a matter of fact, are reported to be signing contracts with automobile dealers in small towns.

They believe that it is likely their equipment will have to be sold from the transportation shop in the small town. All these developments indicate the vital dealer problems which are properly concerning the motorcycle manufacturers at present.

The dealer is the contact point with the public, and he is largely instrumental in molding public opinion of the motorcycle, regardless of publicity efforts of the manufacturer direct to the buyer. Thus the dealer organization assumes a peculiar importance in the motorcycle marketing scheme.

In another sense the dealer organization must be carefully considered from the standpoint of the individual manufacturer. There is a distinct difference in the potential market of the big power motorcycle and the middle-weight and light-weight machines. A manufacturer may be better off temporarily without any distribution in a given territory than to have his product in the hands of a dealer not thoroughly sold on his type of machine.

The type of dealer is important, therefore, from the standpoint of the selling appeal of the particular vehicle. The large majority of dealers in the motorcycle business to-day are thoroughly sold on the high-powered, speedy



motorcycle. This group comprises those dealers who have been in the business for many years, who know all the race riders by their first names, who follow racing records closely, who like the thrills of high-speed driving themselves, and who are capable of selling this type of vehicle to the limited group with similar interests.

In this group of dealers are some high-grade business men, who have visualized the utility possibilities of these big machines and who see the possibility of an expanding market through a promotion of the less dangerous and more enjoyable sporting phases of the motorcycle. This section of the high-powered dealer group is not in the majority at present. The type of man is readily recognized, however, and he is probably capable of developing the field of this type of vehicle to its ultimate extent—which is probably a little wider than that known by total motorcycle sales in the past.

In other words, the best type of dealer now in the business should probably be called upon to sell the high-powered machine. The dirty, unintelligent type of dealer should be eliminated from every kind of motorcycle selling. The best type of dealer, just referred to, is capable of selling everyone that the uncleanly, low-grade dealer sells to—and he can sell to many others besides. The low-grade dealer, through his influence and methods, increases sales resistance to motorcycles in general to a greater extent than any other single factor.

One of the metropolitan dealers of a high-powered machine, for instance, has a shop which is so filthy, so dark and so unpleasant in every way that no self-respecting man would venture into it under any circumstances. Fortunately for the manufacturer involved, the methods of display used by this dealer are so bad that it is difficult to determine what business he is in.

It appears, then, that the majority of dealers now in the motorcycle business are those who have sold the high-powered machine for years and who are "sold" on that type of vehicle. Many of this group are definitely the type of men who do the industry more harm than good. The higher type of dealer now in business, however, must be multiplied. He is capable of marketing the high-powered machine efficiently and of giving it the widest distribution possible.

The education of these dealers must, of course, go on. But manufacturers will do well to estimate carefully where the possibilities of such education begin and end in the case of each dealer. Education implies some basis of starting. There are many dealers selling motorcycles to-day who can never be sufficiently educated to make them a profitable investment from the standpoint of ultimate sales expansion. Not only the actual sales of the individual dealer must be considered, but also his effect upon the motorcycle market in general. This is peculiarly true of the motorcycle, as noted before, because of the prejudice against it which exists so widely. The high-type dealer of this group, moreover, who either exists or can be developed, will relegate to its proper limited importance the matter of racing and race records.

The racing deaths of recent months have probably done more to strengthen the prejudice against the motorcycle than many thousands of dollars spent in propaganda work could hope to overcome. The general public

is interested in the news items describing the death of riders. It is not at all interested in the technical discussions of racing rules and M. A. T. A. regulations which follow such events.

Motorcycle marketing should be visualized as a whole. The prime purpose of the manufacturers and dealers is to sell more motorcycles. Racing has a small part to play in this broad scheme of progress. In tracing the benefits which apparently accrue from racing, manufacturers should consider as well the vast sales resistance which is caused and strengthened by this same means. If an accurate analysis and balance were possible, it is very doubtful as to which side of the scale would weigh down.

Manufacturers sometimes plead that they would like to curtail racing expenditures and the emphasis which has been placed upon racing, but that they cannot do so because their dealers would not permit it. Dealers of this kind are not maximum motorcycle sellers. The dealer whose view of the merchandising problem is so thwarted by the racing bug that he considers it of major importance, will not develop maximum sales in his territory. It is encouraging to note this statement in a recent issue of a motorcycle paper: "It is in the air that factory-promoted races will end with 1921."

The high-type dealer, many of whom are already connected with various manufacturing organizations, would promote other sport events for the big motorcycle which would not only be less dangerous, but would interest more people and which would bring the motorcycle before the public in a favorable light. The details of these phases need not be discussed here, since they

are thoroughly understood by men within the motorcycle industry.

### The Light Motorcycle

The light motorcycle, however, presents a distinct marketing problem. A majority of the dealers selling motorcycles to-day are thoroughly "sold" on the high-powered type; this is true even of the high-type dealer about whom we have been talking. That there is a definite field for vehicles of this kind and for dealers of this kind is not to be doubted. Past and present sales and statistics prove that. They also prove, however, that there is a definite limit to the number of such machines that can be sold; that these limits are already close enough to be defined in a general way. This does not mean that such motorcycles cannot be profitably made. It does mean, however, that the annual sales curve for this type of vehicle has almost reached the point of permanently straightening out.

Thus if the lighter motorcycles are to attain a numerical development similar to or greater than that already achieved by the big machines, they must sell their product to a different class and type of buyers than those to which the big machine appeals. In other words, so far as the ideals of the present majority class of dealers and buyers is concerned, the big machine is superior to the small machine in every way.

There are other types of buyers, however, with different ideals and different purposes, who may be

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**H**ERE is a statement from within the motorcycle industry:

"We strive to reach a field of dignified, clean-cut riders. To do so we educate them in terms of exalted speed and daredevil exploits of track burners. We bemoan the presence of public disfavor and to remove it we increase the burden by eternally shouting Speed, Speed, and more Speed.

"The almighty dollar is so close to the nose of some that it blocks the view of the great heap of dollars that lie just beyond the narrow field of prospects developed by racing."

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sold on the light motorcycle if approached in the right way. This can be accomplished only by a dealer organization which is thoroughly sold on the field and possibilities of the light motorcycle. The usual motorcycle dealer handling a light machine, in addition to a heavy machine, is not likely to do the latter justice.

An example of this occurred recently when a man interested in a light individual transportation vehicle went into a dealer's shop. This dealer handles about twelve different types of motorcycles, ranging all the way from one which will go over 80 miles an hour down to small machines which are little more than bicycles with a motor attachment.

The customer indicated his interest in one of the lighter machines and desired to have his convictions concerning their performance and possibilities strengthened. He was not very strong for motorcycles in general, since he had imbibed much of the popular prejudice; but he was rather interested in a light vehicle, not costing too much, which would take him back and forth from work.

The salesman met this customer's approach by stating that the light machine might do for some people, but said in a rather disparaging tone of voice that it really wasn't much of a machine, anyhow. He indicated that anybody with any red blood in his veins would want one of the big, powerful machines which he himself rode. He then proceeded to relate great speed records which he had made on such a big machine himself, and told much of the power accomplishments, etc.

He finally indicated that he would, of course, be willing to sell one of the lighter machines if anyone insisted upon it. Nevertheless, the customer gathered that this particular salesman, at least, would rather look upon anyone who actually preferred such a machine as something of a "nut" or curiosity.

While perhaps not so marked in every case, this attitude is somewhat typical of the average motorcycle dealer of to-day. The light motorcycle cannot be competently handled by such men, regardless of their business ability, their well-kept salesrooms and their selling achievements.

It would seem that an entirely new dealer personnel might have to be developed; this new group of dealers to sell to an almost new group of buyers. The growth along this line would of necessity be very slow. A new idea and new methods cannot be expected to mature over night. Moreover, the light motorcycle will continue to suffer with the big one the public prejudice which exists against the motorcycle in general, and will thus have additional difficulties to overcome.

Some manufacturers of lighter vehicles, however, already have come to this conclusion and are starting on the road to permanent progress. It is perfectly possible that the road will be longer to increased sales, but once the upward swing is started there would seem to be far greater ultimate possibilities than have thus far developed in the high-powered vehicle market.

#### Co-operative Action

There are certain problems, however, which the motorcycle industry faces as a whole. These problems must be met co-operatively. A big vision of the possible development of the motorcycle in America must be substituted for all attempts to gain small and temporary advantages. A sincere spirit of co-operation among all manufacturers and a definite effort to face constructively the problems confronting the industry might mean thousands of dollars in the pocket of every individual firm within the next 10 years.

Such co-operation would involve the exchange of intimate information and the development of constructive marketing research. The difficulties of the individual manufacturer at the present time do not really lie in the competition of other manufacturers, but in the overwhelming prejudice existing against all motorcycles, in the limited uses to which the motorcycle has been put in most cases and in the lack of accurate marketing analyses.

In carrying out co-operative efforts all agencies within the industry might do well to examine these more fundamental factors in an attempt to determine some real facts upon which to base progressive development. These things are vital to the industry and are more important than questions as to whether or not anyone should be allowed to participate in an M. A. T. A. run unless he is a registered member. There are fundamental problems facing the motorcycle industry. Most of them are such as call for co-operative, constructive thought and action at the present time.

None outside the industry is capable of solving or even of visualizing these problems completely. It is the task of the men within the industry and can be accomplished only by them. A frank discussion of these problems among the various manufacturers would soon result in a concrete visualization of the actual problems. This would be followed by constructive research and finally by the determination of methods of progressive procedure which would largely benefit all concerned.

#### Getting Co-operation Across to the Dealers

This idea of honest-to-goodness co-operation must be instilled into the dealers—or dealers should be obtained with a broad enough vision of marketing to push the idea on their own account. It is reported that motorcycle dealer associations in the past have frequently been little more than criticism parties, and that they have frequently broken up on account of the ill feeling generated by the meetings.

The chief necessity facing the motorcycle industry to-day is that of selling the public on the motorcycle as a vehicle. While each manufacturer and dealer, of course, is immediately interested in selling his own machine, the motorcycle in general must be sold first. If this were successfully accomplished there would be increased business for every manufacturer and dealer in the business. Until it is achieved, sales and production will be limited to the old customers.

The dealer who spends his time knocking other motorcycles in an attempt to convince the public of the superiority of his own machine is definitely piling up future sales resistance for himself as well as for other dealers. The dealer who lacks enough constructive vision to co-operate with other dealers sincerely and broad-mindedly in the promotion of the motorcycle idea has no place in the motorcycle selling scheme of the future.

The vision of a broad merchandising policy for the motorcycle as a vehicle is necessary throughout the industry, throughout its publicity, its sales methods and its thought and discussion, within and without its own borders. Thus may real progress be made toward an increased and constantly broadening market.

There is sometimes too great a tendency to concentrate attention upon traditional problems and traditional interests. The matters discussed at meetings have a tendency to rotate about small points of interest to no one not intimately connected with the industry.

Available statistics concerning the motorcycle industry show few encouraging signs, viewed over a period of some 10 or 12 years. There is no steady commercial growth shown by the industry as a whole to parallel the progress in mechanical and engineering phases during the same period. There have been many ups and downs in both domestic and foreign trade; the figures show a series of abnormal conditions, each one of which affects sales.

A close analysis of these trends, made by those thoroughly familiar with all branches of the industry, might reveal the causes underlying the lack of apparent progress. On the basis of such an analysis, intelligent discussion might proceed as to how the difficulties might be remedied.

These things cannot come about, however, until the industry and its important marketing problems are viewed in a big, broad way and from a scientific and analytical point of view. Such studies would include an analysis of the human and psychological factors which affect the buying of motorcycles. This would not simply be the offhand opinion of a group of men, but sincere, detailed study designed to find out as much as

possible about these variable factors. Many of these factors are apparent, but little constructive effort has actually been made to meet even the obvious difficulties arising from the psychological state of the general public toward the motorcycle.

Were the intense interest and constructive thought of the various agencies within the industry focused upon these problems great progress would be made within a few years. In one sense the vision of the motorcycle industry as regards its marketing problem appears to be out of focus. The position of the lens needs to be shifted.

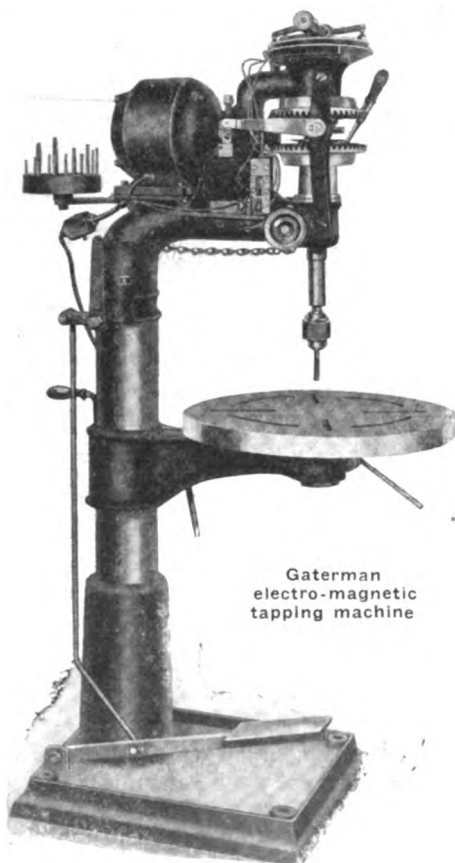
The necessity for immediate sales must, of course, be recognized. It is not always possible to go directly toward an ideal condition. But until some careful analysis reveals the actual possibilities and probable scope of development in some definite fashion, there are few standards by which to direct temporary actions at all. A clear analysis of all the factors affecting motorcycle marketing, an attempt to properly correlate these factors and a concrete visualization of the fundamental problems confronting manufacturers in developing new markets would go far toward giving impetus to future sales.

## Magnetically-Controlled Tapping Machine

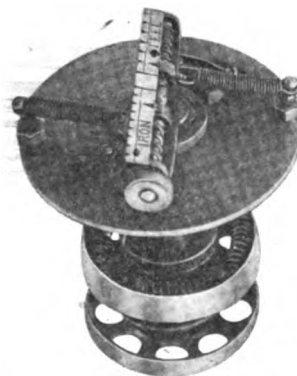
THE tapping machine illustrated herewith carries the tap in a floating spindle, which is driven by two cushion springs, the object being to eliminate shocks and jars on the tap. The machine embodies an automatic oscillating feature which is controlled electromagnetically. By this oscillating feature hand-tapping is imitated, but the limit of strain placed upon the tap is controlled much more accurately, being fixed by the tension to which the spring is set.

Should the tap hit bottom, a tight hole or any other

obstruction which places a greater strain upon it than that for which the dial is set, the machine will reverse automatically, move backward one-sixth of a revolution, thus freeing the tap, and then reverse again. This oscillation continues until the obstruction has been over-



Gaterman  
electro-magnetic  
tapping machine



Adjusting device with  
dial for varying maxi-  
mum strain on tap

come. In ordinary tapping, where the strain on the tap does not exceed the limit for which the machine is set, there is no oscillation. It is claimed for this machine that it will tap one thousand  $3/16$ -in. blind holes in steel per hour with a bottoming tap,  $1/2$  in. deep, full thread.

The machine described is manufactured by the W. Gaterman Mfg. Co. It is to be made in radial and other types, and one of its features that will appeal to the owner of a small shop is that it can be quickly converted into a drill press.

OXY-ACETYLENE cutting has met severe competition in recent years from cutting with fuel gases and oxygen. This is believed to have resulted from difficulty in obtaining compressed acetylene during the war and immediately thereafter. According to the Oxy-Acetylene Welding Committee of the International Acetylene Association, the value of acetylene in this connection is being recognized more and more. A new field seems to lie in cutting out intricate shapes for parts for experimental machines. It is reported that in one case connecting rods were cut out by the oxy-acetylene torch. Forgings are being trimmed practically to finished size by this method.

# Industrial Standardization in Germany

Great Britain alone is carrying on this important work to an extent as great as Germany. A remarkable work has been accomplished in four years, or since the establishment of a central standardization body.

**I**NSUFFICIENT attention has been given to the role which standardization is playing in German industrial reconstruction. The German industries are planning and are carrying out a far-reaching program of standardization as a necessary step in building up an unprecedented industrial structure which must rest in large measure on an extensive foreign trade. In no other country except Great Britain is standardization work being carried on upon a scale or with an intensity comparable to that in Germany.

The German work is of special interest to those responsible for the management of American industries, not only because of its importance, but also because of the similarity in the historical conditions surrounding the national standardization movements in Germany and in America.

Prior to 1917 a vast amount of standardization work had been carried out in Germany by individual companies and by engineering societies and industrial associations, but as was the case in America before the organization of the American Engineering Standards Committee, the work had not been unified along national lines.

As has been the case with all the other national standardizing bodies, except the British, which was organized in 1901, the success of the standardization work carried out by the various countries during the World War as a part of their national conservation programs was a chief cause of the formation of the central German body. It is called the Normenausschuss der Deutschen Industrie, and was organized by the Verein Deutscher Ingenieure at the suggestion of the German Government in 1917. The present membership consists of engineering societies, industrial associations and government ministries, and, in addition, there are 700 firms who are contributing members. The work of the Normenausschuss deals only with those subjects which concern two or more industries or branches of industry.

## Work Accomplished in Germany

It is remarkable that the national standardization movement in Germany should have been so thoroughly organized and that so much work should have been accomplished in four years. One hundred and forty-four approved standards sheets have been issued and over 500 others have been so far developed that they have been published in tentative form. The standards are issued under the general designation of German Industrial Standards (Deutsche Industrie Normen, usually contracted to the slogan "Dinorm"). The Germans were the first of the national bodies to publish standards in loose-leaf form. The work is so divided as to make each sheet as nearly independent as possible. Firms purchase these sheets in quantity, issuing them directly to designers, draftsmen and foremen for use as working drawings and data sheets. (This plan is now followed by the Austrian, Dutch, Swedish and Swiss bodies.) The sale of sheets amounts to about 100,000 monthly.

Looked at broadly and with exceptions such as must always be made in general statements of the kind, the

continental countries are going much further into dimensional standardization than has been done in Anglo-Saxon countries. This includes interchangeability of supplies and of machine elements, the interworking of parts and of related apparatus made by different makers, and the interchangeability, so far as the use is concerned, of complete machines and apparatus. By far the greater part of the work of the Normenausschuss is dimensional, greater attention being paid to such matters as machine elements, screw-threads, bolts and nuts, standard diameters and systems of limit gaging. The Anglo-Saxon mind takes more to matters having to do with purchase and contract, such as specifications for materials and for performance of apparatus, methods of test, etc. The Normenausschuss itself has done very little of this type of work as yet, but it has been highly developed by some of the German special industry committees, for example, in the electrical industry. Some of these special industry committees are very active in the elimination of types, sizes and grades of manufactured products.

## Yielding Commercial Advantages

German manufacturers will go further in yielding apparent temporary commercial advantages for the sake of advancing their national industry as a whole than is the case in America or Great Britain. Three principal reasons for this are: The great economic pressure under which German industry is laboring; the mental trait of more readily acquiescing in decisions affecting national welfare, and the belief that an essential to the rehabilitation of German industry is the rebuilding and great enlargement of their export trade, for which the importance of standardization on national lines is more readily apparent than it is in domestic trade.

The Germans have not yet had their standards translated into foreign languages for use in export, as the British are doing, but they are now giving consideration to this question.

The standardization movement in Germany is particularly significant, since Germany is one of the three leading industrial countries. The industries of Austria, Holland, Sweden and Switzerland are so intimately related to those of Germany on account of geographical and other relationships that they are necessarily affected very largely by developments in Germany. Hence the work is bound to extend to these countries.

It appears that the work is being woven very intimately into the industrial fabric. The very large number of standards purchased by the industry and the fact that the central organization has 5000 firms which are co-operating members are sufficient indication of this.

There seems to be a striking analogy between the present standardization movement in Germany and the research movement developed there a generation ago. Whatever estimate one may place upon the role it played in German industries generally, everyone agrees that research was fundamental in the development of their great chemical industries.

# Co-operation Urged at Meeting of Fuel Men with S. A. E.

Technical sessions of the annual meeting of American Petroleum Institute devoted to automotive fuel problems which were discussed both from the standpoint of the refiner and the automotive engineer. Automobile men urge better quality of gasoline to cut down operating costs. Cheaper fuel will be difficult to obtain in the opinion of men from the oil industry.

CHICAGO, Dec. 8.

CLOSER co-operation between the petroleum and automotive industries in order to secure the maximum of fuel efficiency was the keynote of the annual meeting of the American Petroleum Institute which has just concluded here. The convention was well attended by both automotive engineers and oil men. The registration was about 500. Speakers from both industries emphasized the need for such co-operation and the duty to the public that is owed by both the fuel men and the automotive engineers.

Results of this co-operation, it was emphasized at the meeting, will prove beneficial to both industries for increased fuel efficiency will reduce operating costs and consequently increase the sale of both automobiles and fuel. Cheaper gasoline, it was pointed out by some speakers, is not so essential as a better quality of the fuel. When more miles per gallon can be obtained the car owner will be more willing to pay the price now required.

The technical sessions of the meeting were held as joint sessions with the Society of Automotive Engineers. While the two organizations have co-operated to some extent ever since the Institute was formed, this meeting was the first open gathering in which the mutual problems of the petroleum and automotive industry have been given joint consideration. The engineering branch of the automotive industry was well represented by men who are thoroughly awake to the importance which petroleum has played and will continue to play in the automotive industry.

Two joint technical sessions in which automotive representatives took part were held. One of these sessions was devoted to quantitative and qualitative discussion of the fuel problem. Dr. Van H. Manning, director of research of the American Petroleum Institute, read a paper giving a quantitative survey of the production of motor fuel. He showed that vehicle registration in this country increased 125 per cent from 1909 to 1920, while the production of crude petroleum increased only 101 per cent. In 1911 there were 315 bbl. of crude production for each car, but in 1920 only 48 bbl. of crude per car were produced. He admitted that "one is forced to the conclusion that the decline in production per car is becoming a serious factor," but maintained that there "should be no concern over a future supply of motor fuel." He indicated that at some future date reliance may have to be placed in shale oil as a petroleum substitute, and in imports from foreign sources. He said nothing, however, concerning possible intervening periods of stringency during the time required for the development of these resources.

Figures given by Doctor Manning showed that about 20 per cent of our petroleum requirements last year came from Mexico, but that this importation of crude furnished only about 5 per cent of our motor fuel supply.

H. M. Crane, consulting engineer, in his paper, "Requirements of Motor Vehicle Fuel," said every possible effort should be made by refiners to make the fuel supply more suitable for use in the really only simple form of engine now available. He declared engine simplicity is required if a reasonable degree of economy in the use of fuel is to be expected when handled by unskilled persons.

Mr. Crane also suggested a seasonal and local variation in fuel quality as temperature conditions permit.

Frank A. Howard, manager of the Development Department of the Standard Oil Company of New Jersey, said he recognized the great difference in combustion characteristics of various gasolines, but places emphasis upon the great economic difficulties involved in changing present conditions. Changes, he said, could only be effected by high prices, and these are considered undesirable by all concerned.

A somewhat pessimistic view of future petroleum supplies was taken by Harry F. Sinclair, Chairman of the Board of Directors of the Sinclair Consolidated Oil Corporation. Mr. Sinclair, however, said he expected that there would always be a plentiful supply of petroleum if the public was willing to pay the price. He admitted the situation in the Mexican oil fields is serious and will continue so unless new fields are soon located there. American interests, he declared, should take an active part in the development of other foreign fields if they intended to maintain their present supremacy.

The situation from the standpoint of the automotive manufacturer was taken up by Edward S. Jordan, president of the Jordan Motor Car Company. He declared there must be more mutual co-operation between the two industries and said the automotive manufacturers were endeavoring to make more efficient and economical vehicles. The public, however, he said, is demanding a better grade of gasoline. Ten million owners are using automobiles as utilities and their demands are for greater economy. He pointed out that the more barriers to sales that are removed the greater will be the volume of business for both vehicles and fuel.

N. A. C. Smith, petroleum chemist of the Bureau of Mines, presented a brief paper showing how the volatility of fuel sold as gasoline has varied from year to year, as determined by data collected throughout the country by the bureau. By taking the average and point of 10 per cent of the samples, comprising those at the upper end of the scale, and another 10 per cent comprising



those samples at the lower end of the scale, it was shown that the difference between the extremes was 80 deg. Fahr. in July of this year. In some previous years it was over 100 deg. Fahr., indicating that there is, at least, some tendency toward standardization, though the variation between the best and the poorest samples is very considerable. With the exception of a somewhat abnormal peak in July, 1920, it was shown that the average end point for all samples has steadily increased since 1915.

R. E. Wilson of the Massachusetts Institute of Technology presented a paper on "What Constitutes True Volatility," in which he suggested a change in the method of writing fuel specifications involving two specific tests for volatility and a single test for determining the knock-producing tendency.

The paper by C. K. Francis, chief chemist of Cosden & Co., dealt with variations in the quality of motor fuel, their extent and cause. He dwelt upon the desirability of low sulphur content and freedom from acid and mentioned some causes and effects of faulty blending. He spoke of the desirability of building engines more economical in fuel, but said nothing about the possibility of so improving fuel as to facilitate its more efficient utilization.

The first general (non-technical) session of the meeting was opened by an address by Thomas A. O'Donnell, president of the institute. This was followed by an address by Walter C. Teagle, president of the Standard Oil Co. of New Jersey, on the "Current Year in the Petroleum Industry," in which he dealt at length with the economic conditions of the past year and explained the reasons for the rapid decline in price of crude and refined products, which, he said, were in line with declining values of other commodities. He predicted the need for greatly increased production in the future, though the immediate future may not be quite so promising.

The paper by Edward L. Doheney on "The Future of the Oil Business in Mexico" dealt more with the past than with future or present conditions in that country, outlined the methods followed in locating oil there and indicated that similar methods will be successful in the future.

Edward Pizer, president of the Vacuum Oil Co., outlined European conditions and the outlook for improved commerce with European countries, with special relation to petroleum. He believes that the position of the American Government providing that its citizens be given equal opportunities with those of other countries with respect to investments in petroleum resources will be maintained. He said it would not need a great stimula-

tion of oversea industry to drain this country of present accumulated reserves of petroleum. He expects the foreign demand for petroleum products to steadily increase as the world settles down to normal peace conditions.

The papers presented Wednesday, Dec. 7, included one on "Standardization of Oil Country Supplies," by J. R. Stockton, and one on the practical effect of low volatility by O. C. Berry of the Wheeler-Schebler Carburetor Co.

Mr. Berry pointed out various ill effects of too low volatility and said the fuel mixture for highest efficiency is at the lean edge of the explodable range, and any range below the efficient point would tend to stall the engine. The range upward, he said, was very great. He pointed out that lack of knowledge as to proper carburetor adjustment was causing a loss of about one billion gallons of fuel annually. He also urged the refiners to keep in close touch with progress made by automotive engineers to the end that no further reduction be made in the volatility of fuel until the automotive industry is prepared to take care of it.

The paper by F. C. Mock of the Stromberg Motor Devices Co. outlined some of the limitations and difficulties imposed upon engine operation by variations in the volatility of fuel. He likened the manifold to a fuel still in which the fuel admitted is under ready control, while the degree of vaporization is not easily controlled. He indicated that it would be undesirable to hold all fuel to a recognized standard with the provision that fuel which does not conform to the standard should have the nature and extent of the variation clearly indicated.

Following the presentation of these papers there was a general discussion of the value of research to the petroleum industry.

R. L. Welch, general secretary of the American Petroleum Institute, presented an interesting paper showing that the price of products of the petroleum industry is responsive to the law of supply and demand, as with other commodities, in spite of some popular ideas to the contrary.

Harry L. Horning also spoke on the "Automotive Industry and Oil."

In his address at the annual dinner, which was the concluding event of the meeting, J. C. Donnell, president of the Ohio Oil Co., said that the present daily rate of petroleum production involves the draining of oil from over 135,000 acres a year, so that to maintain this rate a similar acreage must be developed next year. This, he said, will cost, including the cost of acquisition, royalty, drilling, lifting and wildcatting, nearly one billion dollars. The outlook for the coming year, he stated, is fairly bright, but is, of course, largely dependent upon development of the acreage mentioned.

## Industrial Libraries

**M**ORE than 200 special libraries directly concerned with collecting books and data concerning manufacturing and industrial subjects have been established in the United States. This fact was uncovered by the Special Libraries Association, which is a branch of the American Library Association. The former organization has compiled a Special Libraries Directory, which deals with practically all industries, and gives the location and scope of each library in that industry.

The special libraries listed under the heading, "Automotive Industry," include the following:

Class Journal Company, 239 West Thirty-ninth Street, New York.

Cleveland Tractor Company, Cleveland.

Combustion News Service, 43 Broad Street, New York.

Franklin Manufacturing Company, Syracuse, N. Y.

General Motors Acceptance Corporation, 1737 Broadway, New York.

General Motors Corporation, Hyatt Bearings Division, Newark, N. J.

Packard Motor Car Company, Detroit.

A directory of these libraries will prove valuable in that persons seeking information concerning the industry, who are outside the companies maintaining the libraries, can usually be accommodated by the librarians in charge.



## Aluminum from the Engineer's View-point

Editor, AUTOMOTIVE INDUSTRIES:

Dr. Rosenhain's recent article\* is a forcible illustration of the metallurgist rushing in where the engineer fears to tread. This is apparently becoming a fashionable pursuit among metallurgists, and one which may be fraught with very evil consequences owing to the natural inclination of the metallurgist to interpret engineering problems in terms of test pieces. It must never be forgotten that some of the finest real engineering the world has ever seen was accomplished before the metallurgist was ever heard of. Even now, is there any metallurgist who can give the engineer any real idea of what test should be applied to any material to determine its suitability for a given purpose and bet money on the result without resource to extensive experiment?

If Dr. Rosenhain would help the automobile designer to use aluminum he can do so much more effectively by correlating its capacity as compared with ferrous metal to resist surface pressure as when a nut and washer are pulled hard down, its capacity to resist wear when rubbing against cast iron, steel, brass or itself; its capacity for stress distribution in the neighborhood of fillets and drilled holes, etc. This latter brings to mind that probably the most useful work ever done from the designer's point of view is that of Professor Cokers' optical determination of stress distribution. Of what avail is it to conduct expensive and often misleading experiments on ultimate strength and impact tests when the only information given relates to that which occurs after failure has commenced? The engineer wants to know what happens before failure commences, or rather precisely where it commences in the stress strain diagram. In a word, he wants some clear idea of the stress hysteresis effect to enable him to advance from his present practice of determining the static load to which a piece may be subjected, doubling it to allow for shocks and then using a factor of safety from 5 to 10.

While no one is more enthusiastic than the writer over the possibilities of wrought aluminum, he must take exception to the tone of Dr. Rosenhain's article in respect to the reliability of aluminum castings. Some twenty years of intensive experience have revealed far more troubles and mysterious failures arising from the use of forgings than of castings.

The automobile piston, as is well known, has always been in the process of being lightened. A decade ago steel pistons were the "gout," and there are few designers who cannot bear witness to the agonies these produced through sheer mechanical unreliability. Wrist pin bosses pulled out by the roots, cracks started through lightening holes and piston heads collapsed. If any further adverse testimony is required to this use of steel forgings the unfortunate man in the machine shop who had to make them will readily contribute his quota. Granted

that all this was due to bad design, the fact remains that the weight reduction compared to cast iron was relatively small and that the cast iron piston, with its maximum tensile stress of 20,000 lb. or so, its complete absence of elongation or reduction of area, its utter incapacity to look an Izod testing machine in the face, did its job and did it well.

It is a matter for speculation as to whether the most prophetic metallurgist faced with the query as to the suitability of aluminum cast or forged for a piston in an automobile engine of, say, 4 in. more running at 3000 r.p.m. would say that a cast aluminum disk 3/16 in. thick would stand a pressure of some 400 lb. per sq. in. applied 25 times per second. Yet it does it and the cast aluminum piston is used in thousands of cars. If forged aluminum can give us a reduced coefficient of expansion, if by its use we could save even 10 per cent of weight for the same performance there might be something in it, but to suggest to an automotive engineering world already overburdened with difficulties that it should jettison a part on account of suggested advantages in respect of soundness and reliability for which an extended use has shown no demand is a needless addition to the burdens of life. If Dr. Rosenhain can tell us which alloys show the greatest resistance to wear under cylinder working conditions then will his information be gladly received.

Incidentally he would be advised to go easy on the question of removing the ribs from under the piston head. There seems to be a prevalent idea that a piston has only to be made of aluminum for all heat transmission problems to vanish. This is emphatically not the case, particularly with the modern type of a piston with a separated head.

The case for the forged aluminum connecting rod could well have been presented in more detail. Its advantages in respect of reduction of inertia pressure on big end bearings only need an elementary investigation to indicate how far reaching are the consequences of this particular application in respect of reduction in overall weight through shortening crankshaft and crankpin bearings.

The argument for the casting as applied to frame construction is that any frame of wrought material either steel or aluminum has weak spots where one part is fastened to another, to say nothing of a stress distribution throughout the length of the frame which renders the application of any rolled section, or for that matter pressed section, uneconomical. The only difference is that in the rolled section frame the waste material is carried about as a permanent burden, while with the pressed frame the surplus is left at the frame makers.

The charm of the cast aluminum frame is that the metal can be put where it is wanted, there are no riveted on brackets and it can be built up very simply in sections.

If anyone doubts the virtues of a frame which eliminates riveted on springs, horns, etc., let him make a casual inspection of the first dozen cars on the street which look over two years old and as if they had seen hard work.

\*Use of Wrought Aluminum Alloys in Automobile Construction. See AUTOMOTIVE INDUSTRIES for Nov. 3, 1921.

In connection with springs Dr. Rosenhain makes some startling suggestions and the writer would ask his comments on the following:

1. That the suitability of a material for spring purposes is a function of its resilience.

2. That for springs subject to bending the resilience is equal to  $\frac{f^2}{2E}$ , where  $f$  is the maximum stress the material will stand without taking a permanent set, and  $E$  is Young's Modulus of Elasticity.

3. That in the case of a good carbon steel spring of  $f = 190,000$

$$\frac{f^2}{2E} = \frac{190,000^2}{36,000,000 \times 2} = 501 \text{ in lb. per cu. in.}$$

4. That in the case of wrought aluminum the stress at which permanent set takes place probably does not exceed 58,000 lb. even with 88,000 ultimate so that

$$\frac{f^2}{2E} = \frac{58,000^2}{10,000,000 \times 2} = 170 \text{ in lb. per cu. in.}$$

5. Since the relative densities of steel and aluminum are as 2.8 : 1, the resiliency of aluminum for the same weight, as in the case of steel, becomes 450, which, although exceedingly good, does not suggest the substitution of aluminum for steel as a spring material.

At no time in its history has there been more opportunity for the extension of the use of aluminum than now, but there is no sense in starting with misconception if it can be avoided. It is particularly the field of the metallurgist to develop the alloys of aluminum and to give to the engineer a clear idea of the properties of these alloys in terms of the materials he is already using and with which experience has made him familiar.

Few people are so qualified to do this as Dr. Rosenhain, and it is to be hoped that in future he will write along these lines instead of suggesting the laborious machining of pistons from a drawn forging for which any

production engineer would cheerfully specify him being taken out and shot at dawn.  
FORALUM.

## Fuel Saving with Brakes

Editor, AUTOMOTIVE INDUSTRIES:

Your editorial of Nov. 17 certainly makes clear the necessity for better fuel economy and it is a question which should be solved without any more delay.

Any one who has taken part in fuel economy tests realizes that there are some points to be considered besides efficient engines. These are points which do not hinge on the future development of proper engine cycles so should be given more attention.

The curves on page 971 of AUTOMOTIVE INDUSTRIES show the comparative tractive resistances of a Franklin touring car and a Ford sedan. The values at a speed of 17.5 miles per hour are 31 and 65 pounds per ton respectively. There is not enough difference in the weights of the two cars to affect the results materially.

These tests were made on smooth pavements so the different forms of suspension probably make little difference. It is natural to presume that the difference must be accounted for by the types of transmissions used, by the types of bearings and tires and the condition of the brakes.

The writer has encountered pressed steel brake drums which were so badly out of true it was not possible to properly adjust the brakes. Rear wheel bearings which wear and cannot be adjusted are unable to hold the brake drums central with brake shoes. The ideal brake should not show any signs of heating unless it is used to slow up the car.

Considerable fuel can be saved if better stream lines are applied to body design, not because we insist on driving at 60 miles per hour but because we frequently drive 30 miles per hour against a 30 mile per hour wind.

R. M. GASTON.

## French Truck and Tractor Trials for Military Service

RENAULT, Berliet, Dewald, Pavesi, and Blum-Latil will be the competitors in the French military truck and tractor trials to be held in the neighborhood of Paris during the month of December. Three types of machines are provided for in the competition: 7½-ton trucks, 15 and 20-ton four-wheel-drive tractors, and heavy and light agricultural tractors, which must be either four-wheel-drive or creeper-band type.

This competition will determine the types of trucks and tractors which, while being sold to the public for commercial use, will have the benefit of a military subsidy and will be at the disposal of the military authorities in case of mobilization. Whereas before the war a normal type of 3½-ton truck was subsidized by the State and was used for the great mass of military transportation during the war, the military authorities now require only 7½-ton trucks. There is now no necessity to continue the subsidies for the 3½-ton truck, for thousands of these are in use and can be seized by the military authorities in case of war. The 7½-ton truck is very little used commercially, and in consequence its development has to be encouraged by military subsidies.

The four-wheel-drive tractors are almost exclusively military jobs, their commercial use being limited to forest and quarry work. The first rules to be published were of such a drastic nature that no ordinary tractors could be found to fit them, and in consequence changes had to be

made to let in more normal types. Even in their revised form there are very few agricultural tractors in regular construction capable of being entered for the French military trials. Machines of foreign construction are all eliminated, and the requirement of four-wheel-drive or creeper bands further reduces the possible competitors.

## New Classification of Tractors for Export

TRACTORS for export, after January 1, 1922, will be classified into four different groups so as to conform more closely to the requirements of manufacturers and exporters of the machines. The classification will be as follows:

1. Wheel tractors.
2. Track laying tractors.
3. Steam tractors.
4. Garden tractors.

The present classification, which has been in effect since April 1, 1921, does not differentiate between the different types of tractors, but merely includes "tractors" and "parts of."

The new classification has been worked out with the aid of the Statistical Division of the Bureau of Foreign and Domestic Commerce in accordance with suggestions from the industry. Its use should increase the value of export statistics of tractors to those interested.

# Wage Cost Per Unit Essential Feature of Cost Deflation

The cost of labor per unit of operation is important. The wage scale itself is comparatively unimportant. Reduced waste, increased productivity, and new mechanical improvements lead the way to reduced cost more rapidly than do wage reductions. Fundamentals of question discussed.

By Harry Tipper

**T**HE work of adjustment in the production field in the returning activity of business is proceeding with a good deal of difficulty. This is particularly the case with the adjustment of wages and working conditions to the point desired by the manufacturer and to the point insisted upon by the bankers and other economists.

During the last week an injunction was granted against an association of manufacturers in the New York clothing trade in what is understood to be the first case of the kind brought to the attention of the courts. The particulars are not especially interesting to other industries, but the general fact is suggestive in its indication of tendencies. The manufacturers and unions had an agreement in this trade concerning the wages, hours of labor, etc., which agreement had some months to run. A month or so ago the manufacturers gave the unions notice that they expected to revert to piecework and the unions gave notice of a strike. The unions asked for an injunction restraining the manufacturers from taking any action which would not be in accordance with the agreement already entered into, and an injunction has been granted on these premises in one of the New York courts.

At various times in these articles we have pointed out that the unions were not the only ones to break an agreement. Instances have been recorded illustrating the difficulty existing in employers' associations of securing the maintenance of agreements made with unions or with employees as the economic conditions changed. In fact, the whole history of strikes between labor unions and employers' associations is a record of broken agreements on both sides.

A great deal of publicity has been given to the breaking of agreements by labor unions, but very little has been said about the breaking of agreements by manufacturers, and this is the first occasion of which we have any record when the workers' organizations have taken legal action to enforce an agreement which the manufacturers were determined to abrogate.

## A Departure in Union Procedure

A somewhat similar principle was involved in the action taken by the coal miners' unions when the operators gave notice that they would discontinue the practice of taking the union dues out of the wages, as required by their agreement with the coal miners' unions.

Neither of these matters have been finally adjudicated, but they represent a departure in the procedure of the unions. In the past these bodies have been inclined to

rely entirely upon their own power in calling attention to the difficulties or in insisting upon the fulfillment of their agreements or desires. They have not been inclined to favor legal action or to apply to the courts for restraining injunctions in any dispute.

Where a formal agreement is made with organizations representing the workers, there is, of course, a binding character to the agreement which may become the basis of legal action at any time, and these appeals to the courts are interesting as indicating what may happen in the future under similar circumstances if the unions find it of advantage to pursue this method.

## Wages, Prices and Wealth

The general discussion upon labor questions still turns upon the matter of wage deflation, as it is called. Apparently no attention has been paid to the relation between wages, prices and the accumulation of wealth, so that it is presumed that the reductions of wages will automatically bring prosperity and that it is one of the principal difficulties in the way of returning prosperity. Practically no attention has been paid to the fact that the growth of wealth is due to the increasing surplus between the productive power and the amount required for current expenses, this surplus being stored up in convenient form either in product or productive facilities, nor to the fact that this wealth as a basis for credit permits a larger development for increased future efficiency.

The reduction of factory wages does not bring a proportionate reduction in the price which the user must pay for the commodities, so that the wage-earner whose wages have been reduced finds that his expenses are not proportionately less on account of the reduction.

Because of the uneven character of the adjustment taking place at present and the difficulties of securing a balance there will be a tendency for wages to reduce for some time yet, but the problem will not be settled by these means, because the increased consumption of product permitting the increased production of product is required to restore and increase the actual wealth above the national obligations.

The study of wages must be based upon the study of wage costs and the possibility of decreasing the wage costs without proportionately decreasing the wage rates.

The whole growth of the mechanical system of industry and the concomitant increase in wealth have been due to the ability of the producer and fabricator to

increase the productivity of the worker so that the wage cost per unit of product was reduced without decreasing the wage scale.

As a matter of fact, the wage scale for fifty years increased constantly, despite the temporary fluctuations at moments of depression.

It is somewhat astonishing to find discussions of bankers and other economists limited to the reduction of wages as though the efficiency had reached the maximum and it was no longer possible to increase the productivity of the individual worker, and consequently reduce the labor cost without having to reduce the scale.

The evidence in manufacturing is all to the contrary. Builders of mechanical equipment for manufacturing processes claim that it is possible to build a factory in almost any line of mechanical fabrication which would be notably more efficient than any of the present factories in the character and productivity of its mechanical equipment. Industrial engineers have been able to increase by large percentages the productivity of a plant by the introduction of better systems, and able executives in a number of instances have secured increased productivity by their ability to restore the incentive, increase the loyalty and develop the initiative of their working forces.

The waste committees of the American Engineering Council have made considered statements after their investigations which show a tremendous amount of avoidable waste adding its cost to industry in all directions.

These things indicate that the efficiency is far from the observable maximum, and our observable maximum will probably represent a minimum for future managers of industry.

It is unfortunate, therefore, that so much time should be spent upon the constant discussion of the reduction of wage scales and so little time spent on the question of efficiency and increasing the productivity of the worker.

The banker dealing with credit, finance, standards of reserve and other fixed items by which we measure our industrial actions is inclined to forget the dynamic character of industry and to regard the state of industry almost as he regards his own fixed standards of consideration. Gold is a standard by which we measure other values, and consequently it itself must be regarded

as fixed in order that the calculations may proceed. In his considerations of industry the banker is inclined to regard the productivity of labor as more or less fixed, the efficiency of industry more or less at a given point, and the cost of the industry influenced almost entirely by the rates of time costs operating in connection with it.

This method of examination is entirely illogical and has nothing to recommend it. It is not in accordance with the past history, nor in accordance with our known industrial conditions. The periods of greatest prosperity—that is, the periods when our wealth accumulated most rapidly—have been periods of decreasing costs and increasing wages, because they were periods of increasing efficiency. Gradually it is going to dawn upon us that 1913 or 1914 values may have been normal for that time, but they are an absurd comparison for this time. Values have been entirely rearranged and there is no possibility that they will return to the basis which existed before the war.

Instead of using all kinds of means in the endeavor to go back to 1914, we would be better off if we were considering the increase of efficiency that we must secure in order to balance our operations with the new valuations, and raise our manufacturing development to the plane demanded by the new conditions emanating from the war.

The scale of wages is in itself entirely unimportant. The only important thing to the manufacturer is the cost of labor per unit of operation, and past history shows that the reduction of wastes, the increased productivity and the development of new improvements have been the proper ways of reducing cost, and not wage reduction.

Under the present conditions when industry out of balance is attempting to readjust itself, demands will be met in most cases by the reduction of wages, but this will be entirely temporary in its effects and will not succeed in doing more than alleviate the severity of the adjustment.

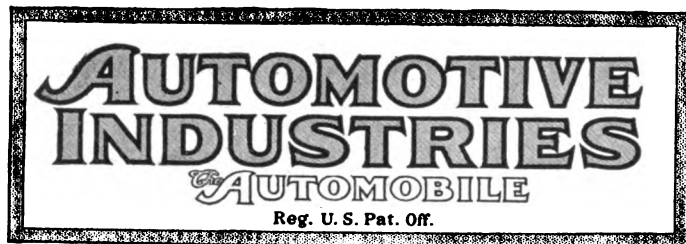
New methods must be devised, new equipment discovered and a new appreciation of the waste of human endeavor determined in order for us to meet the obligations imposed on industry by the war and the necessities demanded for future improvement.

## Tests of Stellite Tools

SOME notable results of performance tests with stellite (an American cutting alloy) are reported in *Zeitschrift für Metalkunde* for September, 1921. Chemical analysis showed the alloy to consist of 50 per cent cobalt, 18 per cent molybdenum, 19.5 per cent chromium, 9 per cent tungsten and 1.5 per cent carbon. In the house organ of Albert Herbert, Ltd., it is stated that by the use of stellite the cutting speed may be increased from 75 to 150 per cent. These claims were fully borne out by the tests reported in our source. A necessary condition, however, is that the cutter is ground to semi-circular form and that the cutting angle does not exceed 5 deg. All other forms of the tool bit resulted in a materially reduced life. In comparative tests with stellite and tungsten (high speed) steel a cutting speed of 130 ft. per minute was used to start with. The depth of cut was 0.080 in. and the rate of feed 0.01 to 0.032 in. per revolution. After the work had been going on under these conditions for 5 hours, the cutting speed was increased to 180 ft. per minute, the cross-section of the cut being  $2 \times 0.00122$  sq. in. In this case the cutting edge of the stellite was destroyed in about 50

seconds. After the bit was ground anew, a plane shaving of 0.012 in. depth and 0.0048 in. feed per revolution was removed, the cutting speed being 308 ft. per minute. Under these conditions the tool worked well. Only when the cutting speed was increased to 385 ft. per minute was the cutting edge destroyed, this happening after 30 seconds. With high percentage tungsten steel it was absolutely impossible to work under the conditions mentioned. The result of the tests is that with stellite a materially higher cutting speed can be maintained in wet as well as in dry turning than with the best tungsten steels. This is its main advantage. In the case of pieces with little stock to be removed, it is possible, by increasing and even doubling the cutting speed, to save a great deal of time. Stellite is equally advantageous in the machining of hard materials. On the contrary, if a great deal of material is to be removed, so that the width of the shaving is large, the conditions are less favorable for the stellite bit, which on account of its form is less suited to the purpose. It is also not so well adapted for cutting screw threads on steel bars, etc.





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## Buy—Build—Work

PART of our business depression has been real; it has been caused by economic factors resulting from the war and could scarcely have been avoided. Part, however, has been psychological, the result of fear. This last part has been unnecessary and has caused unnecessary financial losses and human suffering. It should never have been and can be dispelled readily by a more optimistic view of conditions, by a firm belief in the essential soundness of industry, and by determination to go forward on this basis.

"Buy—Build—Work and create a job for every man." This is one of 24 slogans adopted for a poster campaign inaugurated by the Rotary Clubs of the United States in an effort to overcome the fear psychology which has permeated many business organizations during recent months. The above slogan and the ideals behind the entire campaign should be supported actively by the automotive industry. It should be supported by deeds as well as by words.

Aside from the psychological effect such a slogan may have upon American industry, the actual physi-

cal results from the actual practice of the motto will prove beneficial. Psychological causes produce physical effects and if the slogan adopted is carried out to its fullest extent the so-called business depression will rapidly disappear. Buy—Build—Work.

## Standards Are Created to Be Used

WE fear that the executives of the automotive industry, taken as a whole, have failed to grasp the importance, not to say the economic necessity, of standardization. If this is not true, how else are we to explain, not only the lack of standardization along many lines, but the failure to make full use of many standards already created?

Many manufacturers, including some of the largest car and parts makers in the industry, adhere rigidly to standardization within their own plants, but utterly fail to appreciate the need for bringing these standards into conformity with the standard practice of other makers. They are, in short, a law unto themselves. Like most people of whom this can be said, they are standing in their own light.

Perhaps one illustration will suffice to make this point clear. A certain manufacturer had long employed a set of his own specifications under which all steel which he required was purchased. These specifications differed an inconsequential amount from the standard S. A. E. steel specifications. He did this in spite of the fact that the steel mills (whether the purchaser knew it or not, we cannot say) charged a little more for them than for steels ordered in accordance with the generally accepted standard. This thing went on for some time, for the steel received was quite satisfactory. But one day it occurred to someone to check the actual analysis of the various steels against the factory specifications. They differed slightly but were found to correspond to S. A. E. specifications. It developed, in fact, that the steels were S. A. E. steels, but the vendor had covered himself against a possible technical rejection by charging a slightly higher price than if the order had specified S. A. E. steels!

This may be considered a good joke on the purchaser, but no one will deny that it was poor business. A full recognition of the value of standards would render impossible such situations.

If a standard has been in existence long enough to receive any very general recognition, a manufacturer will find in nearly every case that a change to the standard will benefit him directly, or indirectly, through benefiting the purchaser of his product.

This last-mentioned phase of the situation, the ultimate benefit of the user, is of great importance and far too often lost sight of. We frequently hear it said that so-and-so is such a large buyer or producer that it does not matter whether he uses a certain standard article or not. He can get a certain special size of bearing, for example, as cheap or perhaps a trifle cheaper than a standard size. At first glance this may seem like a real economy, and if the matter ended there it might be.

But it does not and it cannot end there. Once employed this special size must be stocked by the manufacturers of the bearing, of the axle, let us say, and of the car in which it is used, and by a thousand parts depots and ten thousand repair shops, if they would give prompt service. Now if we multiply these special sizes by twenty or fifty—for if one manufacturer gets a special size others will do likewise—the capital tied up in stocks of special parts alone becomes a serious item. Of course the car user pays the bill in the end, but his dissatisfaction with the manufacturer increases as maintenance expenses increase, and the sale of new products is correspondingly handicapped.

We hold no brief for the unqualified acceptance and use of all so-called standards. Doubtless some of them are outworn, immature or in some way out of step with modern conditions. These can and should be revised. Standards, in the sense used here, are not inflexible things which cannot change with changed conditions. But the bulk of those in existence are good and should be used. On the whole the automotive industry has adopted and used standards to a much greater extent than most other industries, but it still has a long way to go in this direction and must take no backward steps.

## The Export Business Picking Up

FROM Detroit comes with increasing frequency the report that such and such a company is building right-hand drive cars that can only be for sale in foreign countries. Washington adds that the shipment of cars, trucks and parts were so large in October that we must go as far back as last January, when old orders long held up were being filled, to find exports of these products appreciably higher. From New York comes the statement of various exporters that the overseas trade progressed through November in as large or larger volume than in October.

Buenos Aires sends a cable announcing that the annual motor show, held during two weeks in November, brought brisk sales and that the trade there is greatly encouraged. The Ford plants in Sao Paulo, Copenhagen and Manchester are operating on schedules appreciably increased—in fact, 100 per cent at Copenhagen and practically so at Manchester with a daily output of some 100 cars and trucks.

Barranquilla advices tell of increasing sales, with dealers turning over in August, September and October numerous cars of various makes. Lima adds that exchange has so bettered that several lines have reduced prices with a consequent stimulation of retail business. An automotive expert returning from Havana declares that the automotive dealers in the island republic are in better shape than most dealers and the monthly export figures show that a surprising volume of business is continuing right through the worst depression Cuba has ever undergone. Mexico is holding her purchases to the high level set in early months, despite the oft-repeated assertion that a let-up is imminent, and Porto Rico reports new buying is necessary to meet the demands for military transportation.

The Far East is buying again. The pound sterling has risen so consistently and is off from par such a slight percentage, not even 20 per cent, that buying in all the English dominions has been stimulated greatly. Even the most pessimistic exporter cannot fail to see Australia definitely on the comeback and South Africa is once again getting into the buying column. One company is shipping cars to Syria and Spain, it is stated, with a rising currency, will revise her prohibitive automobile duties not later than January.

The international political and business situation is clearer to-day than it has been since the war began. Europe is regaining its feet economically and industrially and the recent course of the exchange markets show that this improvement is extending to the realms of finance.

Thus, we find a general condition that can mean but one thing. The foreign markets are again stirring into life and are doing their part in taking up the slack of production, the final 5 or 10 per cent that means the difference between profit and loss. They are beginning to take cars when the home market is slumping off because of winter.

This is the reason for foreign trade and this is the reason American automotive manufacturers cannot longer neglect their export trade. When markets are dull at home, in the winter season, then the foreign sales will bolster up the total and keep up production.

## Maintaining Standards and Prestige

A RECENT article in the London *Times* from that paper's correspondent in Colombo, Ceylon, deplores the fact that some American cars that have been shipped to that territory recently are decidedly inferior, as regards workmanship and material, to the older models of the same makes of cars. The dispatch stated, however, that some makes of American cars, notably those in the lower price class, were still selling quite well among people in the cocoanut territory.

American manufacturers cannot well afford to permit their products to lose prestige in the eyes of the natives of foreign countries. Exporting will play a large part in determining the volume of business the automotive manufacturer will do in future years. If American cars manufactured for export do not reach the standard set by the manufacturers themselves then there can be but one logical result: the business will revert to the manufacturers of other nations.

The same dispatch from Colombo furnished the information that a London taxicab company had purchased the interests of a similar concern in Colombo and planned to enlarge the business to the extent of adding new cars and building new garages. It was also stated that there is ample scope for the founding of similar enterprises, for the cities of Galle and Kandy are without taxicab services. The Colombo Tramways Company has also decided to augment their service with bus lines running from the ends of their car tracks to suburbs.

# Peace Restored in Willys Councils

## Agreement Reached with All Interests

Personal Victory for Willys—  
Banks Agree to Miniger  
as Receiver

NEW YORK, Dec. 6.—An amicable agreement for the settlement of the tangled affairs of the Willys Corp., now in receivership, was reached yesterday at a conference which was the climax of a series following the action of the bank creditors in having C. O. Miniger and Frank Kennison of Toledo ousted as receivers for the property in New Jersey. They were the original receivers appointed by Judge Killits in Federal court at Toledo.

Under the plan which has been agreed upon Miniger will remain as receiver in all districts, acting with Colonel Francis G. Caffey of this city. Kennison will be retained as a co-receiver in Ohio and Judge Killits will be asked to approve Caffey for this district.

### Interests Amicable to Arrangement

All interests have announced that they will be satisfied with this arrangement and will work together harmoniously to reorganize, refinance and straighten out the affairs of the corporation. All court actions will be withdrawn and it is expected a plan of procedure will be decided upon which will be satisfactory to everyone.

The agreement may be regarded as a victory for John N. Willys, who has contended from the first that he acted only for the best interests of all concerned. When it was agreed to file a receivership petition in Toledo, it was urged by Willys that Miniger be named as one of the receivers and the bank creditors' committee be asked to suggest a man to act with him. The course decided upon yesterday merely carried out his original recommendation.

### Receivership Due to Misunderstanding

A statement issued at the close of the conference stated that the receivership was due to a misapprehension. An erroneous report that interests in the East intended to take court action reached other interests in Ohio and the West and they filed their petition with Judge Killits. An identical petition was filed with Judge Knox in the United States District Court here and he appointed Miniger and Kennison as receivers. Similar action was taken in New Jersey.

Incensed at what they characterized

## FIRST COAST TO COAST CAR SHIPMENT IS MADE

NEW YORK, Dec. 6.—The first coast to coast trainload shipment of automobiles left here last night. The train carried 150 touring cars from the Long Island City plant of the Durant Motor Car Co. of New York consigned to the Oakland plant of the Durant Motor Car Co. of California.

The train, which was composed of 30 freight cars, will cover 3285 miles. The shipment weighed 350,000 lbs. and the freight charges will aggregate \$20,000. The cars will be distributed from the Oakland plant.

the desire of Willys to dominate the receivership, the bank creditors' committee filed petitions in the Federal courts here and in New Jersey for the substitution of receivers other than those appointed upon the petition of the Ohio Savings Bank of Toledo. Judge Knox appointed Caffey, a former United States district attorney, as a co-receiver in the southern district of New York, while Judge Bodine, sitting in Federal Court at Newark, removed both Miniger and Kennison, substituting for them Clifford I. Voorhees, a New Brunswick attorney, and James Kearney, publisher of the *Trenton Times*.

### Delaware Motion Postponed

Before the agreement was reached, a bill of complaint was filed in Federal Court at Wilmington, Del., by the Chase National Bank, the Equitable Trust Co., the New York Trust Co. and the Chemical National Bank, all of this city, seeking the appointment of a receiver in that State for all the property and assets of the corporation wherever situated or controlled, on the ground that the corporation was chartered in Delaware. A hearing on this application was to have been given yesterday but it was postponed until Thursday. It has been decided that when the argument is heard the Delaware court will be asked to appoint Miniger and Caffey. The same procedure will be followed in the northern district of New York, so that all interests may co-operate in these districts.

(Continued on page 1143)

## "GOODSPEED" TO BE EXHIBITED

CHICAGO, Dec. 5.—The new car which is being developed by the Commonwealth Motors Co. under the direction of Leland F. Goodspeed will be exhibited at the New York and Chicago shows. It will be called the Goodspeed.

## Newark Court Urges Fullest Cooperation

Willys' Chief Concern Is That  
Reorganization Shall Not  
Be Retarded

NEWARK, Dec. 5.—After hearing arguments by attorneys representing the interests which objected to the domination by Willys of the receivership, Judge Bodine appointed as substitute for Miniger and Kennison a New Brunswick attorney, Clifford I. Voorhees, who was named by him originally to serve with the other two and James Kerney, publisher of the *Trenton Times*, who has acted as receiver in various other cases.

In announcing his decision Judge Bodine said that "no reason exists why there should not be the fullest co-operation between the Ohio receivers, the New York receivers and the New Jersey receivers."

### Elizabeth Plant in Argument

It was contended by counsel for Miniger, Kennison and Willys that inasmuch as the big new plant at Elizabeth never had been in operation, the New Jersey receivers would have no concern except in relation to stocks and bonds. The lawyers asserted that the principal earnings of the corporation came from the Electric Auto-Lite Corp. at Toledo of which Miniger is president and that this should be a determining factor in the receivership. Another source of income is the New Process Gear Corp. at Syracuse and the United States Light & Heat Corp. at Niagara Falls, of which Miniger is also president.

A dramatic story of his defiance of one of the most powerful banking groups in America can be read between the lines in an affidavit signed by Willys filed with Judge Bodine.

### Affidavit Explains Situation

"My primary concern in this whole matter," said the affidavit, "is that reorganization shall not be retarded by failure of co-operation between different sets of receivers in the different jurisdictions in which the property is situated, but that on the contrary the receivership appointed in the primary jurisdiction (Toledo) should be made the officers of the court in the ancillary jurisdictions, with the addition, if desired, of a third receiver, selected by the court, as was done in New Jersey by the appointment of Voorhees.

"Although he is an entire stranger to me, his selection is entirely satisfactory to the common stock interests for which I am entitled to speak, and I respectfully urge in the interest of orderly and harmonious admin-

(Continued on page 1143)

# Prepare Plants for January Output

## Falling Production Is Approaching End

**Factories Are Not Planning to Close for Inventory Before Christmas**

DETROIT, Dec. 3—Production in the Detroit factories, which has been falling somewhat steadily since Nov. 1, will reach its lowest figures this month, with certainty of an early pick-up following the turn of the year. There will be no closing of plants except for inventories at Christmas time and the month will be devoted principally to preparing for production in January.

Practically all of the factories in the district are working on a half-time basis, some with half the usual work force, some three days a week with full force and some working half days only with full force.

Dodge is working a close to normal force on engine assembly, getting ready for quick production in January. It has been on a 400 a day basis since Nov. 10.

Ford finished November with approximately 75,000 cars shipped and will continue into December on the same basis, though the Highland Park plant will be closed for inventory at Christmas and production is expected to be cut previous to this date.

Maxwell with its new models is increasing its production 30 per cent Dec. 1, and will make continued increases. The factory is working full time and is gradually adding men.

Durant plant at Lansing will start production Dec. 20 on a 100 a day basis and will continue at this rate until March 1, when it will be increased.

Cadillac is leading General Motors units in production and is operating on practically a 100 per cent basis.

Oakland is on a basis of 100 cars daily working a full week.

Chevrolet continues to be a steady producer in the light car field and has suffered but slightly from seasonal depression.

Buick and Oldsmobile are operating at about half the rate of the third quarter, the former being on a three day week.

Hupp is producing at the rate of 50 cars daily and expects to build 1300 cars in December.

Reo is working half days and is turning out about 100 cars and speed wagons daily.

Earl Motors is operating steadily on about 60 per cent basis.

Hudson-Essex reports continued sales progress and expects to continue operation into December on approximately the November basis.

Columbia, Liberty and Paige are mak-

## PROSPERITY CAMPAIGN OPENED IN NEW YORK

NEW YORK, Dec. 5—The first of 100,000 billboards to be used by Rotary clubs in the United States and Canada in a prosperity campaign was unveiled in Times Square in the presence of 2000 persons after an address by Raymond J. Knoepfel, president of the New York Rotary Club. The billboard, which has been erected in 43rd Street near the intersection of Broadway and Seventh Avenue and which faces north, bears the following message written by President Harding, with a reproduction of his signature:

"The White House,  
Washington.

"The people of Washington and Lincoln are conquering the difficult problems of to-day no less worthily and with the faith and confidence which they bequeathed to us. We are sure to find the ways to restored prosperity and our mood of happiness.

"WARREN G. HARDING."

ing steady shipments and with new dealers and distributors look for gradual improvement.

Studebaker plants in Detroit and South Bend have been down for inventories in the past week but are now resuming, the South Bend plant on Dec. 5 and the Detroit plant the week later. Practically 100 per cent production is looked for on resumption, November shipments approximating 3000.

Wills Ste. Claire has entered upon half time operation for December.

Packard reports continued large shipments in the light six model with steady gains in truck demand.

Saxon is operating strictly on a sales basis and reports the signing of new dealers in many localities.

## REED FOUNDRY EXPANDS

KALAMAZOO, MICH., Dec. 5—The Reed Foundry & Machine Co. has awarded a contract for the erection of a machine shop immediately adjoining its steel casting foundry here. Work will be rushed on the initial units and is expected to be completed by Feb. 1. Contracts for the necessary mechanical equipment are being placed. The outlook for business for the Reed company is declared at the factory to be excellent. The production of tractors will be an important feature of the business.

## Month Makes Record in Shipment of Cars

**First of Year to Show Increase Over the Same Period of 1920**

NEW YORK, Dec. 6—The automotive industry has safely passed the bottom of the depression and the worst is over. November was the first month of the year to show an increase in shipments as compared with the same period of 1920. The gain was material, and it is probable each succeeding month, until March at least, will mark an equal or greater gain over the corresponding 30 days of the preceding year.

While there was a seasonal decline as compared with October, the falling off was not as great in proportion as it was in 1920. As December opens, the outlook is more encouraging than it was expected to be a fortnight ago. The volume of sales, chiefly because of the good demand for enclosed cars, will approximate, in dollars, the business for October.

## Stability Indicated

The stability of the industry is indicated by the fact that October was the eighth consecutive month to show only a slight variation in the volume of business done by the parts and accessory makers. There was a decline of less than 5 per cent as compared with September, and business has been on much the same basis since the end of February. It can be predicted confidently that the total of sales for November will show little contraction, and it would be no surprise if the December showing was correspondingly good.

Manufacturers in both the parts and vehicle fields, whose financial affairs are on a reasonably solid foundation, can view the future with confidence. The volume of passenger car sales in 1922 will be fully as large as in 1921, and in the truck field they promise to be considerably better. Interest in highway transport, both freight and passenger, is steadily increasing. An interesting trend is found in the fact that both steam and electric railroads are coming into the market with greater frequency for trucks and buses.

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## Northern California Sales Continue Gain

### Demand Is Reported for Medium and Higher Priced Automobiles

SAN FRANCISCO, Dec. 5—A slow but steady increase in the sales of passenger cars has been manifested throughout northern California during November, even exceeding October, when 4920 passenger cars were sold in that month of 1921, as compared with 4469 in October, 1920, an increase of about 451 cars.

The increase was largest in the medium and high priced cars, rather than a result of greater sale of the lowest-priced automobile. The automobile industry apparently has passed the lowest point of its depression in California and is once more on the up-grade.

San Francisco—county and city being co-linear in area—recorded for October, 1921, one of the largest months the automotive industry ever has had here, nearly doubling the sales of October, 1920, the actual figures being 1173 cars in October, 1921, and 716 in October, 1920.

#### All Counties Increase

Alameda County, which contains Oakland, the second city in northern California, reports sales of 706 cars for October, 1921, as compared with 588 sold in October, 1920, an increase of 20 per cent. Some dealers showed increases of 50 per cent for the month; others were not so fortunate, but all showed an appreciable gain for October, 1921, over the same month of 1920. Contra Costa County dealers sold 107 cars in October, 1921, compared with 88 cars in the same month a year ago. Santa Clara County dealers disposed of 288 passenger cars, against 246 in October, 1920.

Fresno and Tulare counties, usually two of the best markets for passenger cars and trucks in the State, showed a falling off, in some unaccountable manner, from their records of October, 1920. In Fresno County, only 374 passenger cars were sold in October, 1921, while 435 were disposed of in the same month one year ago. Tulare took only 204 cars in October this year, as compared with 254 in October, 1920.

## Demand for Castings Feels Sharp Revival

MILWAUKEE, Dec. 5—The Chain Belt Co., Milwaukee, which has been operating its gray iron foundry three days a week with reduced forces nearly all of this year, on Dec. 1 returned to a six-day weekly schedule and increased its force to a number equivalent to the largest staff it has ever employed. This is due to a sharp increase in orders for castings from a variety of sources, principally machinery, motor vehicles, etc.

The malleable iron foundry is increasing its schedules as well.

The Belt company expects only a fair year in its own productive lines, including concrete mixers, paving outfits and construction equipment, but on the basis of present commercial orders for castings from other manufacturers it believes 1922 is going to be a splendid year. It is wholly unusual to experience a sharp revival in demand for castings at the end of the year and the rush at present is regarded as a good omen, especially since orders specify deliveries as far as three and four months ahead.

## Take Appeal from Order Directing New Owen Sale

WILMINGTON, DEL., Dec. 5—An appeal has been filed in the United States District Court here from the court order granted a few days ago directing a new sale of the personal property of the Owen Magnetic Motor Car Corp., near Wilkes-Barre, Pa. The order refused confirmation of the previous sale, at which \$136,000 was bid by clients of Nathan Bilder, who presented the appeal.

The contention of the receiver and Reuben Sattethwaite, counsel for the Wyoming National Bank of Wilkes-Barre, is that the acceptance by the bidders of the return of their bidding check bars them from the right of appeal. The position of the court was that a bond should be required for performance in the event that its ruling should be reversed in a higher court, and a satisfactory form for such bond is to be presented.

## Jacobsen Increases Stock to Meet Demand of Trade

RACINE, WIS., Dec. 5—To finance production of increasing orders, the Jacobsen Mfg. Co. has increased its capital stock from \$60,000 to \$100,000 and on Jan. 1 will increase its operating force from 90 to 100 per cent. It manufactures the "Four-Acre Motor Driven Lawn Mower," placed on the market about a year ago and now widely used by parks, universities, colleges and schools, golf and country clubs and other institutions maintaining extensive lawn acreage.

The Jacobsen machine is in use at Yale University, Northwestern University, Chicago Park Board, Milwaukee Country Club and along the Pacific Coast. An Evanston (Ill.) concern has placed an order for 200 machines.

#### A. E. A. PLANS LABORATORY

CHICAGO, Dec. 5—Plans under way at the national headquarters of the Automotive Equipment Association promise to establish under the control of the association at no great distance from here a laboratory in which replacement parts and accessories will be tested and the stamp of the A. E. A. placed on them. The idea in promoting this new feature of association work is to aid the merchandising of parts and devices.

## "Conservatism," Chief Lesson 1921 Taught

### M. A. M. A. Queries Manufacturer on What Industry Learned During Year

NEW YORK, Dec. 5—The Motor and Accessory Manufacturers' Association asked its 400 affiliated manufacturing concerns this question:

What is the paramount lesson learned by the automotive industry in 1921?

The overwhelming majority of the responses indicates that the chief fundamental lesson learned by the automotive companies during the year was the necessity of maintaining conservative, balanced inventories.

Corollaries of this mentioned by most of the companies was the danger of over-expansion and over-optimism; the menace of "over" overhead; the necessity for rigid, but sound, economies; and the elimination of "rainbow chasing" from business.

General conservatism in buying, greater prudence in making commitments and closer period buying are mentioned by virtually all the executives who contributed to the symposium as last year's principal contribution to business wisdom.

#### Must Be Guided By Consumer

Another significant recurrent note in most of the statements is the lesson learned by manufacturers that the viewpoint of the ultimate consumer must to a greater extent guide production and distribution policies.

The experience of the automotive industry last year, in the opinion of a leading automobile engine manufacturer whose statement is typical of the rest, will be "enormously beneficial in guiding the future policies of the industry. It has taught every one the need for closer period buying."

One of the largest axle manufacturers in the United States sums up the lessons of 1921 thus:

"The paramount thing taught by last year's experience is that the saturation point has been switched from manufacturers' production to used cars, and that until those now in the hands of the dealers can be disposed of there should be a decided contraction in the new product."

A representative unit manufacturer says:

"We must pay attention to fundamental principles in manufacture and in business. Our inventories must be kept within reasonable bounds; we should not sign contracts more or less blindly and, in short, we should conform to the laws of sane business, which for some reason or other we seemed to have forgotten during the preceding few years.

"We have learned, also, of the evils of 'over' overhead; we have learned how to economize in our shops; we are thrifty, whereas always in the past we have been reckless; and we are thinking more of what the public or our customers want, rather than what we feel they should use."



## Milwaukee Prepares For Steady Output

### Nature and Volume of Orders Most Encouraging Since July 1

MILWAUKEE, Dec. 5—The manufacturing situation in the automotive industries at the beginning of December is one of excellent prospects, compared with most other months this year. Makers of parts, engines, bodies and equipment look for a fairly active month, but the real optimism lies in the fact that orders taken during November and so far this month, for delivery beginning immediately after Jan. 1, are of a more encouraging nature and volume than since July 1.

#### Inventory Period Advanced

In fact, these orders in the case of numerous large manufacturers are such that it was deemed advisable to advance the usual inventory period at the close of December, or over the holidays, to the latter part of November, so that the decks might be cleared for steady production. There is nothing startling or sensational about these orders, but they are so much better than the regular run of business in recent months that favorable comment has been aroused in respect to definite improvement in business.

Usually December is a quiet month in all metal trades lines, but this year it doubtless will develop into an unusually active one, although most of the activity is based on preparation for a general upward tendency of production beginning with the New Year. A high spot in the situation is the pressure exerted by orders upon manufacturers of enclosed bodies, of which there are numerous large interests here.

#### Retail Trade as Usual

Some quickening of retail demand for passenger cars is observed on the basis of successful solicitation of Christmas business although in a general way trade is of about the usual early December character. The absence of any heavy snowfall so far this winter has helped business, for the season still is of such quality that motorists are able to make the freest possible use of cars.

This month usually is the slowest of the year for retail sales, and probably will be only an average one. However, with the annual Milwaukee show coming in six weeks, local dealers expect to experience the usual resumption of consumer interest which this event always excites. Enclosed car sales at this time are running from 15 to 25 per cent ahead of a year ago.

#### RUGGLES ELECTS OFFICERS

DETROIT, Dec. 5—The Ruggles Motor Truck Co., Saginaw, which recently acquired the Huron Motor Truck Co., has elected the following officers and di-

rectors: Frank W. Ruggles, president; W. J. Wickes and Julius B. Kirby, vice-presidents; Ezra L. Smith, secretary; Charles T. Kerry, treasurer; John F. O'Keefe, counsel; directors, the officers and Benton Hanchett, Otto L. Dittmar, H. T. Robinson, Guy S. Garber and Walter C. Hill, all of Saginaw; Harry H. Price, Columbus, Ohio; John J. Thorne, Bay City; John Ryan and Albert E. Sleeper, Bad Axe.

## Hampden Motors Formed to Make 2-Ton Trucks

HOLYOKE, MASS., Dec. 5—The Hampden Motor Truck Corp. has been organized with \$1,000,000 capital to engage in the manufacture of 2-ton trucks. A site of eight acres has been purchased in Willimansett, and plans have been drawn for a one-story brick factory comprising two acres of floor space.

It is proposed to build only one model to sell for around \$2,000, and to be ready for production to begin next spring. Though not built primarily for speed, the truck will be of somewhat lighter design than usual for a vehicle of the size. Concentration on one model is expected to be an element of economy, and distribution will be simplified by selling direct through established dealers. A number of original ideas in construction are planned.

The corporation is composed of Holyoke men with these officers: President, Richard D. Bloom; vice-president, John F. Lynch; treasurer, Ernest S. Steele; directors, R. L. Davenport, John H. Woods, C. H. Collins, F. G. Burnham and C. P. Lyman.

## Pierce-Arrow Awarded New York City Contracts

BUFFALO, Dec. 5—The city of New York has awarded to the Pierce-Arrow Motor Car Co. a contract for 87 heavy duty motor trucks with a total value of \$350,000.

The order will place the production capacity of the company's truck department at about 100 per cent. At present it is running a little above 90 per cent.

The trucks are to be used by the department of streets, some of them in the city's snow fleet.

## Compromise Offer Made on Shuler Axle Claims

LOUISVILLE, KY., Dec. 5—A compromise offer of 20 per cent on claims was made by Charles B. Seymour, attorney, in behalf of the Shuler Axle Mfg. Co. at a hearing before Judge George A. Brent, referee in bankruptcy.

Action on the offer has been set for Dec. 14 by Judge Brent and if 51 per cent of the creditors accept by that time the suggested settlement will be confirmed. According to Elliott Pennebaker, attorney representing 80 per cent of the creditors, the claims against the Shuler company aggregate \$100,000.

## Claims Combination Enhanced Oil Prices

### Federal Trade Commission Makes Report on Pacific Coast Petro- leum Industry

WASHINGTON, Dec. 5—Charges that prices of gasoline and other motor fuels sold on the Pacific Coast were unduly enhanced by so-called combinations among oil companies are made by the Federal Trade Commission in part 2 of its report on the Pacific Coast petroleum industry, as submitted in response to a special resolution introduced by Senator Poindexter of Washington, in the first session of the Sixty-sixth Congress. The report contains a large number of letters and documents giving in detail what purports to be evidence of agreements and understandings covering prices.

#### Marketers Association Mentioned

The commission accuses the Independent Petroleum Marketers Association of Los Angeles of having arrived at an understanding on prices in 1915. This report is especially interesting to the automobile industry because of the fact that the acute gasoline shortage on the Pacific Coast on two or three occasions during this period resulted in heavy losses to manufacturers and dealers through restricted sales, etc.

According to the report of the commission:

"The retail price of gasoline at San Francisco increased from 15.5 cents per gallon in January, 1914, to 27 cents per gallon before the end of 1920. The wholesale tank wagon price of kerosene at San Francisco remained at 9 cents per gallon from January, 1914, to August, 1918, after which time it advanced rapidly to 16.5 cents by the end of 1920; kerosene price changes are influenced largely by conditions in the export market.

"While the increases in the prices of these refined products were not so marked as the advances in crude prices, owing chiefly to less pronounced increases in transportation, refining and marketing costs, the refining and marketing departments of the large companies, during the later years of this period, especially in 1919, made on the average much higher rates of profit on investment.

"From 1916 to 1920, a period of marked price advances, the wholesale prices of the large marketing companies for gasoline and engine distillate sold to garages and other resellers were practically uniform, as were also the retail prices at their own service stations."

#### Standard Group Dominant

In conclusion, the report, which was signed by all the members of the commission, read:

"This dominant position of the Standard group in the petroleum industry of the United States is due not merely to the magnitude of its various units with respect to production and capital investment, but also because of its solidarity, arising apparently from an interlocking stock ownership resting largely in the hands of a few great capitalists and from its great financial resources and credit."

## Optimism Prevails at Tractor Meeting

**All Manufacturers See End of  
Depression With 1922  
Prospects Good**

CHICAGO, Dec. 5—The members of the tractor and thresher department of the National Association of Farm Equipment Manufacturers (formerly the N. I. V. A.), who came here to attend the annual meeting of this section, left for their homes greatly encouraged for the prospects of 1922. It appears that each of these manufacturers came knowing that in his own business he had found very strong signs that the corner had been turned. He was wondering if the other manufacturers had found the same indications.

### Black Discusses Outlook

During the meeting it developed that all manufacturers believed that the deep depression of 1921 was past and certainly 1922 would be better. Both in the meeting and in the corridor talks there was every evidence of optimism.

The meeting devoted itself very closely to business affairs and the discussions were very generally participated in. The high points were discussion of a service plan; the Minneapolis Power Farming Show, and the Power Farm Bureau, on all of which definite action was taken.

The most impressive feature of the program was a paper on the "1922 Outlook" by William Black, president of the national association. Black discussed at length the conditions that had confronted the industry since the slump and pointed definitely to the influence that was certain to make 1922 a better year.

### Minneapolis Show to Be Held

The present status of the railroad situation was discussed exhaustively in the regular session by W. H. Stackhouse, and at the banquet by F. R. Todd. An interesting feature of this discussion was the report of the work that the committee of the national association is doing to assist in putting railroad rates and railroad management on a better basis, and the strong pleas in this regard that are being made to Congress.

It was evident from the discussion on the floor that there had been considerable criticism of the Minneapolis show plan. This was thoroughly discussed and a vote of confidence given to the show committee. J. B. Bartholomew, chairman of the committee, stated that he personally would solicit every tractor manufacturer, who is a member of the association, to put exhibits in this show. The manufacturers personally believed that the apathy of the Minneapolis dealers and public was due to a wrong impression that could be overcome.

Bartholomew was supported by Finley P. Mount and E. J. Gittins. Mount said that he was enthusiastically for the trac-

## TRUCKS PROVE SAVING IN COTTON SHIPMENTS

GRIFFIN, GA., Dec. 5—Cotton in this vicinity is being transported to domestic mills with the aid of motor trucks at an average saving of approximately \$1 per bale as compared with railroad freight charges, with the added advantage that deliveries are being made much more promptly.

tor show as planned, and he did not propose that any factory branch managers should "gum up" the proceedings. He said that possibly their own branch manager was one of these, but there must be a change of attitude, and so far as the committee was concerned, they were going ahead with the show even if they had to allot the space not taken to the exhibitors who had taken space. The meeting left no doubt that the show will be held as planned.

(Continued on page 1146)

## Paige-Detroit Subsidiary Formed to Make "Jewett"

DETROIT, Dec. 6—Jewett Motors, Inc., has been formed as a subsidiary of the Paige-Detroit Motor Car Co. to manufacture a six cylinder car to be called the Jewett which will sell in the light car, medium price class field.

The car will be first shown to dealers in the Hotel Commodore during the New York show week and the selling price and sales features will be announced at a dinner to be tendered Paige dealers by the company.

The car will be made in the Paige factories in Detroit but by an entirely separate working force and by a separate company. Officers of the new company are headed by H. M. Jewett, president of Paige-Detroit Co.

The Paige company has adopted a standard of practice which all its dealers will be advised to follow beginning at the time of introduction of the new car.

## American Rolls-Royce Enlarges Force at Plant

SPRINGFIELD, MASS., Dec. 5—Rolls-Royce of America, Inc., after operating on a limited scale for two months, is increasing its factory force from week to week and is now turning out two chassis a week. The machine shop is again in operation and the assembly force much enlarged. It is expected that the normal rate of four chassis a week will be reached by the first week of January.

S. De B. Keim, sales manager, reports gratifying results from the company's exhibit at the New York salon. The company is making deliveries for shipment to California and Florida and the winter resorts of Southern Europe.

## Government Moves in Lincoln Appeal

**Treasury Agrees to Give Immediate Hearing Relative to  
\$4,500,000 Tax**

DETROIT, Dec. 6—Officials of the Treasury Department at Washington have agreed to give attorneys for the Detroit Trust Co., as receiver of the Lincoln Motor Co., an immediate hearing on its appeal from the \$4,500,000 additional tax imposed after an adjustment by the War Department. The hearing will follow the completion of the inventory and its appraisal this week. Until something definite is learned of the course which will be followed by the Treasury Department, the receiver will be compelled to hold in abeyance any plans he may have for reorganization. It is expected it will be possible to hold a creditors' meeting by Dec. 20, and that date has been tentatively set.

### Reorganization Delayed

When the details of the inventory and appraisal are presented to the Federal court the receiver will recommend that operations be continued. The outlook for business is regarded as favorable and models now are being built for the New York and Chicago shows. They will follow new lines in body work.

No serious attempt at reorganization can be made while the Government claim is pending. When it was originally filed several months ago the bill was for \$5,700,000 but this was reduced by \$1,200,000. Filing of this claim prevented the company from putting through any re-financing plan and was one of the reasons for the receivership.

### Mortgage as First Lien

It is contended that unless the government succeeds in establishing the tax claim as a prior lien, which is considered improbable, the mortgage against the plant will come first. The majority members of the board of directors who forced the receivership own a large part of the \$1,250,000 in bonds outstanding and are joint endorsers with Henry M. Leland and his son of \$4,000,000 in bank notes. The Lelands had their entire fortune invested in the company and this is regarded as practically lost.

There are approximately 2000 owners of the \$8,000,000 in class A stock. The Lincoln Motor Co. holds 15,165 shares. The largest individual holder is George F. Fuller of Worcester, Mass., who owns 4550 shares. Sybil H. Fuller owns 3000 shares. Fred T. Murphy, William H. Murphy and Mrs. Rebecca Murphy together own 5400 shares.

### NEWFOUNDLAND AIR SERVICE

ST. JOHN'S, NEWFOUNDLAND, Dec. 5—The Newfoundland Government has inaugurated an aerial mail service between St. John's and Halifax with North Sydney as a port of call.

## 19,645,248 Casings Made During Year

Output of Inner Tubes Aggregates 24,417,229 and of Solid Tires, 377,823

NEW YORK, Dec. 5—Production of pneumatic casings by the tire manufacturers who are members of the Rubber Association of America, which means approximately 97 per cent of the total production in the country, was 19,645,248 for the calendar year ended Oct. 31. Shipments for the same period totaled 22,133,940. The excess of shipments over production was taken from the stocks in storage which stood at 5,170,920 at the end of November 1920 but which had been reduced at the close of October last to 3,545,030.

### Shipments Exceed Output

Production of inner tubes for the calendar year totaled 24,417,229 while shipments were 26,292,718. This excess also was taken from the stocks on hand which had been reduced at the close of October to 4,732,016. Solid tire production aggregated 377,823 and shipments 530,897.

Production of pneumatic casings in October amounted to 1,928,271 and was almost identical with the production in September, when the total was 1,929,268. There was a sharp falling off in shipments in October, however, the total being 1,675,169 as compared with 2,047,929 in September. Shipment figures were the lowest since March, when they were 1,614,651. Inner tube production fell off from 3,274,828 in September to 2,843,918 in October. Shipments, however, were 2,016,371 as compared with 2,645,758 the previous month.

### Statistics of Industry

The detailed figures for the year by months as compiled by the rubber association for the Bureau of Foreign and Domestic Commerce, follow:

PNEUMATIC CASINGS			
1920	Inventory	Production	Shipments
Nov. ....	5,170,928	915,651	1,262,159
Dec. ....	5,508,380	506,111	1,327,153
1921			
Jan. ....	5,319,605	703,430	965,417
Feb. ....	5,193,018	819,892	1,073,756
Mar. ....	4,597,103	1,163,314	1,614,651
Apr. ....	4,527,445	1,651,418	1,785,951
May ....	4,451,668	2,100,917	2,085,882
June ....	4,154,456	2,313,265	2,643,850
July ....	3,892,037	2,570,524	2,757,581
Aug. ....	3,934,583	3,043,187	2,894,442
Sept. ....	3,340,798	1,929,268	2,047,929
Oct. ....	3,545,030	1,928,271	1,675,169
INNER TUBES			
1920	Inventory	Production	Shipments
Nov. ....	5,480,354	1,002,886	1,366,977
Dec. ....	5,786,929	508,446	1,481,285
1921			
Jan. ....	5,586,163	740,824	1,042,617
Feb. ....	5,415,464	916,627	1,129,881
Mar. ....	5,044,861	1,346,483	1,643,690
Apr. ....	4,916,772	1,862,122	1,983,571
May ....	4,751,880	2,210,040	2,342,567
June ....	3,835,098	2,359,928	2,322,673
July ....	3,122,815	3,020,981	3,603,248
Aug. ....	3,649,319	4,430,152	3,804,060
Sept. ....	3,827,830	3,274,828	2,645,758
Oct. ....	4,732,016	2,843,918	2,016,371
SOLID TIRES			
1920	Inventory	Production	Shipments
Nov. ....	294,043	23,299	36,628
Dec. ....	303,473	16,297	40,828

## TIRE FREIGHT RATES CUT TO WEST COAST

NEW YORK, Dec. 5—The traffic committee of the Rubber Association of America announces that as a result of negotiations which have been carried on for some time the westbound freight rate on tires to the coast has been reduced more than 30 per cent.

The carriers have agreed to establish a rate of \$2.75 per 100 lbs. from eastern shipping points to Pacific Coast ports reached by water lines, Los Angeles to Seattle inclusive, to meet water competition through the Panama Canal.

It will be necessary to submit this proposal to the Interstate Commerce Commission and for that reason it is impossible to state the exact date upon which the new rates will become effective.

1921			
Jan. ....	303,753	21,220	29,116
Feb. ....	304,374	23,355	29,599
Mar. ....	283,800	28,710	43,926
Apr. ....	269,985	28,859	42,080
May ....	264,633	35,156	40,122
June ....	240,336	28,395	49,867
July ....	220,003	35,123	55,678
Aug. ....	216,367	55,694	66,866
Sept. ....	161,832	37,441	50,276
Oct. ....	163,299	46,274	46,911

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" include only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

## International Wheel Preparing to Produce

TORONTO, Dec. 5—The Syndicate of Toronto, Montreal and Hamilton capitalists which has formed the International Wheel & Rim Co., Ltd., to manufacture a double disc steel automobile wheel under the Culp and Crenan patents is making arrangements to get into production.

Dies for the wheels as well as for the new Culp demountable rim are being made. Joseph N. Crenan is president and general manager of the company. He states that he has orders for a number of test wheels from several Canadian car manufacturers as well as from most of the Canadian jobbers.

### U. S. RUBBER HAS NEW TUBE

NEW YORK, Dec. 5—A new inner tube has been placed on the market by the United States Rubber Co. It will be sold under the name of Royal Tube and will be of the same general quality as the Royal cord tire. Improvements in construction are said to give the tube increased life and greater adaptability to repair work.

## Tire Outlook Good, Seiberling States

Says Industry Has Passed Turning Point and Is on Up-Grade

AKRON, Dec. 5—"Business has quite definitely turned the corner, but prosperity waits on the restoration of the buying power of America's greatest commercial asset—the farmer," states F. A. Seiberling, president of the Seiberling Rubber Co. of Akron.

He believes the automotive industry, in the last analysis, is dependent upon the farmer, and the prosperity of the farmer, saying, "For not only is he the biggest buyer of automobiles himself, but the trade he creates means automobiles and motor trucks for other people. But the farmer cannot buy automobiles on 'dollar wheat' that costs him 50 cents or more to get to the market."

### Improvement to Be Steady

The tire industry, according to Seiberling, long since has passed the turning point and is steadily on the upgrade. Stocks have been largely absorbed, he explained, and the business to-day is as near sound readjustment as any basic industry in the country.

"Consumption of tires in 1922 is certain to be greater than that of the present year, and the industry will experience a steady increase following the improvement in general business and the expansion of the automobile trade," he adds.

Seiberling believes the improvement in business will not be rapid, but steady, and that it will not jump straight up from "low" to "high." He says the world will never be able to get away from rubber as a material in the construction of tires. Rubber supplies, he states, are abnormal at present. There is more than a year's supply of rubber now on hand in the United States, he estimates. Prices of tires are in proper adjustment with the prices of raw materials.

## American Bosch Program Launched at Conference

SPRINGFIELD, Dec. 5—For the purpose of launching a broader sales campaign in respect to its new automotive products, the American Bosch Magneto Corp., called its branch managers and district salesmen from New York, Chicago and Detroit into conference here.

Alfred H. Bartsch, general sales manager, led in a discussion of plans for appointing new representatives in various cities and otherwise extending sales and service. These arrangements follow the plan of maintaining close relations with all the dealers, with a view to expanding the production and use of devices now being introduced, comprising magneto fittings, impulse couplings, starting motors, generators, battery ignition systems, and numerous small accessories.

## Two Plans Favored in Used Car Problem

### Manufacturers Would Act on One Proposal; Dealers Would Support Other

NEW YORK, Dec. 5—The survey made by the National Automobile Chamber of Commerce in the hope of finding some definite means of solving the used car problem shows that two definite plans seem to be most favored by automobile dealers. The first of these would be acted upon by the manufacturers and the other would be supported by the dealers. The proposals are:

1.—Each manufacturer, in advertising his new cars, to advertise also the market price of his older models.

2.—Dealers in each locality to authorize one or more public appraisers similar to real estate appraisers who for a fee paid by the dealer will give the sales value of any car submitted by dealer or customer.

#### Would Advertise Prices

In explaining these plans in an address before the Washington, D. C., Automotive Association, the following explanation was made by Alfred Reeves, general manager of the N. A. C. C.:

"Under the first plan the manufacturer will advertise the sales price of his older models in good condition, based upon reports from around the country. It should not be necessary to give values of cars less than 18 months or more than four years old.

"The plan would give some protection to the new car dealer because a customer could hardly ask for a greater allowance than he knew could be obtained for his used car. Any dealer exceeding this allowance would do it with the knowledge that he is inviting a loss which loss he is apt to take by promptly selling the car at the known sales value. This plan it is felt would increase respect for the second hand car.

#### Provides for Appraisers

"Under the second plan, the dealers in each locality would appoint a certain number of appraisers to appraise second hand cars offered in trade. These men at proper quarters, with experts, would judge the condition of the car and issue a certificate to the owner giving a value that would be recognized by all dealers.

"The dealers would pay a fee of \$2 or more to the appraiser, who would be entirely independent of any particular dealer. He would be appointed for his ability. Just as certain real estate appraisers are recognized by real estate firms.

"Such a plan would give dealers a true knowledge of the value of the car. Of course, nothing could prevent any dealer from allowing a sum in excess of the appraised valuation, but in so doing he would be incurring a loss with his eyes open. Customers, as a rule, expect the dealer to make a fair profit. Owners of used cars, unfortunately, overestimate their value and where there is no official appraisal in opposition they are generally good enough salesmen to sell the dealer a car for more than its worth.

"No matter what plan may be finally approved by manufacturers and dealers, the fact remains that the used car problem will

continue to be a menace until the dealers learn enough about values to buy second hand cars enthusiastically, for a profit, and not with depressed spirits at prices which they know are certain to involve a loss. I can think of no better slogan to help the used car problem than for everyone concerned to 'buy them right'."

Reeves contended that the real fundamental in the solution of the problem is to take in the used car at the right price, "which means a price that will enable it to be sold at a profit."

## Battery Stockholders Decide Reorganization

HAMMOND, IND., Dec. 5—On petition of the Indiana Box Co., East Chicago, a receiver was appointed in the Superior Court here for the OK Giant Battery Corp. The claim of the petitioner was for about \$300 for shipping boxes for batteries. At the same time the order for a receiver was entered the court ordered the sale of the battery plant for delinquent taxes setting the sale for Dec. 3. A restraining order was secured by some of the stockholders and the sale was stopped.

Previously twenty-five of the battery company stockholders held a meeting at which it was decided to reorganize the company, the plan including the appointment of a stockholders' committee to take charge of the plant as soon as the receivership is ended. A. G. Slocum, former secretary of the OK Battery Corp., is receiver.

## Lay Reorganization Plans for Kelley Tire Company

HARTFORD, CONN., Dec. 5—Plans for the reorganization of the Kelley Tire & Rubber Co. have been started through Edward Newman, a New York lawyer, who heads a group of stockholders and the law firm of Holden & Peck of the stockholders' committee. Receiver A. H. Barclay of New Haven is not yet ready to announce the plan but states that negotiations are in progress.

It is said that the stockholders are to buy bonds of the company and receive a bonus in preferred stock but that all stockholders will receive an allotment of common stock whether or not they go into the refinancing plan.

## November Sales Remain Steady in New Orleans

NEW ORLEANS, Dec. 5—Leading automobile dealers here say that sales for November have held up well, especially during the first three weeks of the month. The fourth week was somewhat slack with prospective purchasers more inclined to talk of waiting until the first of the year.

New cars have been in better demand than used automobiles. The latter continue to move slowly and the supply on hand still appears ample to preclude possibility of any notable early improvement in that line.

## Bock Bearing Plant Is Profitable Unit

### Economy Program of Standard Parts Does Not Consider Its Sale

CLEVELAND, Dec. 6—There has been outlined for the Standard Parts Co. a program of economy that in operation under the administration of receiver Frank Scott has resulted in the payments of dividends of \$2,000,000 to creditors within a short time, and has put the company in an excellent condition for the future.

A part of this economy program is the sale of certain plants, a series of consolidations, rearrangements of plants and changes in the methods of handling material. The program for sales of plants that are a part of the \$20,000,000 parent corporation that is engaged in the manufacture of automobile accessories and parts became known here to-day.

#### Bock Not Sold

Some time ago a small establishment 2½ miles distant from the main plant of the Bock Bearing Co. at Toledo was sold. This gave rise to the report that the Bock Bearing plant, a unit of Standard Parts, had changed hands, but this was denied at general offices of Standard Parts here. It was said the Bock Bearing plant is one of the most profitable units of the parent concern, that it has not been sold and that it is not for sale. In the small plant that was sold but a single operation was performed and it was disposed of under the general economy plan.

The American Ball Bearing Axle plant in this city is for sale, while the forge plant at Canton has been sold, pending confirmation of the court, and the plant of the Spring Co. at Canton is on the market. The work that was done in the Spring plant at Canton has been transferred to the Perfection Spring plant in this city and a considerable saving has been effected.

The Hess-Carphage Axle plant at Cincinnati also is for sale. It will be disposed of as a going concern. When the plants that are on the market are disposed of the Standard Parts will have as remaining units the Perfection Spring Co., the Eaton Axle Co., Standard Welding Co., Bock Bearing Co. and the Spring service stations at New York City, Boston and Cleveland, as well as the Pontiac Spring Co.

#### G. M. BUILDING READY JUNE 1.

DETROIT, Dec. 6—General Motors will begin work to complete finishings on its office building here soon after the first of the year. By June 1 it is hoped to have the entire structure ready for occupancy. Most of the interior work remains to be done on the west wing. Decision to complete the building came in connection with the recent sale of \$12,000,000 bonds.

# REACH AGREEMENT IN WILLYS ACTION

## Plan Satisfactory to All Interests

### Provides for Retention of Miniger as Receiver—Kennison Kept in Ohio

(Continued from page 1136)

Judge Bodine will be asked to reappoint Miniger to co-operate with the other two receivers already designated by him. It was agreed at the conference that this plan would be appropriate because it would assure the other receivers the benefit of Miniger's long and successful experience as a manufacturer in their attempt to solve the problems growing out of the big new plant of the corporation at Elizabeth where the Chrysler six was to have been built.

#### Bankers Attend Conference

The conference yesterday was attended by representatives of the Chase National, Chemical National, New York Trust and Equitable Trust of this city as well as by attorneys for the bank creditors' committee. Other banks which sent representatives were the First National of St. Louis and the Merchants' Loan & Trust Co. of Chicago. The receivers and interests in Ohio were represented by Toledo attorneys. Willys attended personally with his counsel. James P. Cotton represented the first preferred stockholders, Littleton Fox the second preferred stockholders and Col. J. M. Hartfield the merchandise and construction creditors.

A statement in behalf of the bank creditors' committee was made after the conference by J. A. Bower, vice-president of the New York Trust Co. He said there were sufficient assets to meet all claims against the Willys Corp. and he emphasized the fact that the Willys-Overland Co. is not involved financially by the receivership.

#### Has Many Assets

It was pointed out by Bower that the Willys Corp. has a large amount of assets to cover its obligations which have been estimated at between \$10,000,000 and \$14,000,000. One of them is the Elizabeth plant which is valued at \$8,000,000 and rated as one of the finest production plants in the world. Other valuable assets are the New Process Gear plant at Syracuse and the Electric Auto Light plant at Toledo with various smaller companies. The Willys Corp. also holds 33 per cent of the stock of the Willys-Overland Co. and several million dollars' worth of stock in the Fisk and Federal rubber companies. These stocks are said to approximate \$20,000,000.

A statement made by Alfred A. Cook attorney for the New York Trust Co., said:

"Every interest is desirous of the carrying out of the program of amicable adjustment. There are plenty of assets to cover all liabilities and all of us wish to correct the erroneous impression that the Willys-Overland Co. is affected. Willys-Overland is solvent and sound."

Definite plans have not yet been evolved for the straightening out of the difficulties of the corporation. The Elizabeth plant is the only unproductive unit and it is considered certain that an effort will be made to sell this property. The New Jersey receivers announced Saturday that they would attempt at the earliest possible moment to get rid of it and that the first chance to buy would be given the bank creditors. The "peace conference" may modify this plan in some respects but not the determination to get rid of the Elizabeth property. All Willys interests feel that beyond the sale of the Elizabeth factory there should be no dismemberment of the corporation and that the various other plants should be operated under its direction.

#### U. S. Light Not Involved

A statement has been issued by the United States Light & Heat Corp., Niagara Falls, asserting that it is not involved in the receivership and that the only connection between it and the Willys Corp. is that its preferred stock is owned by the Willys Corp.

Sale of the Elizabeth plant would make it possible to apply the earnings of the Electric Auto-Lite Corp. and the other producing companies to the liquidation of the obligations. Up to this time half the earnings of Auto-Lite have been used in paying for the maintenance of the big factory in New Jersey where a skeleton organization had been maintained in the expectation of beginning production in the near future on the Chrysler car.

The amicable agreement which has been reached is expected ultimately to result in payment of all debts and the preservation of substantial equities for the various classes of stockholders through reorganization and refinancing under the receivership.

## Union Insurance Acquires Motor Mutual Indemnity

KANSAS CITY, Dec. 5—J. B. Sackett, President of the Union Insurance Co. of Wichita, Kan., announces that he and his associates have taken over the Motor Mutual Indemnity of Kansas City and will move its home office to Wichita. It was organized in November, 1920, but has done almost no business.

It is the purpose of the new management to write fire and theft insurance on automobiles at manual rates and accept as assured only members of the Anti-Automobile Thief Association of America.

## Cooperation Urged by Court in Newark

### Willys Files Affidavit Setting Forth Steps Which Led to Action

(Continued from page 1136)

Illustration that Messrs. Kennison and Miniger be retained with him."

In his affidavit, Willys also set forth that he and his family owned approximately 80 per cent of the common capital stock of the company. This represented property and securities contributed to the corporation by him worth more than \$14,000,000 when the former Electric Auto-Lite Corp. became the Willys Corp.

#### Willys Sought Harmony

"During the past eight months," the affidavit went on, "efforts have been made to which I have lent all the assistance in my power, to bring about an agreement, but it has proved impossible to reconcile the various conflicting interests."

The banking group's reorganization plan was abandoned early in November, he said, and to save the situation, he proposed the staving off of a receivership by putting liquidating power in the hands of a representative committee. This the bankers would not accept, he claimed.

"The only counter suggestion," the affidavit proceeded, "was that the Auto-Lite and New Process Gear plants be transferred at once to subsidiary corporations so as not to be affected by a receivership. This might violate restrictions governing first preferred stock and cause serious liabilities for the directors without the consent of 75 per cent of the first preferred stock, which it was not practicable to obtain. With no plan of reorganization in sight, the affairs of the corporation were left in a truly desperate position."

#### Agreed on Receivership

"My information was that some individual shareholder was trying to precipitate some form of receivership, and a possible receivership in creditor's action was also mentioned."

"I was informed the bank creditors were investigating the question of auctioning off component units of the enterprise, a program which, if carried out, meant disaster to all classes of stockholders. This latest circumstance undermined my confidence and the confidence of other directors in regard to receiving further co-operation from the bank creditors' committee in preserving the enterprise."

Then followed information on the directors' decision at a regular adjourned meeting to accept a receivership.

"The plan of receivership," said Willys, "reflected the conscientious convictions of myself and the other directors that we should accept the protection of the court."

"The chief function of the receivership in

(Continued on next page)



## Urges Cooperation in Willys Action

### New Jersey Court Acts—Affidavit Pertaining to Receiver- ship Filed

(Continued from preceding page)

the New York jurisdiction," the affidavit ran on, "will be to take custody of stocks and securities. By the force of circumstances, the most important business activities of the defendant will be in its manufacturing operations at Toledo. Therefore, there was no impropriety in the directors consenting to the primary jurisdiction taken by Toledo.

"The ultimate payment of all debts is assured, and that all shareholders have substantial equities to preserve is established beyond doubt by the great value of the treasury assets and the earning power of the Auto-Lite and the New Process plant, without considering the other large investments. A reconstruction value of \$10,000,000 was recently placed upon the Elizabeth plant."

#### Refutes Aspersions

The affidavit next presented information relative to the 739,000 shares of Willys-Overland stock held by the Willys Corp. This stock has a book value of \$18 a share, exclusive of goodwill, it was stated, and an end of business depression would make this asset equal four-fifths of the corporation's total debts.

Willys then asked the privilege of refuting certain aspersions.

"I was never a stockholder nor officer nor director of the Ohio Savings Bank & Trust Co., and I am not a borrower there and have no personal dealings. I have no influence over it. In fact, I failed to persuade it to join the bank creditors' committee.

"The allegation that the majority of the directors of the Willys Corp. and of the Willys-Overland Co. are dominated and controlled by me does an injustice to the officers of the companies. I suggested Miniger for receiver with no thought to dominate, and he would not stand for domination anyhow, but I believed it proper that the operating head should be named.

#### Judge Indorses Receivers

"His name was suggested for the reason that it seemed entirely natural, proper and customary that the man at the head of the largest income producing operating unit of the defendant should become the operating receiver.

"I have no business or personal relation with Kennison, having met the gentleman less than half a dozen times in my life. I urgently requested that Judge Killits be asked not to appoint a second receiver until after all committees and other interested parties had been notified, but the court declined to appoint an operating receiver alone and named Kennison as his own selection."

Willys told of the sale of Willys-Overland stock to the Willys Corp., pointing out the care with which the transaction was made, and he remarked: "There is nothing in the transaction upon which any personal liability on the part of the directors who participated in it can be predicated."

A letter from Judge Killits endorsing Kennison and Miniger, which was read to Judge Bodine by their counsel, Thomas

H. Tracy, was addressed to Federal Judge Hough, who had been expected to handle the case in New York, and was as follows:

"I am sending this by Messrs. Miniger and Kennison, whom I appointed receivers for the Willys Corp., and am glad to have the opportunity to thus make you acquainted with each of these gentlemen. Miniger has been for a long time the successful administrator of the affairs of the defendant and is competent in every conceivable way to administer the estate for the court from an operating and marketing end of the business.

"I deemed it best to appoint two receivers because of the magnitude of the business of the corporation and the diversity of interests to be represented, and selected of my own choice Kennison as the second receiver. I have known him for a long time as favorably as I have known Miniger and have every confidence in his capacity to faithfully serve the court in this position. He has no connection whatever with the Willys Corp. For a long time he has been closely identified with banking and commercial matters in this city."

Affidavits were presented on the ability and character of Kennison and Miniger, along with a letter from Judge Killits attesting that Kennison had been his personal choice for receiver, and that Kennison had no connection with Willys.

#### Repudiation "Almost Criminal"

"This company," declared Conover English, associated with Tracy, "is successful in Ohio, and the man who has made this possible was Miniger. Judge Killits may feel that if his receivers are repudiated, he should shut down on money for the New Jersey plant. There should be a close connection between Toledo and New Jersey."

"It would be almost criminal," remarked Judge Bodine, "to throw out an experienced operating man where a plant is operating, but we don't have any operating problem in New Jersey."

## Predicts 50 to 100 Miles on Gallon of Gasoline

DETROIT, Dec. 6—Fifty to one hundred miles per gallon of gasoline is a development in the motor car industry not far removed, according to C. F. Kettering, president of the General Motors Research Corp. and vice-president of the General Motors Corp. He made the assertion in an address to "Gold Medal Men" of the Cadillac Motor Car Co. at a dinner at the plant last evening. Gold medals were presented to 81 men employees and gold rings to four women employees, all of whom have been with the company 10 years.

"Increased mileage will come about through a change in the method of refining gasoline," Kettering said. "We know there now is a constructive attitude on the part of the oil companies to refine oil along the right lines. It is possible to-day easily to double the mileage and when this has been done a lot of trouble with the automobiles will be solved, such as elimination of carbon.

"The use of gasoline was more or less accidental," Kettering explained. "No one asked if it was the right thing for the motor car. It was the nearest thing at hand. Gasoline was then simply a by-product almost to be had for the asking."

## Planning for Show Week in New York

### Various Organizations Set Dates and Places for Annual Meetings

NEW YORK, Dec. 5—With interest in the coming New York show keener than ever before, the national organizations of the automotive industry with headquarters here are making unusually elaborate preparations for the week, which is the busiest of the year for them. The number of exhibits at the show itself will establish a new record and an unusually large number of announcements which will be important to the trade are expected.

#### Arrange For Dinners

Preliminary arrangements are well under way for the annual dinners to be held during the show. The Rubber Association of America will dine at the Waldorf Monday evening, Jan. 9. The first dinner of the Old Timers' Association will be held the same evening. The dinner of the National Automobile Chamber of Commerce will be held at the Commodore on Tuesday evening, that of the Motor and Accessory Manufacturers' Association Wednesday at the same hotel and the banquet of the Society of Automotive Engineers at the Astor, Thursday evening.

#### Meeting Dates Set

The annual meeting of the Rubber Association of America for the election of officers will be held at the Waldorf Monday afternoon. The annual meeting of the M. A. M. A. will be held at the Commodore Wednesday afternoon. The directors of the N. A. C. C. also will meet Wednesday. A large number of more or less incidental meetings of dealers and committees will be held during the week. It is probable manufacturers will devote more than the usual amount of attention to arousing greater interest among dealers.

#### Show Roster Changed

NEW YORK, Dec. 6—Several changes have been made in the past few days in the roster of exhibits at the New York and Chicago automobile shows. The Jackson Motors Corp. of Jackson, Mich., will exhibit only at Chicago and the William Small Co. of Indianapolis, which makes the Monroe car, has withdrawn from both shows. This places the total makes of cars to be displayed at New York at 92 and the figure for Chicago is 80.

The show management has been informed that the New York dealers propose to make the exposition this year a "selling show" and they are making plans to take prospects in large numbers to the Grand Central Palace. The color scheme of the decorations this year will be purple and gold with purple predominating.

## Naming Field Force for Rickenbacker

### Eighty Distributors Will Be Appointed on Five-Year Contracts

DETROIT, Dec. 7.—Distribution of the new Rickenbacker car will be through a strong distributor organization working upon a five-year contract with the factory. By March 1 distributors will have been named in 25 to 30 leading centers of the United States and additional territories will be allotted as fast as production at the plant permits.

#### Dealers to Be Protected

In determining upon the five-year contract as the basis of its sales relationships, Captain E. V. Rickenbacker, vice-president and director of sales of the company, said he regarded it as the only equitable basis upon which a substantial dealer should be asked to operate. Because of the long tenure of the contract, Rickenbacker said, great care would be exercised by the company in naming its representatives, which accounted for the apparent delay in announcing its sales organization.

Under the contract no dealer can either forego his obligations or be removed by the factory except for cause. Every dealer will be protected against loss through price reductions by a special clause guaranteeing against this. Territorial lines will be strictly drawn and enforced.

#### May Handle Other Lines

No dealer will be required to handle the Rickenbacker line exclusively, the only obligation in this respect being that he handle no other car in the general class of the Rickenbacker. By handling two or more non-conflicting lines, Rickenbacker declared, a dealer can make substantial reductions in his overhead and a competent dealer, he said, can handle several lines with equal fairness to all.

The company is carefully considering the used car problem, but it is considering it from the angle of the dealer who has been successful in meeting and profiting by accepting trade-ins.

Distributors in New York, Boston, Philadelphia and Chicago will be named before the first of the year and distributors in other main centers will be added from time to time until March 1. When fully organized the distributors will number about 80, Rickenbacker said. These will be expected to handle a production of 12,000 to 15,000 cars in 1922.

## Hanson to Manufacture New "Little Six" Car

ATLANTA, Dec. 6—George W. Hanson, president of the Hanson Motor Co. of Atlanta, announces that the company will shortly start the manufacture of a new model to be known as the Little

## FORD PROVING METAL CURRENCY NOT NEEDED

DETROIT, Dec. 8.—To prove his contention that metal currency is not necessary to carry on the commerce of the world, Henry Ford is understood to be establishing a "food products bureau" which will enable farmers to exchange the products of the soil for Ford cars, trucks and tractors. Under the plan as it is being worked out, it is understood, Ford dealers will be authorized to barter directly with farmers, taking produce at its current market price. The dealers in turn can use this produce to pay the Ford company for motor vehicles.

Six. It will have a 112-in. wheelbase and will be a companion car to the present line of Sixes manufactured by the company.

While no definite price has been announced for the new model, it is said that it will list for less than \$1,000 and be the lowest priced six-cylinder car on the American market. The new car will first be shown, Hanson stated, at the New York and Chicago shows, and then at the Atlanta show.

## 26 Companies Included in Automotive Merger

NEW YORK, Dec. 7.—Substantial progress has been made in the last few weeks in negotiations for the formation of the big automotive merger which will be known as the Associated Motor Industries, a Delaware corporation with a capital of \$80,000,000. The roster of companies which will be included now contains 26 names, embracing established companies not only in the parts field but in the passenger car and truck branches of the industry. One of the purposes of the merger will be to assure the parts companies included, a definite amount of business each month through the sale of the motor vehicles which will be controlled by the parent company.

Promoters of the enterprise assert that ample financial backing has been obtained to insure the success of the enterprise and declare negotiations now have reached a point where the merger can be called an actuality. One of the cardinal points in the merger plan is a scheme for financing dealers in its products and those who purchase them.

#### CORBITT ANNOUNCES PRICES

HENDERSON, N. C., Dec. 6—Corbitt Motor Truck Co. has announced the following prices on its 1922 models: H, 1-ton, \$1,400; E, 1½-ton, \$2,200; C, 2-ton, \$2,600; B, 2½-ton, \$3,000; R, 3-ton, \$3,200; A, 3½-4 tons, \$3,800; AA, 5-ton, \$4,500.

## Inventories of Reo Reduced 50 Per Cent.

### Olds Reports Company Enjoyed Unusually Profitable Year Despite General Conditions

DETROIT, Dec. 7.—The plant and branch inventories of the Reo Motor Car Co. totalling \$12,484,152.52 on Aug. 31, 1920, are shown to be reduced about 50 per cent by the statement issued as of Aug. 31, 1921. Inventories of the current year are placed at \$6,556,044.15, based on market values as of the August date.

President R. E. Olds sums up the outstanding features of the year's operation in a statement accompanying the financial report, declaring the company to have enjoyed an unusually profitable year notwithstanding the conditions prevailing in most other lines of business.

Surplus \$9,785,666.57

The company has in cash, drafts in transit and Government bonds, \$3,255,968.46. Notes and accounts receivable of \$2,823,078.49 are shown to offset current liabilities of \$1,196,280.38. The ratio of current assets to current liabilities is shown to be six to one. The company has no bonds or preferred stock and has no fixed interest charges. Net profits for the fiscal year total \$1,022,232.31 and after cash dividends of \$693,725 there is a surplus of \$9,785,666.57. The common stock is shown to have a book value of \$24.10 a share.

#### Percentage Increase Large

Referring to the volume of business done during the year, Olds said though this was less than for 1920, the percentage of normal has been much larger than the general average of the industry.

## N. A. C. C. Directors Vote to Continue Tax Program

NEW YORK, Dec. 8.—Directors of the National Automobile Chamber of Commerce decided yesterday to continue their tax program for another year with the hope that it will result in the elimination of burdensome excise taxes.

Further consideration was given to suggestions made to the National Automobile Dealers Association for contract changes and it is expected a definite report on this subject will be sent out soon.

The directors made a further survey of the used car problem and a report on investigations which has been made is expected in a fortnight.

In their discussion of business conditions, the directors pointed out that practically all companies have adopted a conservative program for the winter and that no definite plans for the next year will be made until after the New York and Chicago shows, although many companies have gone to the market for the purchase of supplies on a moderate scale.

## N. A. C. C. Opposes Overloading Trucks

### Directors Endorse Committee Resolution—Overspeeding Is Also Condemned

NEW YORK, Dec. 7—Directors of the National Automobile Chamber of Commerce at their meeting here to-day went on record unanimously as opposed to the overloading and overspeeding of motor vehicles. This action was taken in reference to the ruling made by highway and motor vehicle authorities in the State of Connecticut that any person desiring to register a commercial motor vehicle for an increase over its load capacity must obtain from its engineering department a certificate to the effect that in the opinion of the manufacturer such vehicle is capable of being safely operated under all conditions when loaded to the increased capacity.

#### Certificate Giving Dangerous

The resolution in reference to this proposal, which was adopted by the motor truck committee of the N. A. C. C. at a meeting yesterday and then by the directors to-day, follows:

*Whereas*, The National Automobile Chamber of Commerce has consistently opposed the overloading and overspeeding of motor vehicles for the safety of the public, the protection of the investment of the operator, and the protection of the reputation of the manufacturer, and

*Whereas*, The National Automobile Chamber of Commerce is convinced that it must continue to oppose the overloading and overspeeding of motor vehicles for the protection of the public highways over which such vehicles operate, and for the protection of the motor vehicle industry against restrictive legislation practically prohibiting the economic operation of motor vehicles—particularly the operation of trucks engaged in the transportation of people and product, and

*Whereas*, certain states have enacted laws permitting the registration of motor vehicles with a carrying capacity in excess of the manufacturers' rated carrying capacity upon the production of a certificate from the manufacturer that such motor vehicle can be "SAFELY OPERATED" "UNDER ALL CONDITIONS" "AT ALL TIMES," and some manufacturers have given such certificates, and

*Whereas*, it is the conclusion of the National Automobile Chamber of Commerce that the giving of such certificates authorizing the carrying of loads in excess of the rated carrying capacity of such motor vehicles, under the conditions of such laws, is dangerous because of first: contingent liability on the manufacturer in case of accident, both personal liability and property damage; second, claims under the manufacturer's warranty for breakage and defects resulting from overloading authorized by such certificates; third, for the far more important reason that the acquiescence of motor vehicle manufacturers to overloading will be immediately seized upon by legislators as a basis for further restrictive legislation and higher license fees, and will immediately deprive the manufacturers of the co-operation of the Bureau of Public Roads of the Department of Agriculture, the State Highway Commissioners and public road officials, in their attempt to reach a practical solution of the highway problem in its relation to motor vehicle transportation; and fourth, the granting of certificates by manufacturers permitting overloading violates not only every engineering and manufacturing principle, but every principle of clean, competitive selling, and can only result in misunderstandings and sales resistance, as having once departed from a national understanding and enforcement of the manufacturers' rated carrying capacity, there is no limit on overloading that can be accepted as a standard.

*Now, therefore, be it resolved*, that the National Automobile Chamber of Commerce hereby reaffirms its policy of being unalterably opposed to overloading and overspeed-

## Shipments Show 9 Per Cent Gain Over Last November

NEW YORK, Dec. 7—Reports of November shipments of passenger cars and trucks as compiled by the National Automobile Chamber of Commerce show that they exceeded by 9 per cent the total for the same month of last year. It was the first month to show a gain over last year.

Another cause for gratification is the fact that November shipments declined only 21 per cent from the October total, while last year November shipments were 27 per cent less than for October. The shipment figures by months for this year and last follow:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
January	25,057	6,485	29,283	3,185	....	93
February	25,505	9,986	43,719	7,507	....	99
March	29,326	16,287	57,273	9,939	....	75
April	17,147	20,187	64,634	14,197	....	1,619
May	21,977	18,608	74,286	15,193	....	2,381
June	22,516	20,269	60,746	18,834	8,350	3,947
July	23,082	19,470	52,342	15,320	8,702	3,725
August	23,386	20,350	34,060	14,290	7,095	3,565
September	20,804	20,150	24,431	13,550	5,469	3,580
October	17,209	17,323	14,127	11,257	2,519	2,300
November	13,253	14,061	9,467	10,509	659	1,385

ing of motor vehicles and that it condemns the practice of giving certificates authorizing the loading of motor vehicles beyond the manufacturers' published rated carrying capacity, and urges its members to discontinue the granting of such certificates, and be it

*Further resolved*, that the National Automobile Chamber of Commerce continue to co-operate with the Bureau of Public Roads of the Department of Agriculture, the State Highway Commissioners, and other public road officials, in stamping out the overloading and overspeeding evil for the safety of the public and the protection of motor vehicle transportation over the highways, and be it

*Further resolved*, that a copy of these resolutions be forwarded to the Bureau of Public Roads of the Department of Agriculture and the National Association of State Highway Officials.

The motor truck committee adopted another resolution suggesting to Highway Commissioner Bennett and Motor Vehicle Commissioner S. Toeckl of Connecticut that they rescind their ruling and adhere strictly to the text of the State law.

## Optimism Prevails with Tractor Makers

(Continued from page 1140)

Gittins was on the program for a paper on "Terms." His position was that during the good selling years a very satisfactory standard of terms had been put into force. His fear was that, now that selling was again highly competitive, terms would be given less consideration.

Bartholomew made an emphatic announcement that his company would continue on a strictly cash basis.

Mount and George M. Gillette were among those who advocated shorter terms. It was decided to appoint a committee to make suggestions in this regard.

The following officers, more of whom were re-elected, were named for the coming year: Chairman, Finley P. Mount; vice-chairman, George M. Gillette; secretary-treasurer, Edwin C. Merwin. The executive committee is composed of George M. Gillette, chairman; E. J. Gittins, J. B. Bartholomew, A. H. Gilbert, Grant B. Willis, C. S. Brantingham, Harry H. Bates and W. R. Snively.

## Paige Maps Campaign for Used Car Sales

### "Background" Advertisements Will Create Confidence on Part of Public

DETROIT, Dec. 6—Convinced that one of the principal causes for the failure of used car demand has been lack of confidence in the integrity of the dealer offering the car, the Paige-Detroit Motor Car Co. has mapped out a campaign of "background" advertising designed to build up a greater feeling of reliability. The advertising matter will be prepared at the Detroit offices and will be run in papers in any city in which the Paige dealer will assume 50 per cent of the cost.

This advertising will serve only to create confidence. The dealer must run his own ads describing the particular cars which he has to offer. The feature of the "background" ads is the guarantee that all cars are strictly in the condition represented and that money will be refunded if they fail to perform up to the standard set. It formerly was the custom to run three new car ads to one used car insertion. This practice will be reversed for the time necessary to clear stocks of Paige dealers.

Folders have been prepared at the factory illustrating the best arguments for the purchase of used cars. They will be furnished to dealers at the price of printing.

### NO DUTY ON TRUCKS

LONDON, Nov. 25 (By Mail)—Nyassaland's revised customs tariff puts motor trucks on the free list. It must be proved, however, to the satisfaction of the Collector of Customs that each vehicle has been constructed, adapted and intended to be used solely for the conveyance of goods, while chassis, components and accessories must be so proved to be imported solely for such vehicles.

## Competition Slight In Truck Exports

**Gordon Lee Tells Sales Managers  
Foreign Rivalry Is Not  
Important**

DETROIT, Dec. 5—American motor truck manufacturers will be little affected by foreign competition in the export markets of the world for some time to come, said Gordon Lee, director of the automotive division of the Bureau of Foreign and Domestic Commerce, addressing the annual convention of the National Association of Motor Truck Sales Managers, in session here.

Referring to the truck producing companies of England, France, Germany, Italy and Belgium, he showed that even operating at maximum capacity, they could take care of only half the export business done by American manufacturers in 1920. These countries, he said, had recovered the business done by American manufacturers previously, but in the export markets their competition was not important.

### Confidential Information Sought

Questionnaires will be mailed to all car and truck manufacturers soon after Jan. 1, asking for detailed confidential figures on exports in 1921, so that these may be turned back into percentages showing just how American motor products found export markets in 1921. General co-operation in the preparation of these, he declared, is necessary in getting a good start toward business in 1922.

Questionnaires will be received monthly from the 850 commercial attachés in all foreign countries outlining prevailing conditions and a constant cable service will be maintained, Lee said, in getting immediate information to manufacturers on prospective business.

### To Stimulate Truck Business

Continuance of the movement toward standardization in the automotive field was urged by Lee, the interchangeability of parts being a strong factor in favor of American products. The department is continuing its activity in this respect with the active co-operation of the Society of Automotive Engineers committee, headed by David Beecroft, president of the society.

C. W. Treadwell, manager of sales instruction for the Burroughs Adding Machine Co., demonstrated to the convention the increased success the Burroughs company has found through the sale of its product by sales portfolio rather than demonstration of the machine itself. He said the same method could probably be employed with success in truck sales, the idea being to interest the prospect in the results of transportation rather than the means.

At the executive sessions of the association the business outlook for 1922 was closely studied and plans were considered whereby the association could ren-

der assistance in bringing the truck business to the fore. It was agreed that there would be greater stimulation in the truck business than there has been for a year or more and every effort will be made to further it.

Two directors were re-elected, A. C. Burch of Clydesdale and C. J. Helm of Acme, and one new director, Charles Costello of United States was named. Officers for 1922 will be chosen at a directors' meeting to be held this month.

## Month Makes Record in Shipment of Cars

(Continued from page 1137)

Stabilization of prices, both for the materials which go into motor vehicles and for the finished product, is one of the important problems confronting the industry, and there are increasing indications that costs are adjusting themselves to an era of keen competition. It is the general belief that another month will bring readjustments which will stand for some time.

All eyes are turned toward the New York and Chicago shows which promise the largest number of important announcements made at these expositions in years. An evidence of the public interest in automobiles is found in the large attendance at the New York salon at which only high-priced cars were displayed.

A determined effort will be made at the coming session of Congress to have removed the excise or "stigma" taxes which the new tax bill continued on sales of automotive vehicles and equipment. It is expected also that the Graham joint resolution, which would impose a duty of 90 per cent on American-made surplus war equipment reimported from Europe, will be passed by Congress and cut off this unfair competition.

## Allan A. Ryan Purchases Block of Durant Stock

NEW YORK, Dec. 7—Allan A. Ryan, who previously has played an important part in the development of the automotive industry, has taken over a large block of stock of the Durant Motors Co. of Indiana, a subsidiary of Durant Motors, Inc., and will act in a brokerage capacity in handling its sale. This stock will be listed on the curb market and trading in it is expected to be brisk.

Wall Street has been speculating for some time over the possibility of a financial combination between the Durant and Ryan interests, but it can be stated on authority that Ryan simply is acting as a broker for W. C. Durant and his associates. It also can be stated positively that no negotiations are pending for the amalgamation of the Stutz Motor Car Co., with which Ryan has been closely identified, with Durant Motors.

## Government Will Buy Few Motor Vehicles

**Budget Presented to Congress  
Makes Provision for Ex-  
tensive Research**

WASHINGTON, Dec. 5—Estimates submitted to the Congress to-day by the newly created Budget Bureau show that the Government does not contemplate entering the automotive market as a heavy purchaser of motor vehicles during the fiscal year of 1923.

Because of the large quantities of surplus material on hand sentiment in Congress is opposed to purchases of new automotive equipment until it is evident that the surplus has been completely absorbed. However, there is the sign that the Federal authorities expect to spend several millions in research pertaining directly to the automotive trade. There will be live prospects for aircraft and accessories.

### Air Service Asks \$15,000,000

The estimates of the War Department include \$3,038,037 for motor transportation of the Army to be devoted principally to transportation of troops and supplies.

The Army Air Service submitted estimates for \$15,000,000, of which \$3,000,000 will be devoted to the purchase of new aircraft and equipment. The Army plans to spend \$4,200,000 of the appropriation for experimental research in aircraft matters.

It is proposed to use \$250,000 in experimental research into helium, and \$525,000 for the procurement, installation, improvement of gas plants, hangars, repair shops and ground equipment for the air service.

### Navy Given \$17,000,000

The estimate of appropriations for the Bureau of Aeronautics of the Navy Department gives the total amount as \$17,000,000. It is proposed to use \$6,618,100 of this for the maintenance and operation of air stations, fleet activities, aircraft factories, helium plants, testing laboratories, spares, engines and hulls, flying, overhauling and repairing of aircraft and their engines. For new construction and procurement of aircraft and equipment (power plant and hull), \$6,631,450 is provided, and for continuing experiments and development work for all types of aircraft, \$1,116,950. The sum of \$475,000 is asked for construction incident to flying, stowing, releasing or securing aircraft.

Fifteen thousand dollars is asked by the Bureau of Standards for the standardization and testing of mechanical appliances. The Bureau also requests \$45,000 for the maintenance and equipping of automotive engines.

The Bureau of Public Roads has renewed its request for an appropriation of \$48,000 for investigating engineering problems pertaining to agriculture.

## INDUSTRIAL NOTES

**General Motors Corp.** reports that one out of every four of its stockholders is a woman. In April one out of every five was a woman. There were 17,230 women stockholders of record Oct. 3 as compared with 15,116 on April 15. Women now constitute 21 per cent of all common stockholders and own a total of 6 per cent of the entire issue outstanding. They constitute 45 per cent of the preferred stockholders and own 37 per cent of the outstanding preferred. They represent 41 per cent of the 6 per cent debenture stockholders and own 28 per cent of that stock outstanding. With the 7 per cent debenture, women constitute 21 per cent of the holders of that issue and own 24 per cent of the 7 per cent debenture outstanding.

**The White Co.** reports that its sales for October were the highest for any month since June, 1920, and that its November business was within about 5 per cent of October. The company has been operating a 44½-hour week for more than a month, as compared with a 32-hour week in July and 40 hours in August, September and most of October. The working force now numbers 2000, which is about one-third of the aggregate employed during the peak period. Inventory, which at the end of 1920 stood at \$22,989,000, is now \$16,000,000.

**Hendee Mfg. Co.** is gradually increasing its operations. Manufacturing efficiency is reported to be the highest in the history of the company. In November of this year the company produced 1000 motorcycles and as of Dec. 2, 1921, had orders for 5000 machines. The management is said to be expecting a large business in the spring for both the domestic and foreign account. The company is planning to prosecute vigorously the development of its business in the British Isles.

**Savidge Tractor Co.** has reorganized as the Savidge Tractor Mfg. Co. with the following officers: President, William Savidge; vice-presidents, C. J. Jacoby and W. M. Edinger; secretary, R. H. Dalby; treasurer, Louis Haefner. These officers together with Frank A. Payton, W. F. Korte, Henry Wehde, Jr., A. J. Schuessler, C. F. Stelzel and John Strubel constitute the board of directors. The new capital is \$300,000 preferred and \$200,000 common.

**Victor Kreft Mfg. Co.,** formerly of Two Rivers, Wis., has completed its new factory at Eagle River, Wis., and is again in quantity production on shock absorbers and other metal automotive specialties. The concern has contracts on its books with more than a dozen state distributors calling for 2000 sets of shock absorbers for delivery in the next three to five months, as well as large orders for the other articles of its line.

**International Harvester Co.** Springfield works expects to open this week with nearly a normal force. Production methods are being slightly changed. Production of the light motor truck will soon be brought up to 25 a day, the outlook for business steadily becoming more optimistic. The gray iron foundry has been opened with a force of 75 men.

**A. O. Smith Corp.,** Milwaukee, is engaging in quantity production of a pressed steel running board designed for replacements on cars having the ordinary wooden board, as well as for new designs of cars. The weight of the steel article is no greater than the wooden board.

**General Auto Supply Co.,** Lancaster, Pa., announces the location of its main offices at Harrisburg. The Lancaster and York stores

will be continued, but that at Lebanon will be closed after the first of the year.

**Firestone Tire & Rubber Co.** has purchased the Apsley Rubber Co., manufacturing boots and shoes at Hudson, Mass. Firestone is also considering entrance into other fields of rubber manufacture.

**Loening Aeronautical Engineering Corp.** is erecting a factory at 420-428 East Thirty-first Street, New York City. It is expected that the new building will be ready for occupancy in the spring.

**United States Radiator Corp.** of Detroit, a \$4,000,000 Michigan corporation, has filed articles and been granted a local charter in Wisconsin. Offices will be established in Milwaukee.

**Willys-Overland Co.** has received a Pacific coast order for 400 Willys Knights and Overlands this week. A special train will take them from the factory in about a month.

Cleveland Trade Exceeds  
That of Last November

**CLEVELAND, Dec. 6**—Business in Cleveland improved greatly in November over the previous 30-day period, according to a survey that has been made by the Cleveland Association of Credit Men.

The improvement shown during November is not the stimulation of Christmas buying to trade, for the annual holiday shopping period is just getting under full swing in this city, as it cannot be said to fairly start until the first of December.

The credit men sent a questionnaire to many merchants in the city, and in the list were automobile retail salesmen. They, with few exceptions, reported that there was a healthy increase in November over the previous month. So far as the 1920 November record is concerned, it has been left far behind.

Sixty-four per cent of the merchants questioned about November business reported that it was better than in October; 18 per cent said it was stationary and 18 per cent said their volume of sales was lower in November.

Chicago Truck Makers  
Limit Sales District

**CHICAGO, Dec. 5**—Chicago motor truck manufacturers, with but one or two exceptions, are confining themselves to sales in the local territory. They are not going out of Chicago and immediate territory to keep up their rate of production, and with some this is to be the practice rather than an expediency.

Exceptions are the Available Truck Co., which reports that its sales are greater than for a long time and are scattered over a wider territory through the efforts of its sales force, which has been greatly reduced. Diamond T sales are strong in Chicago, and this company will continue a strong competitor for local business.

**Chicago Motor Truck, Inc.,** is closed down at the present time taking inventory, but will open after the first of the year on scheduled production of one truck a day.

## FINANCIAL NOTES

**Moline Plow Co.** reorganization committee has addressed a circular letter to the holders of the 7 per cent notes extending the time of the deposit to and including Dec. 12. Total claims of all creditors and noteholders, the letter states, computed without interest, approximate \$19,500,000, of which \$13,650,000 represents claims of bank creditors, \$1,840,000 merchandise creditors and \$4,000,000 serial noteholders. More than 80 per cent of the serial noteholders have deposited and bank creditors, constituting 70 per cent of the total claims, have accepted the reorganization plan.

**Fisher Body Co.** for the three months ended Oct. 31 reports a surplus after charges and Federal taxes of \$1,939,541, which after allowing for preferred dividends was equal to \$3.75 a share on the 500,000 shares of common stock of no par value outstanding. In the previous quarter earnings were equal to \$2.30 a share and in the same quarter last year \$5.05 a share. The surplus for the six months was equal to \$6.06 a share after preferred dividends, as compared with \$9.34 a share in the same period last year.

**Yellow Cab Mfg. Co.,** subject to approval of the stockholders, declared a stock dividend of 100 per cent on Class B stock, increasing total outstanding to 100,000 shares, and has increased the cash dividend rate from \$7 to \$7.20, payable in monthly installments of 60c. each. Stockholders will hold a special meeting this month.

**Sharon Pressed Steel Co.** final plans for refinancing and taking care of the creditors of the organization have been completed. The statement of the present financial condition of the company shows current assets, \$437,452.63; property, plant and equipment, \$1,805,786.76; current liabilities, \$207,429.11.

**Commonwealth Finance Corp.** has declared the regular quarterly dividend of \$1 a share and an extra dividend of 75c. a share on its common stock and the regular semi-annual dividend of 3½ per cent on its preferred stock, payable to holders of record Dec. 31.

**Autosales Corp.** declared a dividend of 4 per cent on the preferred stock, payable in preferred stock Dec. 31 to stock of record Dec. 16. In December last year the company declared a dividend in preferred stock amounting to 4½ per cent.

**Jordan Motor Car Co.** directors, at a meeting this week, declared a quarterly dividend of 1½ per cent on the preferred stock, payable Dec. 31, to stockholders of record Dec. 10.

**American Metal Parts Co.,** Milwaukee, specializing in automotive parts and equipment, has recently increased its capitalization from \$100,000 to \$200,000 to accommodate the growth of the business.

**Hendee Mfg. Co.** has declared quarterly dividends of 1½ per cent on preferred stock, thus maintaining the rate of previous years.

**Torbenson Axle Co.** has paid a quarterly dividend of 1½ per cent on preferred stock.

## JENNINGS SPEAKS AT SYRACUSE.

**SYRACUSE, N. Y., Dec. 5**—Clyde Jennings, managing editor of *Motor Age*, appeared before the students of transportation in the College of Business Administration at Syracuse University in the first of a series of lectures to be delivered by various speakers on the subject of transportation. He surveyed the history of transportation.



## MEN OF THE INDUSTRY

C. E. Wilson, chief engineer of the Remy Electric Co., has been appointed factory manager as successor to I. J. Reuter. Reuter has been named general manager of the company to succeed J. D. Mooney, who has become operating vice-president of the General Motors Export Co. F. C. Kroeger, Remy sales engineer in charge of the Detroit territory, succeeds Wilson as chief engineer.

J. H. De Jong, for the past three years associated with the Cole Motor Car Co., has joined the selling division of the Haynes Automobile Co. as Canadian district sales manager, with headquarters in Toronto. Prior to his association with the Cole company, De Jong was a distributor at Omaha for twelve years.

O. Q. Hinds, who has sold his interest in the former Anderson Electric & Equipment Co. of Chicago, has associated himself with B. J. Grigsby, O. E. Grigsby and W. C. Grunow in the Grigsby-Grunow-Hinds Co., a company formed to manufacture automobile accessories.

M. Lincoln Shuster, assistant general manager of the Motor and Accessory Manufacturers' Association, is in Washington this week to take up with the Bureau of Foreign and Domestic Commerce the question of establishing an export department of the M.A.M.A.

Wilson Bailey, who has been acting as eastern district manager for the Trackless Transportation Corp., has been appointed to the position of general sales manager in charge of all sales, both domestic and foreign, for the corporation.

W. C. (Fuzzy) Anderson, former foreign sales executive for the Ford Motor Co., has organized the Anderson Sales Co. of St. Louis to market the new Brevard farm lighting system. Thomas G. May will be secretary of the company.

Federal Corp. Trustee Loring G. Lane has been authorized by the referee in bankruptcy to dispose of the company's property at Westfield, Mass., at public or private sale. The company manufactured spark plugs.

Harry L. Cunningham, Detroit, secretary-treasurer of the Rickenbacker Motor Co. and former Michigan distributor for Maxwell and Studebaker, has been appointed to handle the new Rickenbacker for Michigan.

J. E. Simonds has resigned as export manager of the U. S. Tractor & Machinery Co. He was formerly Chicago manager of the Duplex Engine Governor Co. His future plans are not announced.

John G. Painter, for a number of years sales manager of the Continental Motors Co., has joined the Detroit Pressed Steel Co. as special representative in the Disteel wheel factory sales division.

T. N. Hart, who has been active in the tractor and implement business for several years, has been appointed block manager of the Lima, Ohio, district for the Bates Steel Mule Co. of Ohio.

Alemite Products Co., Ltd., subsidiary of the Bassick Mfg. Co., will begin the manufacture of its products at Belleville, Ont., this month. W. E. Rowsome is general manager.

Gordon Cameron has been appointed director of service for the Republic Truck Sales Corp., in complete charge of the servicing of Republic trucks from the factory.

Edgar Updyke, automobile dealer in Indianapolis, has been named distributor for the Stutz Motor Car Co., covering the Indiana territory.

Jules Berthier has been elected president of the Bergougnan Rubber Corp. to succeed H. H. Coleman, resigned.

E. T. Fuller has taken over the Franklin franchise for the State of Michigan formerly held by W. J. Dougherty.

Walker Evans has been appointed Cleveland representative of MacManus, Inc., advertising agency, Detroit.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

Call money remained unchanged at  $4\frac{1}{2}$  to  $5\frac{1}{2}$ , with a firmer undertone noted, which possibly may have been accounted for by Government withdrawals from local banks and preparations for the interest and dividend disbursements of Dec. 1. There was a slightly easier undertone in time money as evidenced by the 5 per cent rate for all fixed-date maturities from 60 days to 6 months as compared with 5 per cent to  $5\frac{1}{4}$  per cent during the previous week. Prime commercial paper remained unchanged at 5 per cent to  $5\frac{1}{4}$  per cent.

The Federal Reserve statement as of Nov. 30, 1921, showed the total amount of notes in circulation as \$2,366,006,000, a decline of \$23,910,000 from the previous week, representing the lowest total reported since Sept. 27, 1918.

The total reserves of the New York institution increased \$18,302,000, the factors in this being an increase of \$21,599,000 in gold reserves and a decrease of \$3,297,000 in other cash reserves.

## Sterling Rises

The number of commercial failures reported for the month of November was 1988 with total liabilities of \$53,469,839. The number of November failures is the largest for any month this year and is 938 more than in the month of November, 1920, when 1050 failures were reported with total liabilities of \$30,758,130. The amounts involved in the failures for November, 1921, however, were exceeded in February, March and May of this year.

The average of operations for all steel plants for the month of November was estimated at 40 per cent to 45 per cent against 30 per cent or less at one time last summer. Lake Superior iron ore shipments in 1921 amounted to 22,300,726 gross tons, the smallest amount moved since 1904. Much interest attended the announcement on last Friday that negotiations were under way for the ultimate consolidation of several of the independent steel companies.

## Moratorium a Factor

During the past week demand sterling rose to  $\$4.07\frac{1}{2}$ , a new high record for the year and the highest level since the week ended Nov. 22, 1919, when the rate touched  $\$4.08\frac{1}{2}$ . The discussion of the proposed two-year moratorium for Germany on its reparation payments was perhaps a factor, not only in this rise in sterling, but in the sharp recovery in German marks.

## METAL MARKETS

**M**ANY are the hopeful signs that are visible in the present twilight period of the steel market. Of course, what actual buying by automotive consumers is in evidence is strictly of a routine, filling-in character, but the preliminaries to negotiations for 1922 contracts are decidedly encouraging to the steel industry, portending a healthy automotive demand during the first half of the coming year.

Alloy steel specialists report keener interest in automotive steels, although the tonnages involved in inquiries are by no means impressive individually. Much resale alloy steel has, however, been gotten out of the way and the market faces a much improved outlook. About the frailest item in the list of automotive steels is that of cold-finished steel bars. Although the market for this commodity is fairly steady, this is solely due to the incisive retrenchment which has been made in production. The latter continues, even at this advanced date of readjustment in other branches of the steel industry, at not more than one-fifth of the finishing capacity.

Although the sheet market is now heralded to be on the uniform basis of 2.25c. for blue annealed, 3c. for black, and 4c. for galvanized sheets, the price levels recently announced by the Corporation's sheet subsidiary, there continues considerable irregularity. Some of the mills have essayed a dual price for blue annealed, one applying to the heavy gages and another to the lighter gages, from 13 gage and up. Plate mills continue to share the 2.25c. base price freely when inviting tonnages of heavier gages are offered.

**Pig Iron.**—Automotive foundries are not figuring very prominently in the market just now. At best, the pig iron market is marking time.

**Steel.**—Bessemer screw stock is being quoted at 1.60c., Pittsburgh, on hot-rolled bars, demand being of a routine character. Cleveland alloy steel interests quote automotive steels as follows: Bars, S.A.E. \$100, \$4 per 100 lb., base; S.A.E. 2300, \$5; S.A.E. 6100, \$5; S.A.E. 3200, \$5.50; S.A.E. 3300, \$7.50; S.A.E. 3400, \$6.50; silico-manganese, \$3.90; S.A.E. 52100, \$9; and chrome-molybdenum steel, \$4.75.

**Aluminum.**—Odd lots of imported aluminum continue to be offered at prices lower than those named as official quotations by the domestic producer. As previously stated, the trade's interpretation of the official prices of the domestic consumer is, however, that they are not necessarily rigid and that on worth while business of the desirable kind foreign competition is being met most energetically.

**Copper.**—As the result of the recent advances in the copper market the principal makers of copper and brass products issued new price lists on Dec. 1, showing advances ranging from  $\frac{1}{4}$ c. to  $\frac{3}{4}$ c. per lb. on the different articles they produce. A period of quiet in the copper market is now generally looked for.

## EQUIPMENT COMPANY BANKRUPT

**KANSAS CITY, Dec. 5.**—The Zahner-Fowler Equipment Co., with factory and distributing house in this city, has filed a petition in bankruptcy in the Federal Court. Unsecured obligations for machinery, steel and materials, are about \$15,000 and notes to banks and creditors a like amount. Assets aggregate \$25,000.

# Calendar

## SHOWS

- Jan. 7-13—New York, National Automobile Show, Grand Central Palace. Auspices of N.A.C.C.
- Jan. 9-14—New York, Motor Car Body Exposition, Automobile Body Builders Association, Twelfth Regiment Armory.
- Jan. 28-Feb. 4—Chicago, Automobile Salon, Hotel Drake.
- Jan. 28-Feb. 4—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.
- Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

- Dec. 3-14—Brussels, Belgian International Automobile Show.
- March, 1922—Santiago, Chili, Annual Automobile Show.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.
- Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

- Dec. 10—New York, American Institute of Mining and Metallurgical Engineers.
- Dec. 20—Philadelphia, American Society of Mechanical Engineers.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.
- Jan. 17-20, 1922—Chicago, American Road Builders Association.
- Jan. 30-31—Chicago, Fifth Annual Convention, N. A. D. A., La Salle Hotel.
- Jan. 30-Feb. 2—Boston, Sixth Annual Conference of the International Delivery

Association, Copley Plaza Hotel.

June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.

Sept. 13-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

Detroit, Dec. 23, Feb. 24, Mar. 24, April 28, May 26.

New York, Jan. 10-13, 1922—Annual Meeting.

Chicago, Feb. 1

Minneapolis, Feb. 8-9—Annual Tractor Meeting.

## Reeves Discusses Taxes with Mellon

### Also Confers With Government Officials on Credits and Standardization

WASHINGTON, Dec. 5—The outstanding developments of conferences between Alfred Reeves, general manager of the National Automobile Chamber of Commerce and Government officials here last week, was the statement that credit prospects for the automobile industry were distinctly favorable and that standardization activities were progressing without detracting from the individuality of distinctive automobile types.

### Credit Situation Encouraging

Reeves discussed the tax situation as it affects the automobile industry in detail with Secretary of Treasury Mellon. It is expected that this conference will have much to do with the recommendations of this cabinet officer in the future, possibly at the next session of Congress, when an effort will be made to amend the latest tax bill and remove burdensome excise taxes from the automotive industry.

Governor Harding of the Federal Reserve Board gave Reeves an encouraging view of the general credit situation as it affected the industry. It is expected that money will be available at lower rates during the winter.

### Working on Standardization

At the Department of Commerce, the automobile representative discussed standardization activities of the Bureau of Standards. He was told that the principal effort was directed toward the elimination of waste, and as a consequence brought about lower production cost. For instance, he was told of efforts to reduce the 10 or 12 sizes of steering wheels to four, which could be accepted as standard for the automotive industry. So far as Reeves could ascertain, there is nothing in the plan of the Department of Commerce to take individuality from

car designs, but instead they are conducting a great work to save money for manufacturers and incidentally increase sales through lower prices.

Conferences also were held with officials in the automotive division, Bureau of Foreign and Domestic Commerce, and plans were discussed for co-operation of the Government with the industry in the promotion of domestic trade as well as foreign business.

Reeves talked with Senate and House leaders regarding the tax situation and other important problems of the trade.

## Lower Distribution Costs Sought by Tire Industry

AKRON, Dec. 6—The tire industry has turned to selling costs as the next problem to be solved in bringing the industry to rock-bottom basis. Much has already been done in the way of closing expensive branches in the high-rent districts in large cities, but the cost of distributing the products remains as high as 30 per cent in some instances.

Sales departments were the first to feel the new policies brought about by the depression, but changes in policies consisted mainly in weeding out all salesmen except those who were actually producing profits.

This, however, has been found to be insufficient and further plans are being considered to curtail sales costs. The methods to be used are purely a matter of speculation. The factories are on the most efficient basis of their history. Every semblance of extravagance has been eradicated.

## MANY OLD TIMERS ACCEPT

NEW YORK, Dec. 5—The first annual New York dinner of the Old Timers' Club, already announced for Monday evening, Jan. 9, at the "S. S. Flotilla," will be one of the most largely patronized events of automobile show week, according to the committee in charge, which reports heavy early reservations from all parts of the country. The attendance will be automatically limited to 400, the maximum capacity of the "S. S. Flotilla."

## Japan Not Seeking Texas Helium Fields

### United States Navy Department Denies That Negotiations Have Been Opened

WASHINGTON, Dec. 5—Recommendations have been made by Dr. Joseph S. Ames, chairman of the National Advisory Committee for Aeronautics, for the acquisition by the Government of the best helium producing fields and for the promotion of research into the uses of helium. There has been a rumor current that emissaries of the Japanese Government had made overtures to the Navy Department for the purchase of helium properties in Texas but the Navy officially denies such negotiations.

The helium fields in Texas are under the joint control of the Army and Navy. According to Dr. Ames, it is necessary for national defense to acquire and seal these properties for future use and prevent their exploitation by commercial interests.

Helium, a non-inflammable gas, is expected to revolutionize aircraft product especially as it relates to dirigibles. A demonstration before scientists here today showed that helium is superior to hydrogen with the exception that the lifting power is eight per cent below that of hydrogen.

## Export Managers to Meet During New York Show

NEW YORK, Dec. 7—Export managers of the National Automobile Chamber of Commerce will meet here in their annual convention on Jan. 10, during the annual show. Decision to hold this meeting was made to-day by the N. A. C. C. directors.

The proposed program will take up the subject of distribution in foreign countries, road building, financial credits for the automotive industry from the War Finance Corporation, and the possibilities of combination of American firms for developing export trade.

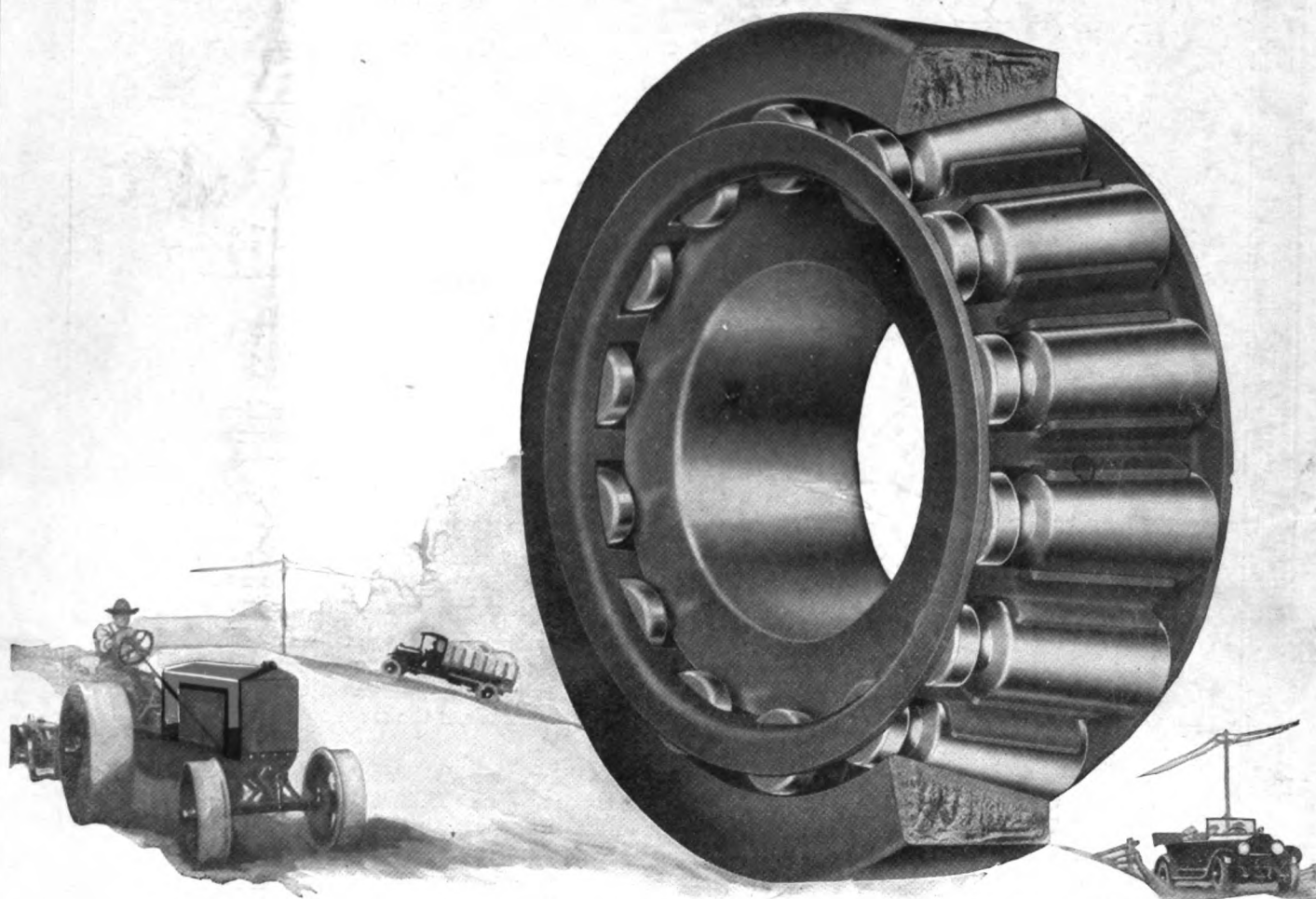
# AUTOMOTIVE INDUSTRIES

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# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

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No. 24

## Sound Tariff Principles Warrant Support of Industry

Tariff Principles Committee of U. S. Chamber of Commerce has made seven recommendations which are of vital importance to automotive industry. Adoption would aid the industry directly in foreign trade and indirectly in domestic sales.

By Norman G. Shidle

**T**HE automotive industry is dependent upon general industrial conditions. And general industrial conditions are closely related to tariff problems. Thus the automotive manufacturer is vitally concerned with the application of sound principles to tariff adjustment, even though the direct effect of tariff is less on his industry than on many others.

As the second largest industry in the country, the automotive industry is vitally concerned with any question which affects the economic development and progress of the nation and of the individual manufacturing organizations which comprise American industry. As an unsettling factor in the business world, the tariff is probably without serious rival for premier honors. It has been said that back in the '80s and '90s business was almost forced to take a vacation two years out of every four: one year preceding every election to wonder what was going to happen to the tariff and one year following every election to wait for it to happen.

The political character of our tariff causes similar unsettled business conditions even at the present time,

and automobile manufacturers are definitely concerned in any constructive effort to alleviate this situation. If tariff questions were out of politics, general business conditions would fluctuate less violently and would not be unsettled with every presidential election. The prosperity of the country would be enhanced, through more constant production and industrial effort, and the market for automotive products would be easier to predict and less difficult to sell.

The importance of foreign trade to the automotive industry adds greater weight to the tariff problem, viewed from the automotive standpoint. Feeling the necessity for foreign trade opportunities to be more important than the exclusion of foreign competition in this country, the N. A. C. C. recommended lower duties on automobiles than were contained in the previous tariff law, and as a result succeeded in getting the former schedule of 40 per cent reduced to 25 per cent in the bill that has been under consideration in Washington for the last eight months. The tariff bears more directly upon the automotive industry in its effect upon foreign markets than in any other way, but the extreme importance of the indirect in-



fluences pointed out, renders the question one of immediate concern to every manufacturer.

Consequently, the recent report of the Tariff Principles Committee to the Board of Directors of the Chamber of Commerce of the United States should be carefully examined by executives throughout the industry. Its acceptance by the Chamber and subsequent adoption by the government would effect a stabilization in business and an ultimate economy in the carrying on of industry that would almost equal in scope the results of the disarmament conference, should that conference fulfill the best hopes of the nation.

The Tariff Principles Committee was concerned, not with attempting to write a new tariff bill, but with outlining the fundamentals upon which sound tariff legislation should rest and the principles which should be applied in "taking the tariff out of politics" and making it function for the best interests of American business and industry. The committee made seven recommendations.

The first recommendation is "that tariff legislation should be so framed by Congress as to permit subsequent adjustment of individual rates or particular schedules of rates within prescribed limitations, and authorize changes therein from time to time without general revision of the tariff; that reasonable latitude in the application of tariff rates to any commodity, or group of commodities, be provided for, in order that there may be flexibility in the adjustment of said rates to the varying fluctuations of industrial and trade conditions."

The second recommendation is closely allied with the first, so that the two may be discussed simultaneously. It is as follows:

"That tariff legislation should provide for and create a Tariff Adjustment Board, appointed by the President and confirmed by the Senate, with such emolument and tenure of office as will remove the members from political influence and personal interests; that this Board shall be separate and distinct from the United States Tariff Commission, the duties of which should be modified to require report of its investigations to the Tariff Adjustment Board in addition to the reports it now makes."

The adoption of these two recommendations would mean that the setting of tariff rates would be in the hands of a board of impartial experts. The responsibility for the actions of the board could be definitely fixed in a way that is utterly impossible as regards Congress. The responsibility for the appointment of men to the board would reflect credit or discredit very readily upon the President and this in itself would go far toward assuring the appointment of a capable and impartial board. The Interstate Commerce Commission furnishes an example of the possibilities of a non-political body of this kind and indicates the practicability of the recommendation.

The idea is that Congress would simply indicate in the tariff bill certain wide limits within which the board would have power to adjust duties. It would be necessary to make these limits wide enough that the board would have a considerable degree of power; otherwise the plan would be rendered ineffective. It would be necessary, of course, to guarantee the country against

continual change of tariff rates at unreasonable short intervals. The committee has recognized this fact by recommending that Congress specify that any rate established is not subject to change within a fixed period from the date when it becomes applicable.

President Harding endorsed the principle of a flexible tariff in his recent address to Congress when he said: "Doubtless we are justified in seeking a more flexible policy than we have provided heretofore. I hope a way will be found to make for flexibility and elasticity, so that rates may be adjusted to meet unusual and changing conditions which cannot be anticipated."

His method of providing this flexibility, however, is somewhat different than that recommended by the committee of the Chamber of Commerce. The Smoot amendment, introduced immediately after the President's address, embodies the latter's ideas along this line:

This board, proposed by the committee, operating as outlined, would eliminate the necessity of constantly writing new tariff bills, would take away the uncertainty concerning tariff now prevalent at every election, and would allow American business to continue its normal course unaffected by political considerations of tariff legislation.

Even more important, however, it would make possible the ready adjustment of tariff schedules to current conditions. Under present methods a tariff measure is very likely to be entirely out of date, so far as its usefulness is concerned, by the time it has made its way through the toils of political debate into the final form of a law. The recent emergency tariff measure furnishes an excellent ex-

ample of such a measure. As President Harding said in his message, "A rate may be just to-day and entirely out of proportion six months from to-day." The method recommended would enable us to have a tariff constantly fitted to current conditions, regardless of the degree of fluctuation in economic and business movements.

Further analysis shows such a board to have other important potential functions. It might save manufacturers a great deal of money very directly by eliminating the usefulness of or the necessity for expensive lobbies. Where there are two conflicting industrial interests, the board might call them together in conference and get something like the real facts of the case upon which to base an intelligent decision; it might even get the opposing interests to render a joint compromise proposal. In other words, the board might function to some extent as an arbitration body on tariff matters. This phase is not suggested in the report of the committee but would seem to be a perfectly possible and logical development were the recommendations of the committee carried out.

In its third recommendation, the committee advocates reasonable protection of American industries that are subject to destructive competition from abroad and states that "there must be protection against emergency prices and emergency conditions that may prove destructive." It further states that "there is no thought of urging a Chinese wall type of protection nor a policy of attempting to foster any and every industry that may be started on American soil."

A fourth section recommends the maintaining of anti-dumping legislation now on the statute books. This

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**A**UTOMOBILE and truck sales depend primarily upon the normal and continuous functioning of business. The application of sound economic principles to tariff would go far toward reducing industrial fluctuations. Every executive should examine carefully the proposals of the Tariff Principles Committee of the U. S. Chamber of Commerce. This committee has not been concerned with writing a new tariff law, but only with the principles upon which sound tariff action should be based. The recommendations have been put to a referendum of the members of the national body.

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should meet with the entire approval of the automotive industry, especially as regards reimportation of goods originally manufactured in the United States. The Graham resolution, which according to latest reports will place a duty of 90 per cent on such goods, will take care of the immediate needs of the automotive industry in this respect—provided it is passed, as now seems likely. The general principle enunciated by the committee, however, should be supported by the industry for more permanent protection.

The fifth recommendation of the committee deals with the framing of tariff legislation with a view to encouraging our foreign trade. In addition to recommending this practice, the committee practically indorses the provision in the tariff bill at present under discussion which gives to the President bargaining powers as regards tariff treaties with various countries. This would enable the President, for example, to force Canada to give us cheap wood for wood pulp if we are to give Canada cheap coal.

The automotive industry has been among the first to recognize the direct relation between domestic tariff and foreign trade and to attempt to have the two correlated in practice. It has recognized the necessity of having a domestic tariff calculated to promote the good-will rather than the enmity of foreign countries if Ameri-

can products are to be successfully sold abroad.

The committee recommends that the "American valuation plan" not be adopted. Space is lacking for a full discussion of the pros and cons of this particular question, but a close analysis of the problems indicates that there is little question but that the "American valuation plan" would fail to work for the best interests of American industry.

The final recommendation favors "the postponement of a general revision of the United States Tariff until conditions in international trade and finance are sufficiently stabilized to form a basis for legislation possessing permanent value."

The recommendations of this committee are the result of a study which has been carried on for over a year by a group of the most able business men in the country. A thorough analysis of the proposals, together with an examination of their importance to the automotive industry, brings out forcibly the benefits which would accrue to manufacturers through their adoption. This result cannot be obtained without considerable pressure from business. By putting its whole weight behind these recommendations, the automotive industry can perform a very real and practical service for itself, for the industries which contribute to it, and for American industry as a whole.

## Motor Vehicles in the Postal Service

**A** GENERAL survey of motor transportation in the Post Office Department has shown the desirability of reducing the number of trucks to eight standard types, which are economical and especially suitable for the service. In his annual report to the President, Will H. Hays, Postmaster General, declared that standardization of equipment will contribute to better service at a substantial reduction in cost.

A statistical study of the Government-owned motor-vehicle service to determine the cost of operation per mile and per hour and miles per gallon of gasoline for the fiscal year of 1921 shows how various trucks and cars perform in the strenuous work of the postal service. A well-known model with  $\frac{3}{8}$ -ton capacity costs 17 cents per mile without driver; 31 cents with driver; 71 cents per hour without driver; \$1.32 per hour with driver, and travels 8.1 miles per gallon of gasoline. Three standard makes of trucks of  $\frac{1}{2}$ -ton capacity showed varying costs. One cost 20 cents per mile without driver; 91 cents per hour without driver, and traveled 8.5 miles per gallon of gasoline. Another of the same capacity cost 34 cents per mile without driver; \$1.11 per hour without driver, and traveled 4.7 miles per gallon of gasoline. Another truck with the same carrying capacity cost 31 cents per mile; \$1.18 per hour without driver, and made 4 miles per gallon. One model truck with a capacity of 1 ton cost 18 cents per mile without driver and another of the same carrying weight cost 31 cents. The former got 7 miles per gallon and the latter 3.9 miles.

A similar study of Government-owned motor trucks operated 16 hours a day for 365 days a year showed the rate of depreciation for a year. The smaller type, with a capacity of 750 lb., depreciated 25 per cent, while three trucks of popular make, having a carrying capacity of 1000 lb., showed a depreciation of 33  $\frac{1}{3}$  per cent for two models and 25 per cent for another model.

The depreciation for the trucks having a carrying capacity of 3000 lb. or more averaged 20 per cent.

During the fiscal year 1921 Government-owned motor-vehicle service was extended to 42 additional cities in

lieu of contract service, making a total of 262 cities where Government-owned motor-vehicle service was in operation wholly or in part. This service involved the use of motor trucks of from  $\frac{3}{8}$ - to 5-ton capacities.

The expenditure for this class of service during the fiscal year was \$11,777,842, being an increase of \$2,974,688 over that for the preceding year.

Collection and delivery of department store parcels was inaugurated during the year in one city and the success attending the initial effort in this direction resulted in a demand for similar facilities in many large cities. It was found impracticable to make collection of such parcels except from classified stations, but the delivery feature was rapidly extended, and has resulted in a saving to the merchants, as well as considerable revenue to the department.

The use of motorcycles in the delivery and collection of mails, where feasible, is being continued.

## S. A. E. Tachometer Standard Revised

**R**EVISIONS in the present S. A. E. Standard for Tachometer Drive has been recommended by the Aeronautic Division of the society. An increase in the diameter of the driving shaft from 0.152 to 0.187 in. is recommended, as is an increase in the diameter of the hole for the driving shaft. This would be increased from 0.161 to 0.191 in.

These revisions are recommended because experience has indicated that the present standard dimensions for the shaft connection on the engine end are not of suitable proportions to insure freedom from trouble. This is especially true in the operation of the centrifugal type of tachometer, which turns faster than indicated speed. Breakage has been known to result through use of the present dimensions, even though special alloy steels have been used for the shaft.

The recommendations will be acted upon at the next meeting of the Standards Committee on January 10.

# Need for Fuel Research Shown at Petroleum Meeting

Understanding of difficulties faced by both the automotive and petroleum industries is leading to a praiseworthy disposition to co-operate. More research and education are needed and a demand for more economical engines becomes increasingly apparent. Must face higher fuel prices.

By Herbert Chase

**I**T is almost past understanding how two of the country's greatest industries, each very largely dependent upon the other for prosperity, if not for very life, could have grown up in this country with but slight recognition of their mutual dependence or need for co-operation. Such, however, is the case. A condition of this kind could not continue indefinitely. The war taught the need for industrial co-operation, and the beginning of such co-operation between the automotive and the petroleum industries occurred in a small way shortly after the war. The seed planted at that time is now starting to germinate, but it has not yet borne fruit.

The annual meeting of the American Petroleum Institute, which took place in Chicago last week set a promising and commendable precedent by arranging for joint sessions in which the technologists of the petroleum industry met members of the Society of Automotive Engineers. It was the first general gathering of men from the two industries and afforded a splendid opportunity for discussion of their mutual problems.

It should be said to the credit of the Society of Automotive Engineers that the meeting was brought about through its efforts and an appreciation of its members of the need for better mutual understanding between those who produce the fuel, on the one hand, and those who build equipment which uses the fuel, on the other.

Apparently few of the petroleum representatives realized why it is becoming increasingly difficult to use present-day motor fuels. For the first time the petroleum industry as a whole established close relations with those who represent their greatest customers and got from them an expression of what the customers' real needs are.

There was general agreement that the user of automotive equipment should be given the most possible for his money in service from the fuel. The automotive men expressed their views as to how this can be done and a willingness to adapt the engine to the fuel as well as possible, but also suggested the desirability of better fuel. Petroleum men, in general, had little to say about the possibility of providing better fuel. Few, in fact, appeared to realize the need or the possible advantage, either to themselves or to the public, of better fuel.

So it appears there is great need for co-operative education regarding the true fuel situation.

When the steel producers found, years ago, that ordinary steels were not satisfactory for most automotive purposes they set about the development of better ones, and have increased their output enormously thereby. Not so the producer of motor fuels. The demand has

increased, in spite of poorer quality, and the onus has been placed upon the automotive manufacturer to adapt his product to the use of the fuel made available. There are many reasons for this, some of them apparently beyond the control of the fuel producer, but it does not follow that conditions could not have been changed had the oil producer sought with energy to improve fuels by employing better refining methods. There are still, in fact, great possibilities in that direction which should be sought through thorough and extensive research. Such research must be vigorously carried on.

To date the fuel producer and refiner have sought to increase motor fuel output chiefly by seeking new oil resources, but for many years the supply has failed to increase as rapidly as the demand, so there is evident need for improved yield of gasoline from the crude. Unless the automotive industry asserts itself forcibly the increased supply will be secured simply by cutting deeper into the crude; that is, by furnishing less and less volatile fuel, and thus placing greater burdens upon the vehicle user and manufacturer.

The situation is, in fact, none too encouraging from the automotive viewpoint. For many reasons the oil man hesitates to admit a future shortage of petroleum even in this country. He has always got more oil by more drilling and wildcatting, but has for several years steadily lost ground in reference to the demand, domestic fields alone considered—a fact which he is prone to forget. Mexico has been making up the deficiency.

The recent American Petroleum Institute meeting heard again the same old story that there will always be an adequate petroleum supply, but it is more frequently qualified by saying, "If America is willing to pay the price she will get her share." "Mexico will continue to supply oil." "Other South and Central American countries have great reserves," and other like statements which are more or less true, but fail to make it clear that motor fuel is going to cost far more in the future than in the past.

There was but little inclination at the meeting to discuss the Mexican oil situation, but, as we reported last week, Sinclair admitted that it is serious, that we cannot afford to neglect consideration of what will occur if 20 per cent or more of our supply of crude is cut off by failure of present Mexican fields.

Two things become increasingly evident. The first, that the automotive industry must expect to face considerably higher prices for fuels, and, second, that every effort must be put forward at once to develop engines which will be more efficient and at the same time use less volatile fuels.

# A Semi-Racing Roadster Body of New Design

It is provided with a permanent top with a rear window which can be easily lowered. A large luggage space with openings at each side is located within the body just aft of the seat. No entrance door necessary.

By George J. Mercer

**N**EW roadster body models are sharing with touring bodies in the tendency toward more comfortable seating arrangements, including higher sides and seat backs. There is also a continued change toward cycle-type mudguards and side steps without running-boards, and larger windshields with wing attachments.

The design shown in the accompanying cut is of the semi-racing type—a model intended for those who enjoy driving at high speed. Bodies of this type are seldom equipped with a top on account of the wind resistance it offers and the unpleasant eddies which it creates.

To minimize these objections the top in the design here shown is made permanent and is carried further back beyond the seat than usual, thus allowing space at the rear of the passengers. A large window which can be let all the way down allows for the escape of the air which otherwise creates pressure under the top. This window is made to operate in a runway in the same manner as closed body windows, but it is smaller than most such windows. It is operated with a lift strap and rests on the fence when up.

The windshield is wide, having a 42-in. glass, which comes well down on the sides of the shroud to afford better protection. The upper part is movable, but the lower is stationary. The lower glass is split in the center to avoid likelihood of breakage. A ventilator is used on top of shroud, and the front end of the top which extends forward of the shield is tapered from the underside up, the reverse of ordinary practice. This makes the top end look thin and also gives a wide angle of vision.

Ordinarily the type of body here shown is made with bucket seats set on the frame, the tanks and tires filling the remainder of the space at the rear. One reason for presenting the cut here shown is to illustrate another and more finished design. The body includes luggage space, but is short to allow space for the tanks at the rear. Nevertheless the locker space provided back of the seat

is commodious and readily accessible from each side.

The shape of the top also differs from common practice, but since it is a permanent structure, greater latitude is permitted than with the folding type. When we do not have to fold the top down, there is no logical reason why it should be made with the restrictions that the folding type entails. A car of any description needs a top. In the summer it often happens that the seat cushions will be uncomfortably hot after the car stands in the sun for even a short time, while the entire interior as well as the

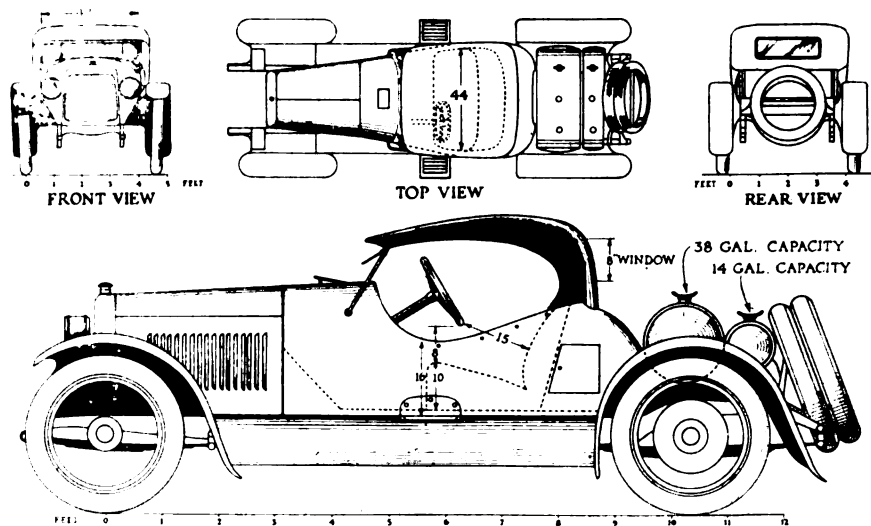
passengers require protection in case of a storm. Since the top is seldom folded, it seems logical to make it stationary, and provide a ventilating window at the rear if the seat is far enough forward to escape the tail dust.

The body shown is made without doors. The height of the body side above the step is 16 in. To make it a ladies car, one door can readily be placed on the right side.

While the use of the roadster is not

as great as it was when the automobile was looked upon merely for pleasure purposes, there will always be the class of buyers who want this type of body. This is especially true among young men who have opportunities to become car owners, and in many cases roadster bodies are being fitted to used chassis for this type of purchaser. The design presented herewith is one that is believed to be suited for this use. It offers a chance for the amateur to build his own body for a second hand car, and while the individual may have tastes somewhat different from the design submitted, it is believed that from the diagrams he could work out his ideas along the lines suggested.

The car manufacturer can also gain from a study of this design some of the principal features which are believed would be desirable to include on a roadster body. Many improvements would probably be made by different manufacturers, but the basic idea is one that includes most of the features that are especially desired by the purchaser of this type of car.



Four views of a new design for a semi-racing roadster body

# The Paris Aeronautical Exhibition

Seventh annual show is made up almost entirely of planes manufactured in France. One Dutch and two Italian makers enter field, however. Chief interest was in the several commercial planes exhibited.

**F**RANCE is holding its seventh annual aeronautical exhibition in the Grand Palais, at Paris, the scene of the recent automobile show. Theoretically international, the exhibition is practically all French, for of the 20 makers showing 35 types of airplanes (Government-owned military machines excluded) there are two Italians (Ansaldo and Ricci), and one Dutch, the rest being purely French firms. England is indirectly represented by a Vickers-Vimy plane built in France under license.

The presence in the show of the Dutch firm, N. V. Nederlandsche Vliegtuigfabrik, and of its chief engineer Herr Fokker, has given rise to a vigorous protest on the part of French manufacturers and aviators.

## French Makes Predominate

Of the 35 planes in the Grand Palais, 30 are French construction, 2 are built by the Italian Ricci Co., and one each are by Ansaldo, of Turin, the Dutch Fokker Company, and the French Vickers Company. There are three triplanes, five monoplanes, and 27 biplanes. Of the triplanes two are Italian Ricci single-seat, cheap, sporting type machines and one the Besson flying boat. In the monoplane section Morane exhibits two of his parasol type planes; Lioré-Olivier has an all-metal scout machine and Hanriot also an all-metal special scout machine.

Commercial aviation is the dominating feature of the show, and although military machines are exhibited they are to be found only on the French Government stands, and not among planes shown by manufacturers. The industry has shrunk since 1918, as is shown by the presence of only 17 French makers of airplanes, of which the following is the list: Farman, Bleriot, Besson, Breguet, Nieuport, Mureaux, Caudron, Sanchez-Besa, F.B.A., Hanriot, Levassor, Lioré & Olivier, Morane, Potez, Tampier, Latecoere and Astra. Very few of these are occupied exclusively on aviation.

In the aviation engine section there are no exclusive makers of airplane power plants. The exhibiting firms comprise automobile manufacturers who maintain an aviation engine department, among them being Renault, Lorraine-Dietrich, Hispano-Suiza, Talbot-Sunbeam, and Peugeot, and makers who during the war were exclusively engaged on aviation engines but since then have had to take up other branches of engineering. These latter are Salmson, Gnome & Rhone, and Anzani. The Farman Company now builds both engines and planes, and the Breguet Company has taken up the construction of the Bugatti 16-cylinder engine for its airplanes. Airplane construction in France is being reduced to a small number of specialized firms having either none or only an indirect interest in the automobile industry, while aviation motor construction is being continued by a few makers who have specialized in this type of engine.

Big capacity commercial planes and all-metal construction are the features of the exhibition. Farman has the biggest plane in the show, this being a biplane with four Lorraine-Dietrich engines of a total of 1400 hp. driving two tractors and two pusher screws. The plane has a

total weight of 10 tons, of which, 4.8 tons comprise useful load. Its wing spread is 114 feet, its length 69 feet, and height 26 feet. Total wing area is 3229 square feet.

Breguet exhibits his Leviathan Type XXI all-metal plane in which duralumin is almost exclusively employed. In addition to the unfinished exhibition machine a finished duplicate is at the factory ready to undergo its trial flights. This biplane weighs 3 tons empty and has a load capacity of 3½ tons, with a speed at an altitude of 6500 feet of 105 miles an hour. Its range of action with a useful load of 2½ tons is 380 miles, and with a useful load of 2 tons 685 miles. The Breguet Leviathan is fitted with two 16-cylinder engines built in the Breguet shops to Bugatti designs; the two engines, which develop a total of 900 hp. drive a single tractor screw. One of the features of the new Breguet is the use of sheet aluminum for covering the wings. This is not employed in single sheet form, but in strips of 5 inches in width extending from the leading to the trailing edge. The edges of each strip are carried round and riveted to a metal rib. This type of construction has already been employed for the covering of fuselages, but its use is new for wings, and has not yet been experimented with in the air. Experience has shown that with unbroken sheets of aluminum as a wing covering there is a tendency for the metal to fracture in use; it is believed this will be overcome by the use of strips, and as the thickness of the metal is only half a millimetre weight is less than with linen covering.

## Another All-Metal Plane

Another all-metal construction is shown by the Latecoere Company, a concern which builds as well as operates airplanes. This firm exhibits the fuselage of a day bomber constructed entirely of duralumin. The complete wings are not shown, but it is stated that these will have metal covering. The plane has a wing spread of 86 feet, length 50 feet, height 20 feet and total weight 5-1/10 tons. The plane will be driven by four engines developing 1000 hp., and will have a speed of 142 miles an hour. A new big commercial plane by the same company is of duralumin construction with fabric covering for the wings. This machine, which is designed for 20 passengers, has a wing spread of 80 feet, length 46 feet, height 20 feet, and weighs 7 tons complete. It is driven by three Salmson water-cooled engines, with tractor screws.

Bleriot has also a 20-passenger plane of wood construction driven by four Hispano-Suiza engines of 275 hp. each. The engines are mounted in tandem each side of the main fuselage, there consequently being two tractor and two pusher screws. Normal speed is given as 124 m.p.h.

No direct sales are expected as the result of the exhibition, but the event is made use of to the full in order to create an opinion favorable to aviation. A congress is being held during the exhibition, and this, in addition to being of a technical nature and attended by experts, has a popular side comprising visits to the leading airplane factories, state laboratories, landing grounds, and the shops of aerial navigation companies.



## Things Seen at the Paris Airplane Show

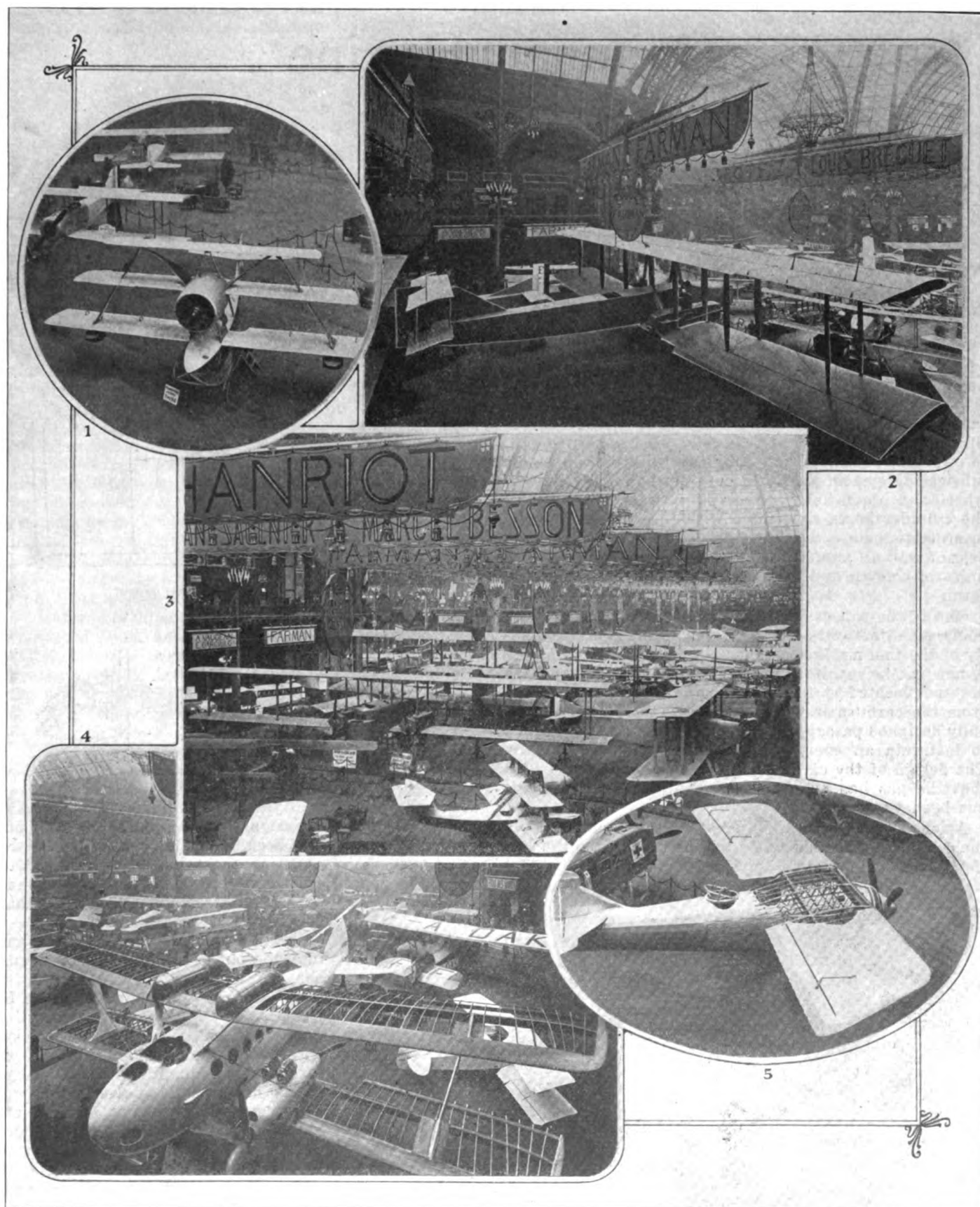


Fig. 1—Berson triplane flying boat. Fig. 2—Farman giant plane. Fig. 3—A general view of the exhibit. Fig. 4—Bleriot 4-engine 20-passenger plane. Fig. 5—Breguet duralumin passenger plane

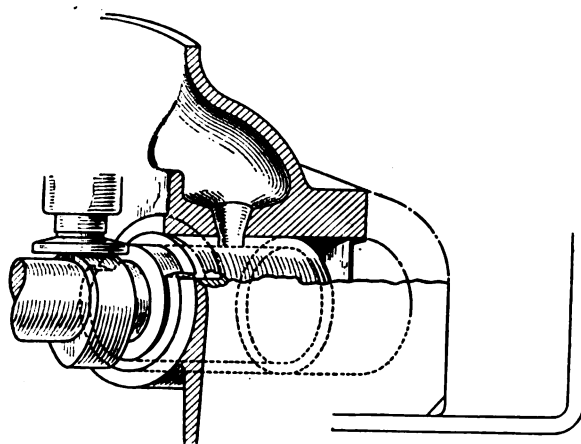
# Entirely New Design Embodied in Mitchell Engine

New features include balanced crankshaft, hot spot manifold, unusually light cast iron pistons, pressure feed lubrication of main bearings, an improved combustion chamber form and a thermostatic valve in the cooling system. Quality of fuel marketed said to cause the change in design.

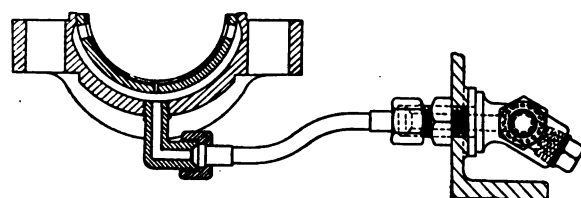
**A** NEW six-cylinder engine has been designed by the engineering department of the Mitchell Motors Co., Inc., to replace the engine that has formerly been used on Mitchell cars. In developing this engine the designers have aimed particularly at high engine torque at low speed, as well as at economical operation under these conditions, realizing that the average car engine is operated far more at speeds materially below that corresponding to its maximum horse power output than around that speed and above it. It has been sought to minimize internal friction by careful attention to the lubricating system and by accurately balancing the fly-wheel and crankshaft. Great pains were taken to get the cylinder bores concentric with the cylinder barrels in order to ensure, as nearly as possible, an even thickness of wall all around the cylinders. This tends toward uniform cooling and maintenance of a true cylindrical form.

One of the causes for revisions of engine design with many manufacturers has been the change in the quality of the fuel marketed, and this applies to the Mitchell. A new intake manifold has been produced which has a hot spot located at the top end of the vertical passage from the carburetor. This vaporizes the gas and carefully designed passages and bends with long sweeps tend to maintain an even distribution to all six cylinders. The design of the carburetion system is said to be such that the gas has no chance to condense again once it has been vaporized.

Among other points of interest on this new engine is the combustion chamber. As will be noted from the sectional view, the spark plug has been located in a spot



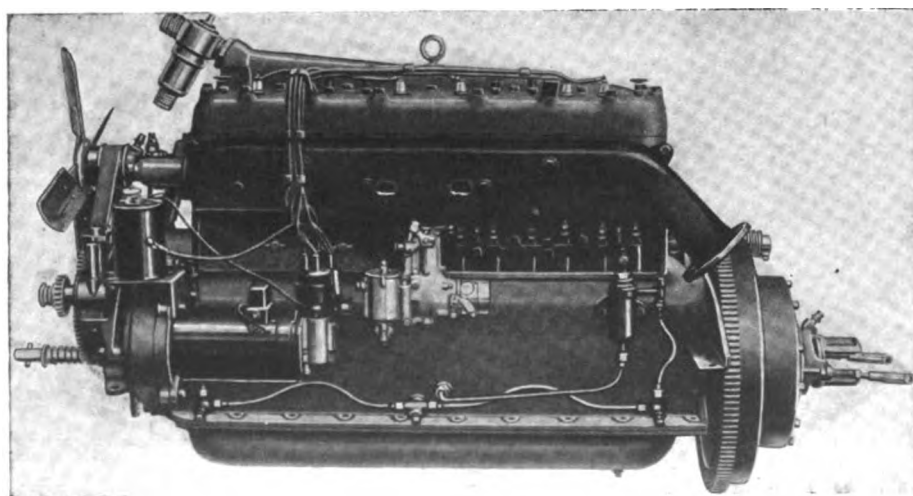
Camshaft bearing oil pocket layout



Details of oiling system

where there is a relatively large volume of gas, and it is evident from the design that turbulence in the combustion chamber has been aimed at. It will also be noted that the combustion space has been designed to extend well beyond the valve heads opposite the cylinder bores, so that when the valves are open there is a passage of less resistance for the gas into and out of the combustion chamber.

Structurally the engine is of the L-head, block-cast type with six cylinders of 3½-in. bore by 5-in. stroke, with a removable head. The S. A. E. rating is 29.4 hp., but on the block the engine has actually shown over 50 hp. The piston displacement is 288.6 cu. in. The crankshaft is statically and dynamically balanced and has force feed oiling to the main bearings, of which there are three. These bearings are 2¾, 2⅝ and 3½ in. long (front to rear) and all are of 2¼-in. diameter. The connecting rods and camshaft bearings and the gears and



The new Mitchell six cylinder engine

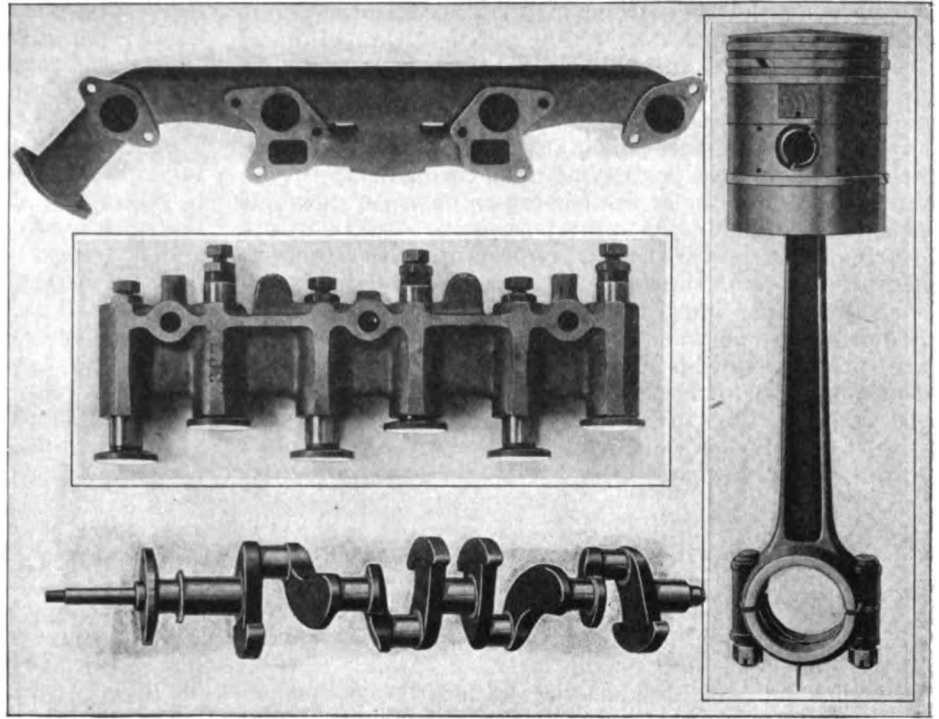
pistons are oiled by a constant level splash system. Cooling water is circulated by pump, and a Fulton thermostat is fitted to lessen the warming-up period and maintain a substantially constant engine temperature.

There are few encumbrances on the right side of the engine, only the starting motor, breather and filler pipe, and the water inlet connection being on that side. On the left side are located the inlet and exhaust manifolds, valves, carbureter, generator and ignition and the oil leads. While there are quite a number of units on this side, they have been so placed that it is still quite easy for a mechanic to adjust the valves. The bottom of the crankcase is of pressed steel, and its removal gives access to all bearings, no special wrenches being required to reach the end main bearings.

Much care has been given to the piston and rod assembly. The piston is of cast iron, but its sections are very light, so much so that it is possible to squeeze it into a slightly oval shape by hand. The thought here is to get a piston which will readily adapt itself to the shape of the cylinder bore. The piston clearance at the top is 0.010 in. and on the skirt, 0.003 in. The bearing surface is nearly equally divided above and below the piston pin. Three compression rings are used, and one oil scraper ring. The piston head, which is  $\frac{1}{8}$  in. thick, is slightly conical and is finished by polishing. A number of equally spaced  $\frac{1}{8}$ -in. holes are drilled in that portion of the piston between the two bearing surfaces, to relieve the pressure. Flats are cut on the piston immediately above the piston pin bosses, and  $\frac{1}{8}$ -in. holes are drilled at an angle of 25 deg. through which oil scraped into the flats by the ring above is forced into the piston pin bearings.

The connecting rods are given a better finish than formerly, and the set of six rods which go into an engine are balanced against each other, both as regards their rotating ends and reciprocating ends. In other words, the rotating or crankpin ends of the rods all weigh within  $\frac{1}{2}$  oz. of each other, and the same applies to the piston pin ends of the rods.

There are four rings per piston,  $\frac{3}{16}$  in. wide each. The piston pins are  $\frac{63}{64}$  in. in diameter. In order that



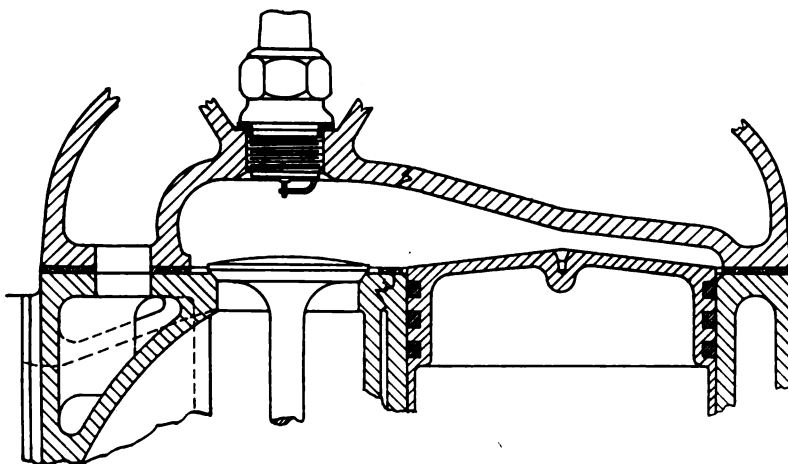
Tappet guide block, manifold, crankshaft and piston and connecting rod assembly

the piston pin may line up square with the barrel of the piston, the holes in the bosses are reamed in relation to the barrel to within a tolerance of 0.001 in. per in., measured with a plug projecting  $1\frac{1}{2}$  in. from the barrel.

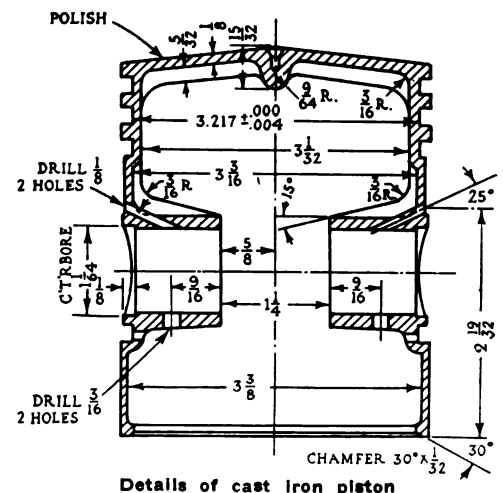
Much has been done to ensure the easiest possible flow for the gases in and out of the combustion chambers. The water spaces around the valves have been materially increased. The valves have a clear diameter of  $1\frac{5}{8}$  in. and have a lift of 0.275 in. The tappets have been lengthened and are held in removable guide blocks. It is necessary to remove three horizontally placed cap screws from each assembly of six tappets, whereupon the guide block and tappets can be removed as a unit.

A counterbalanced crankshaft is now used. With the shaft supported at both ends and turning at 2000 r.p.m. the middle bearing must not run out more than 0.003 in. The shaft is very stiff and with the pressure system of oiling used a high linear speed on the bearings is permissible.

The lubrication system has been worked out very well, particularly in the matter of oiling the main bearings. A cross sectional view of the center bearing is



Section through cylinder head and top of block



Details of cast iron piston

shown in one of the accompanying illustrations. From this it will be noted that the oil is fed to the bottom of the bearings by a cross line which is connected to the main distributing line outside the engine by means of a T. The oil is carried behind the bearing metal in the cap and reaches the bearing surface through two small holes in the upper portion of the bearing near the dividing line. The holes are located on opposite sides and in a channel extending almost the entire width of the bearing. These channels, therefore, form a reservoir dam from which the oil is fed to the revolving shaft over the entire width of the bearing, which is said to be not always so when the oil channels in the bearings are cut from one side to another and cross in the center. The upper half of the main bearings is oiled by splash, the oil collecting in suitable pockets formed integral with the crankcase webs which carry the bearings.

The camshaft is also oiled by splash, suitable pockets

being cast above the bearings and so arranged with curved baffles which help throw the oil into the pockets. One of the features of the oiling system is the manner of attaching the outside oil leads and the drain arrangement. The connections between bearings are made by copper tubing, each section being made with a rise and fall. This allows for any variation in length and makes it possible to drain any of the leads without affecting the others. At each T there is a plug, the removal of which drains that particular lead. These form catch pockets in which settle foreign substances which may get into the oil, and once they have been trapped there is no danger of them being again set into circulation.

A change has been made in the timing gears. A steel camshaft gear is now used, in connection with fiber crankshaft and generator drive gears. The camshaft gear is very much lighter than the combination steel and fiber gear formerly used. This gives a quieter drive.

## Overhead Camshaft Engine on New Leach Power Plus Six

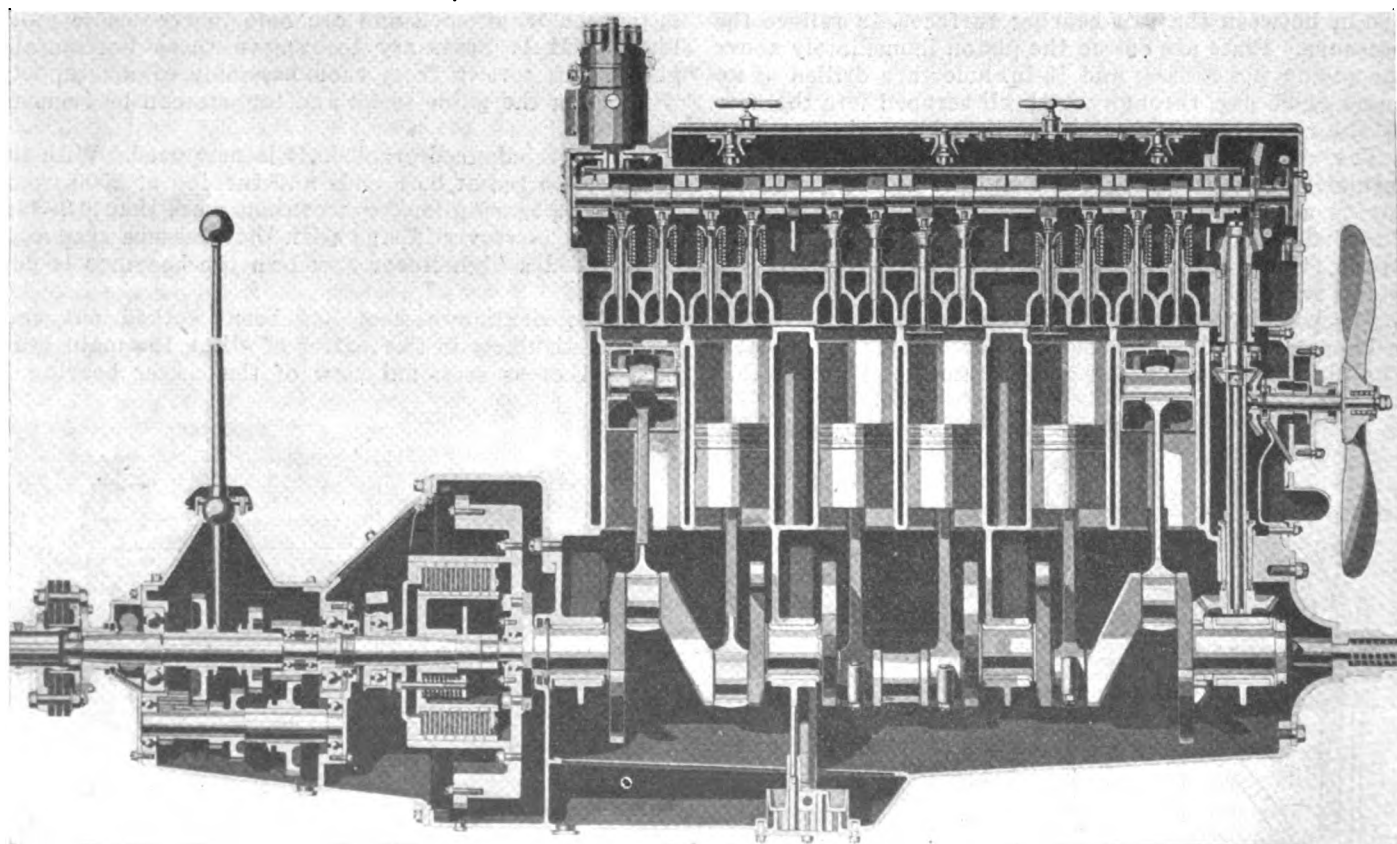
A SECTIONAL view in halftone is shown herewith of the six-cylinder engine of the Leach Power Plus car. This engine was designed by Harry A. Miller, who for years has been building special engines for automobile racers. It will be noticed that the design here shown embodies many features current in racing engine practice. The engine has cylinders of  $3\frac{3}{4}$  in. bore and  $5\frac{1}{4}$  in. stroke, and while the S. A. E. rating is only 33 hp., brake tests are said to have shown the engine capable of delivering 107 hp. The crankshaft is provided with balance weights.

The valves are located in the cylinder head and are operated by an overhead camshaft. The latter is driven by means of spiral bevel gears, as are the fan and water pump. An aluminum cover incloses the valve mechanism and side plates cover large hand holes in the sides of the

cylinder block, making all parts of the engine unusually accessible. There are no accessories or parts on the left side of the engine, which side is absolutely free, while on the right-hand side there are only the carburetor and manifold. The pistons can be removed from the engine either from above or below.

Large water spaces are provided on the cylinders, which extend down their entire length. Engine lubrication is by pressure feed. High economy is claimed for the engine, the car mileage being given as 14.5 on a gallon of gasoline and 2000 on a gallon of oil.

Changes have also been made in the chassis and body of the Leach six for 1922. The wheelbase has been lengthened to 134 in., new heavier springs have been fitted and shock absorbers eliminated.



Sectional view of new Leach motor, Model 9-99, showing overhead valves and camshaft, and counterbalanced crankshaft, as well as oiling system



# A New Make of Electric Truck

Series type resistance is used to facilitate gradual starting and acceleration. Motor drives through a silent chain, running in oil, to a jackshaft with differential, and thence to rear wheels by roller chains. Made in four sizes.

**A** NEW method of control which permits of very gradual starting and of speed variation by imperceptible steps has been brought out by O. B. Electric Vehicles, Inc. The firm will manufacture a complete line of trucks. All of the four models (1, 2, 3½ and 5 tons) are designed along the same lines. These trucks are equipped with a single G. E. motor which drives through a silent chain running in oil to a countershaft or differential shaft, from the ends of which the power is transmitted to the rear wheels by roller chains in the usual manner. The frame is made of rolled steel channels with the open side outward, which permits of securing brackets and other fittings to the inside with comparative ease. The spring hangers, which are riveted in place, are developed in the form of frame corner pieces. The two side rails have their ends bent at right angles so as to form one-half of each end cross-member, and they are joined together by fish-plates, inside and out, and rivets. The main frame members thus are identical in form and therefore interchangeable. This principle of making parts on the right- and left-hand sides of the truck alike and interchangeable has been followed throughout the design, and materially simplifies the service problem.

The battery is underslung between the front and rear axles. The battery box is made of angle steel riveted to the frame. There are guides on the floor for the battery trays, three trays being slid into the box from each side. After all of the trays are in place a crossbar is bolted in position in front of the trays, holding them securely in position. The battery box is covered by a sheet of compressed pulp which keeps out dust and water. Forty-four cell batteries are used on all models, which has been found most convenient for charging from 110-volt circuits. On the 3½-ton model the battery has a capacity of 300 ampere-hours.

The most interesting feature of the O. B. truck is the controller. It is of the resistance type, introducing resistance into the main circuit, which is gradually cut out. It will be understood that the single motor is of the series type, and its speed under any given load can be varied by changing the voltage impressed upon its terminals. This can be conveniently done by including

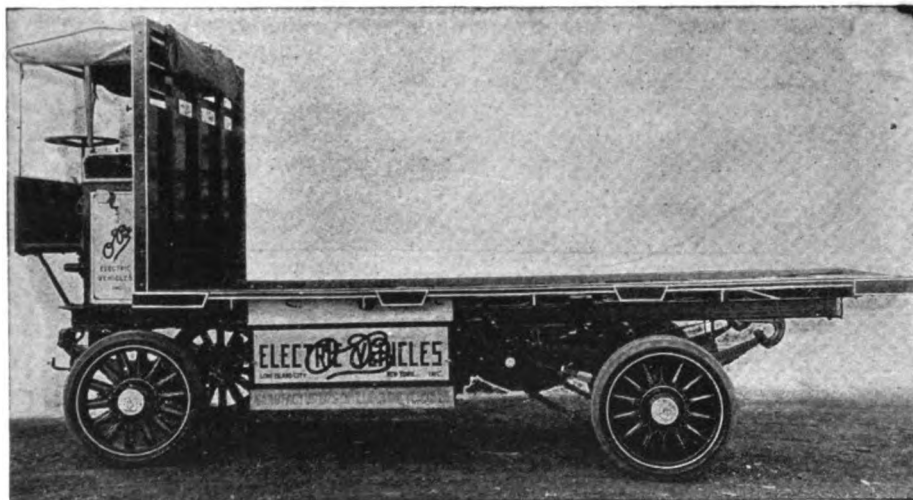
a variable resistance in the motor circuit. It is true that a certain amount of energy is lost in the resistance, but the idea is to use the resistance only in starting, while maneuvering and when caught in a traffic jam, and the total amount of time that any appreciable power is lost in the regulating resistance is comparatively small. On the other hand, the use of an almost infinitely variable resistance has the advantage that it permits of jarless starting from rest and of exactly suiting the speed to traffic conditions. The resistance used is the Allen Bradley type of current compensator, which consists of a stack of resistance material the resistance of which can be varied within wide limits by subjecting it to mechanical pressure. This compensator is combined with the O. B. controller. As the circuit is first

closed, the current is compelled to flow through the compensator with very little pressure on the resistance material, hence it encounters a great deal of resistance, little current flows into the motor and the latter exerts but a very moderate torque. As the controller handle is moved over further the resistance material is compressed, its resistance is reduced and the current flow and motor torque increase.

This continues until the resistance material is fully compressed and the resistance is at a minimum. There is only one more step on the controller, and that is with all the resistance cut out of the circuit. The controller is located under the driver's seat, and the handle extends up from the side of the driver.

The wiring from the battery to the motor and controller is carried in conduit in the frame channel on the outside. The wires are laid in grooves cut in two boards, which are placed with the grooved sides together. These boards are placed into the frame channel and the whole is then protected with a sheet metal cover.

Steering is through a spur pinion and sector reduction gear, with a large handwheel whose rim is wound with cord. The service brakes are of the internal expanding type and are of very large diameter. There is a pair of emergency brakes on the ends of the countershaft. Both brakes are equalized, and the operating devices of both are provided with ratchets by which they can be set in place.



One of the new O. B. electric trucks



As is customary in electric vehicles, anti-friction bearings are used throughout. The motor itself has ball bearings, and adjustable roller bearings are used in the front and rear wheels. For adjustment of the chain tension, radius rods are provided between the rear axle and the differential shaft housing. The turnbuckles on these radius rods are provided with square portions at the middle of their lengths to take a monkey wrench. This same plan of providing square wrench seats is followed out in the hub caps. Another feature bearing

on the servicing problem is that the squared portions of the hub caps of all models are of the same size, so the same size of non-adjustable wrench will fit them all. The wheels are of the Archibald wood type with two-piece felloe. The springs are of the Spring Perch Co.'s make.

All three lamps carried on the truck are of the same design, except that the rear lamp has one red glass. The trucks are sold with an equipment comprising the seat, lazy-back, footboard and cushion.

## Semi-Automatic Arc Welding

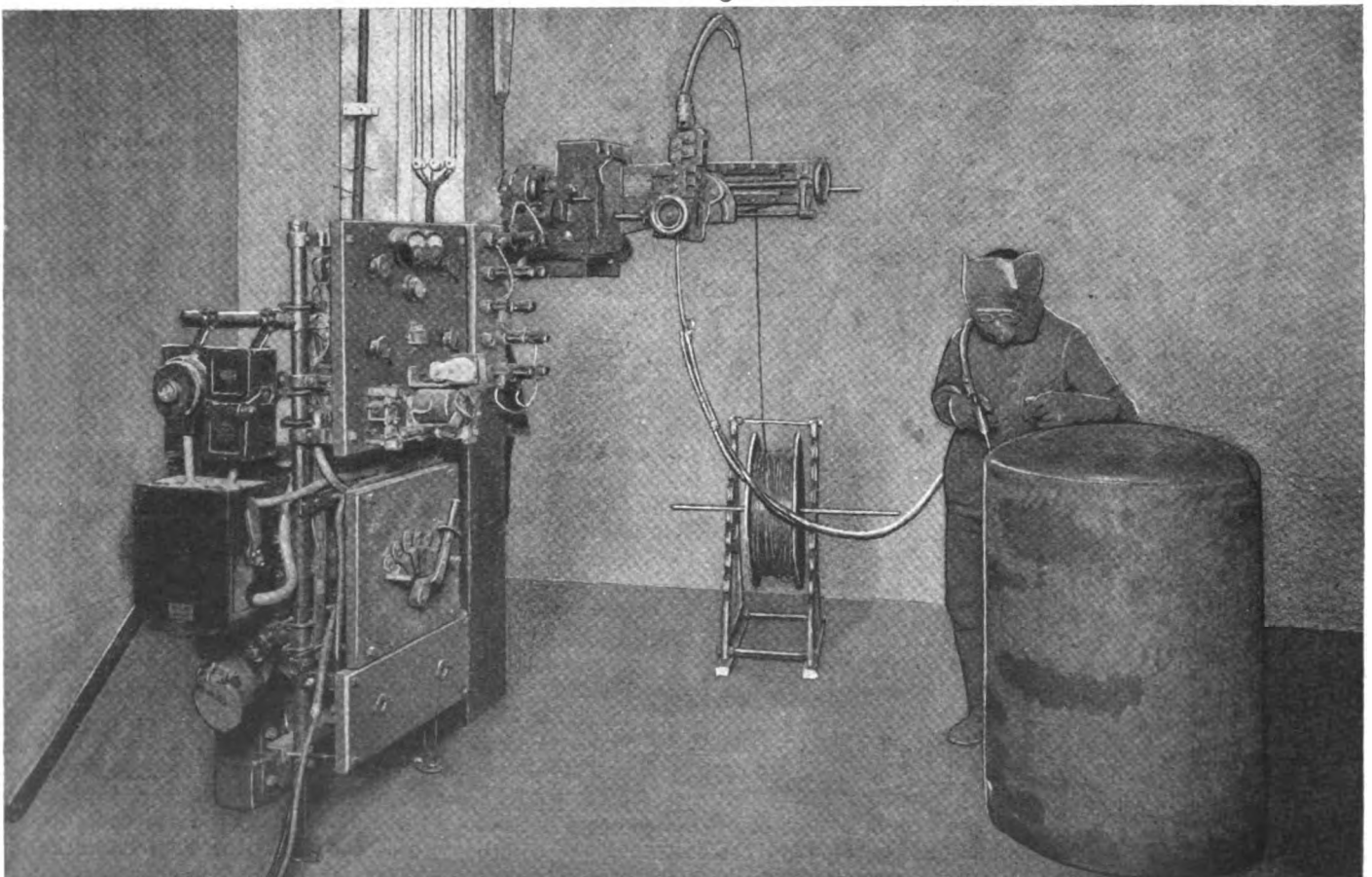
**A** SEMI-AUTOMATIC arc welding lead has just been developed by the General Electric Co. for use in conjunction with its automatic arc welding head, which retains the continuous features of the automatic apparatus, yet allows the operator to direct the arc as required by the conditions of the work.

The apparatus consists of a welding tool to be held by the operator, which acts as a guide for the electrode wire. In the handle of the tool, which greatly resembles an automatic pistol, is a switch for operating the control on the panel of the automatic welder to start and stop the movement of the electrode wire. Attached to the tool is a 10-ft. length of flexible steel tubing, called the "flexible wire guide," with an adapter on the other end for attaching it to the automatic welding head. The wire passes from the feed rolls of the head into the flexible tubing, and thence to the arc through a "guide nozzle" in the welding tool. The automatic welder functions in its accustomed manner, tending to hold the arc length constant, and the operator merely directs the arc

as required by the exigencies of the particular job.

The field of application of the semi-automatic is the welding of products where the seams to be welded are of very irregular contour, or on very large work where the travel mechanism and clamping necessary for the full automatic welder would be complicated and costly. In many cases the edges of the seams are not accurately prepared, making gaps in some places and tight fits in others. The automatic welder with mechanical travel cannot compensate for these conditions by varying the speed, or by manipulation of the electrode, but with the semi-automatic they are taken care of.

The semi-automatic welder may also be used for building up metal rapidly, as in the case of the filling up of blow holes in castings, or the building up of worn spots, etc. The speed of deposition of the metal varies widely, being somewhere between the ordinary hand speed, and that of the automatic, according to the conditions of the particular job. In general it is about twice as fast as hand welding.



Semi-automatic electric arc welding outfit developed by General Electric Co., Schenectady, N. Y.

# Weather Protection on British Open Cars

Sudden development in framed side panels for folding tops evident at the Olympia show. Standardized rear cowl on Humber. Combined side panel and rear screen on Swift. More than a dozen makers adopt the scheme, either offering the panels as standard equipment or at an extra cost.

By M. W. Bourdon

**A**N outstanding feature of the open body designs exhibited at Olympia was the large number fitted with means better than the ordinary detachable side curtains for affording weather protection to passengers.

At the shows of 1919 and 1920 standard cars were alone in providing framed side panels with transparent centers for the folding tops, but at this year's show there were more than a dozen British makes using some variation of the Standard scheme. This sudden consideration for passengers' interest is due, without question, to the popularity and practical success of the originator's arrangement, and without suggesting for a moment that Standard cars have not many other points of appeal, it can safely be said that the almost completely justified claim that they combine the protection of a sedan with the advantages of an open car has been a sales argument of no little weight.

The accompanying sketches illustrate eight different arrangements. In some cases this "all-weather" feature is standard equipment furnished with all open bodies; in others rigid framed panels are an extra, as with Wolseley and Enfield-Allday. As will be gathered from a discussion of individual designs, most of the front panels can be used as side wind deflectors when the top is folded; on the Swift four-passenger the units—each consisting of three panels and extending to the back of the rear door—can be utilized at the sides for this purpose, or as a rear shield; but others depend upon the top for partial support and cannot be used with the latter down.

In all cases some provision is made for storing the side panels when they are not in use. Usually there is a tray under the front seat. Not all methods are effective in preventing head draughts entering between the valance of the top and the upper edge of the side panels; further, not all open with the doors automatically, a

few needing some form of clip or turn-button to be released as a preliminary.

**Humber.** To apply this scheme to the best advantage, inside and outside door handles are required, and these are found in a few examples—Humber and Standard, for instance. The Humber application, Fig. 1, is on lines similar to the Wolseley, so far as the means of anchoring the rear corner of each over-door panel is concerned. A flat steel tongue drops into a neatly fitted socket in the door frame, though the Humber

"tongue" is not so conspicuous as that of the Wolseley. Humber provides four transparent panels on each side of the four-passenger cars, arranged as three separate units; over the front door, alongside the front seat and over the rear door, and behind the rear door.

The front unit has a flap extension of the fabric which incloses the flat metal framing

of the transparent panel, and this flap is secured top and bottom to the fixed vertical pillar of the shield, the fabric thus forming a flexible "hinge" which eliminates the need for precise alignment of door and curtain hinges. The front panel of the central unit is secured by turn-buttons to an inner valance of the fabric top and to the body side in the same manner, and forms the support of the fabric "hinge" for the panel over the rear door. The third unit is also secured by turn-buttons at top, bottom and rear edge.

The inner valance running the whole length helps prevent draughts passing in over the tops of the panels, and to the same end the free top corners of the over-door panels normally spring inward from the vertical so as to press firmly against the frames of the units against which they abut when closed. For storing the panels a locker is provided under the front seat.

This provision is found as standard on all Humber open cars. The 16-hp. five-seater has in addition a rear cowl hinged to the back of the driving seat and sup-

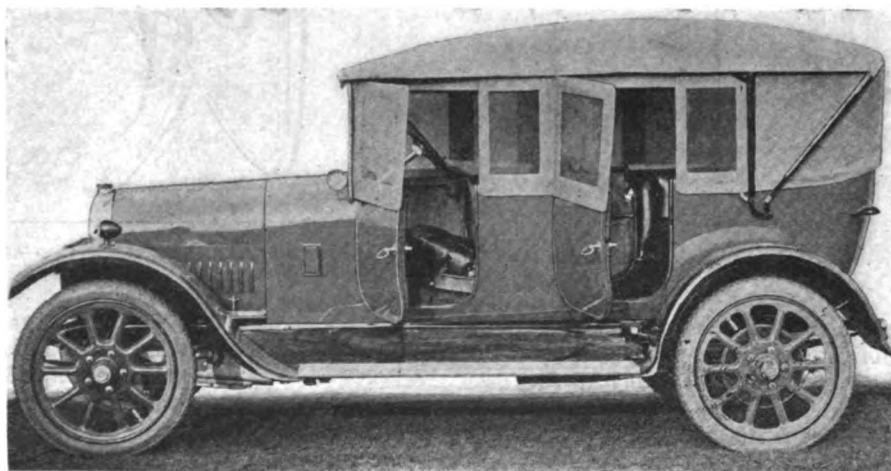


Fig. 1—New 11-hp. Humber with standard four-passenger body and folding top with framed side curtains that open with doors

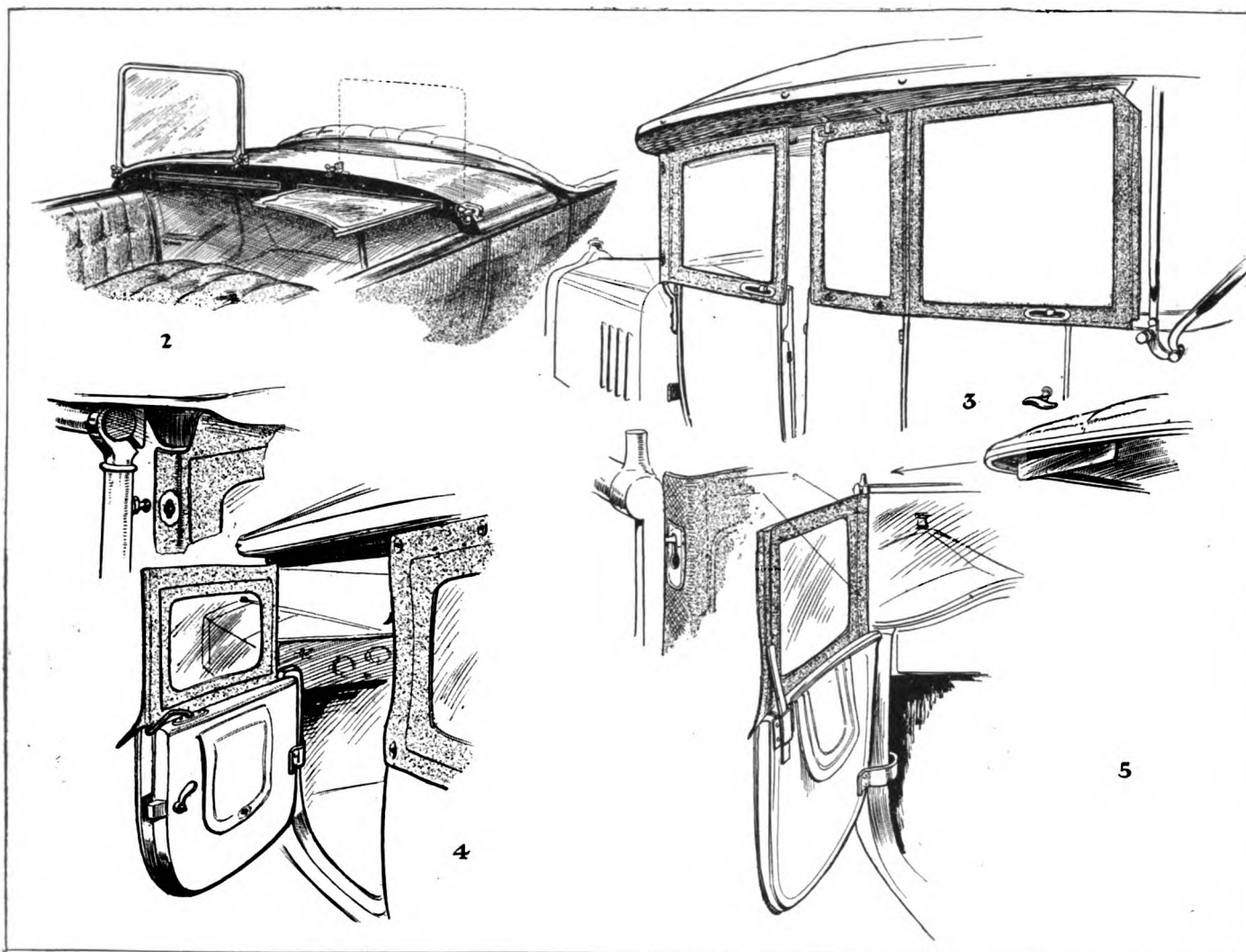


Fig. 2—Humber rear cowl and shield, one of the latter half-entered in its storage pocket. Fig. 3—11 hp. Standard. Fig. 4—Albert. Fig. 5—Wolseley

porting on its rear edge a pair of detachable windshields. The transparent portion is thick non-inflammable celluloid, and each shield can be removed by unscrewing two thumb nuts and stored in one of a pair of horizontal pockets formed in the cowl with slot openings at the rear. To assist in raising the cowl a hinged telescopic tube with a stiff helical spring inside is fitted at the center just below the hinge.

This cowl and windshield fitting can be used with or without the side curtains and whether the top be opened out or folded. It is also removable entirely by drawing out the hinge pin, leaving only a neat half-hinge on the top of the front seat panel. When raised with the front seats occupied the windshields are horizontal and well over the heads of the occupants, and the cowl cannot fall forward because of the stop provided by the telescoped tubes.

As the accompanying sketch (Fig. 2) shows there is a space between the two shields. This permits a certain amount of draught, but not so much as might be imagined, as, owing to the front windshield the air currents are not direct. The reason for this separation of the shields is to allow them to be stowed away in the pockets provided in the cowl, the curvature of the latter preventing a single and full width shield being accommodated in this way. At present Humber is the only British maker with a standardized body supplying anything of this kind.

**Standard.** The sketch showing the Standard side cur-

tains (Fig. 3) is almost self-explanatory; it need only be said that the darkly shaded portion is a detachable valance or strip of thin leatherette—the material used for the top itself—this strip being secured to the framing of the top by snap buttons and pierced to take the short leather straps which support the top edge of the central panel. The strip is also a draught excluder.

**Albert.** The Albert front panels are also secured to the windshield standard by snap fasteners on extension flaps of the fabric which surrounds the celluloid panels. But the fabric does not inclose a full metal frame as in most other cases, there being merely two round section uprights to keep the panel as a whole taut vertically. The peculiar shape of the bottom extension of the rear upright is evident in the sketch (Fig. 4); it is formed thus to enable it to swivel outward in the socket on the door to avoid dragging and straining the panel when the door is opened and to allow the inside door handle to be operated from outside the car. Within the door panelling is a spring which normally tends to keep the panel tight against the door and adjacent curtain. In this case, also, an inner valance is fitted and has the center panel (alongside the driving seat) attached to it by turn-buttons; but it is not, as in the Humber, stitched to the fabric of the folding top—merely to the top bows at three points—so that draught exclusion is by no means complete. As in the Humber there are three units, the central one of two panels and the rear-most alongside the back seat.

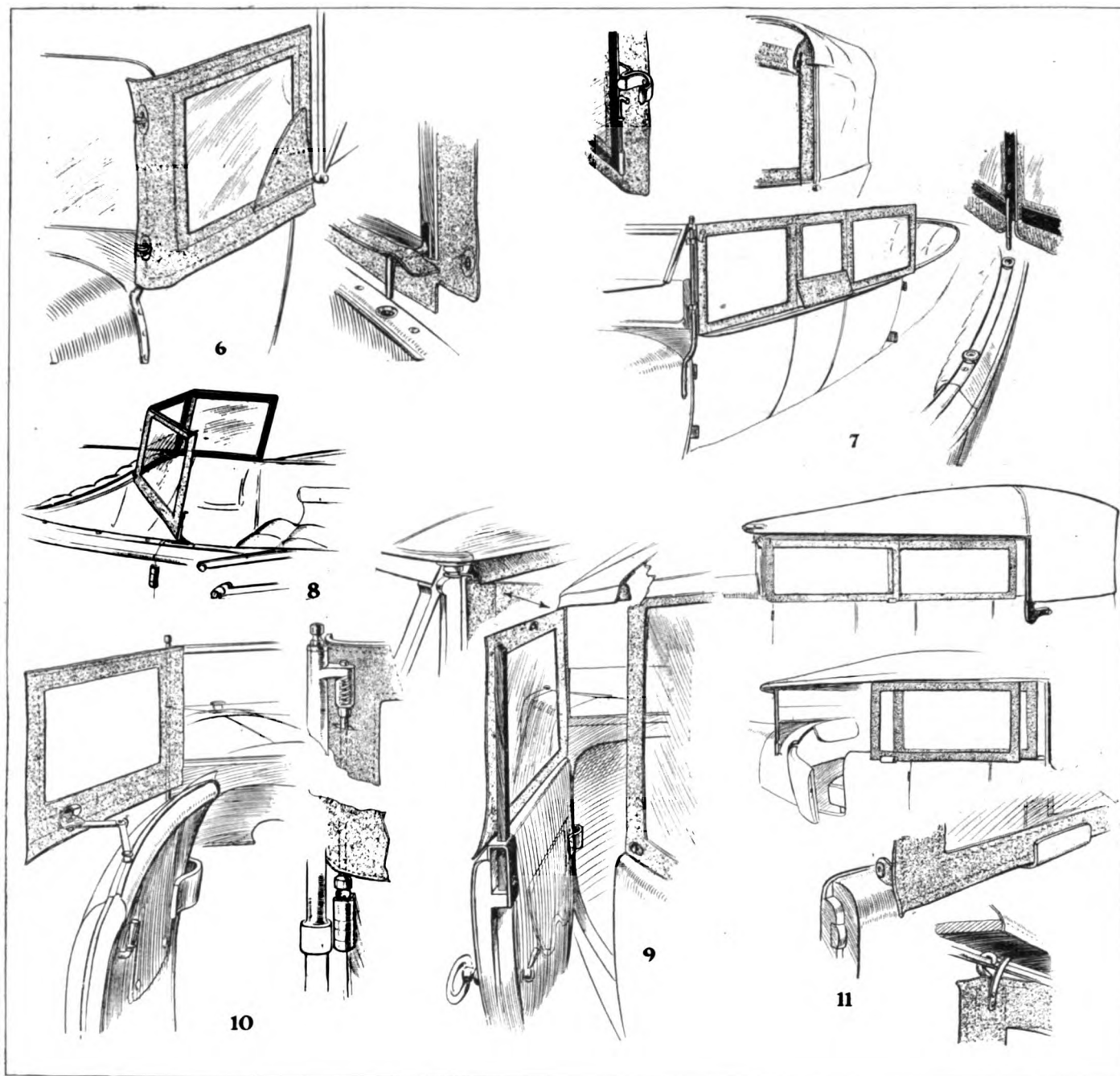


Fig. 6—10 hp. Swift. Fig. 7—12 hp. Swift. Fig. 8—12 hp. Swift, side curtains used as rear screen. Fig. 9—Riley  
Fig. 10—Sunbeam. Fig. 11—Enfield Allday

**Wolseley.** As with the majority of these open-with-door side panels, the Wolseley arrangement has evidently been adapted to an existing folding top. To exclude draught where the top framing overhangs the screen pillars, a wood filler piece has been attached to the corner of the front bow and from it hangs a short valance; this somewhat makeshift feature is indicated in the right-hand inset sketch of Fig. 5 herewith. The left-hand inset shows the slotted plate by which the hinge flap of the front panel is secured to a stud on the windshield post. In this case, as in the Albert, the metal framing within the fabric surround of the celluloid is not complete, consisting merely of a flat steel upright at the rear end dropping into a socket on the door.

**10-hp. Swift.** The fabric in this arrangement (Fig. 6) is supported by a full frame of flat steel, the latter being exposed on the inside and having cranked steel "pegs" of round section riveted to it. These pegs, one back and one front, drop into holes in the door tops,

while the "hinge" is again of fabric attached to the windshield pillar. The rear lower corner has a triangular fabric flap, serving two purposes, (1) to allow one of the occupants to extend an arm for signalling to other drivers, and (2) to enable the inside door handle to be operated from the outside. No special provision is made for excluding draught over the top of the panel.

**12 hp. Swift.** As already mentioned, one of the "curtains" of this car can also be made to serve as a three-panel rear seat shield and is shown in use as such, in Fig. 8. But it should first be said that the complete side panels—three in all—form a single unit on each side, the front and back sections being hinged by the fabric to the central one. At the front the unit is secured to the tubular pillar of the windshield by spring clips, as shown in the left inset view of Fig. 7. A secondary interior valance of the fabric top serves to exclude draught and to support the upper edge of the central panel, a sectional view being given in the upper inset of Fig. 7,



taken at the back of the side opening. A signalling flap at the bottom of the central panel is normally held closed by a metal tongue projecting inwardly over the bottom framing. The latter is exposed to the interior and has the fabric surrounds of the celluloid riveted to it. Two pegs drop into sockets below the central panel, as indicated in the right-hand inset, the holes in the tops of the body sides having rubber sleeves let into them to prevent rattle. The rear corner of the back panel is held closed by a "bolt" of 3/16-in. wire bent to a right angle at the top.

One objection to this arrangement, as it is applied, arises from the doors and panels hinging at opposite ends in respect of both front and rear entrances. Thus the panels do not open with the doors but must be manipulated independently. Further, the U-shaped spring clips at the front edge are not ideal and will either break or the unfastening of them will cause the fabric to be strained and torn, though a leather tab is attached to the top corner to serve as a hold.

A side unit serving as a rear shield is seen in Fig. 8. There are two rubber lined holes in the back of the front seat for the pair of pegs on the central panel, and at each lower corner of the side panels is a "bolt" to locate the ends by dropping into a slotted socket on the body sides. Used as a windshield, the fitting is by no means rigid, but it is almost as firm as the majority of the extending arm rear shields pure and simple. It should be quite as effective as a means of protection when the triangular corner pieces of fabric which are provided are fitted to fill the spaces in front of the side panels and inside the doors.

Riley. This application occurs on a two-door, four-passenger body (one wide door in front at each side and tip-up front seats). The fabric surrounds inclose a flat section steel framing which at its top front corner has a horizontal wire ring extension at right angles to form a hinge when it is dropped over the stud at the top of the windshield pillar, this stud serving primarily as an anchorage for the folding top (see inset in Fig. 9). At the rear the panel framing is secured by snap-buttons to a steel tube of square section which drops into a somewhat unsightly socket on the door. A second shallow valance is stitched to the fabric top as indicated in the sectional portion of the sketch, but finger manipulation is needed after the door and panel have been closed to push the outer valance outside the top edge of the surround. The rear panels are fixed by turn-buttons at bottom and rear, but at the top, as in the case of the front panel, flat spring steel hooks are used to hold the inner valance to the surround.

Sunbeam. This embodies a distinct improvement on

most of the other arrangements in regard to the hinging of the panels over the doors. Attached to the top of the windshield pillar in vertical alignment with the exterior hinges of the doors is a rearward elbow with an extension at right angles projecting down. This extension is cylindrical and contains a spring-backed plunger with a spherical bottom end. The fabric surround of the celluloid has a flat steel framing at top, bottom and rear, but at the front the flat steel is secured to a round section vertical rod, inclosed in the fabric excepting its projecting ends; the latter are cupped, the top one engaging with the spring backed plunger which presses the lower one on to the top of the pin of the door hinge. This system, which affords a neat, workmanlike and draught-proof fitting, is illustrated at the right of Fig. 10. On the left of the sketch are seen the hinged arms by which the back corner of the panel is held to the door, and the finger hook for drawing the panel inward. These hinged arms are needed to enable the door to be opened from the outside of the car, for interior handles only are provided; also they allow the "window" to be pushed open for ventilation.

Enfield-Allday. The scheme adopted by Enfield-Allday (Fig. 11) differs fundamentally from all others, for no attempt is made to arrange hinged panels or to make the latter open with the doors. There are two panels at each side of the car (a four-passenger, four-door body), and by means of four steel hooks—two for each—they are hung from horizontal rods attached to wood filling-in strips under the valance of the folding top. A guide plate fitted to the body side between the doors, prevents flapping at the center when all is closed up. The two central hooks on the panel frames are inverted in their position on the rod; that is to say, the back hook of the front panel is fitted behind the front hook of the back panel, this arrangement allowing either unit to be moved forward or backward without disturbing the other. So, as shown at the center of Fig. 11, the panels are slid rearward to open the front door; and vice versa.

The wood filling-in strip under the valance at the front end of the top is a fixture with its section of "curtain rod" and folds back with the top. But the rear one is detachable and must be removed before the folding process commences; it is secured by a couple of pegs at one end and a turn-button at the other end. A feature of the folding top unconnected with the side panels is a concealed spring within each rear support, the latter of square section steel; by this means the top unfolds itself and carries the front bow to the windshield, after it has been given an initial lift and light forward push.

## Loading and Unloading Devices

IMPROVEMENT in road transport can be brought about by educating the motor car user to an appreciation of the importance of doing away with delays in loading and unloading at terminal points. This fact is strongly emphasized in the London Times, which declares that these delays and failure to overcome them have offered definite sales resistances in several instances. Blame cannot be wholly placed on either the manufacturer or the user, although a good share of it can be laid at the door of the latter, since failure of proper organization is largely responsible. The manufacturer, on the other hand, has perhaps not given thought enough to this feature in the design of motor trucks.

Loading equipment, however, does not come within

the scope of the automobile manufacturer, but a bit of propaganda emanating from the automobile factory, emphasizing the need for organization and proper facilities might have the tendency to overcome this sales resistance. The manufacturer, of course, has been discouraged from equipping trucks with such devices because he has heard from far and wide the demand to "cut costs." Cost cutting cannot well be accomplished with the addition of equipment.

Motor truck salesmen, however, could probably extend their replacement market, as well as develop new fields, were they to educate the motor truck users in methods and means of reducing the time required at loading and unloading stations.



# Gear Tooth Shape and Its Relation to Standardization

The properties of the involute form of gear tooth are discussed. True involute teeth with a certain pressure angle and relation between addendum and diametral pitch will not interfere with pinions down to 12 teeth. Such a system would facilitate universal interchangeability.

By E. W. Miller\*

**F**OR standardization none probably will contend for a tooth design other than involute. Those who have studied gear teeth for many years appreciate that the number of possible gear tooth curves is almost infinite. The vast majority concede the decided superiority of the involute to any other as yet discovered. It is, therefore, suggested that the involute system only be considered.

Let us think about an interchangeable system. Let this system consist of all members from 12 teeth to a rack, inclusive. It is understood that each member of the system will run satisfactorily with any other member. The advantages of this plan are obvious. The gear manufacturer may make up a quantity of gears with various numbers of teeth and carry them in stock. This not only permits of quantity production with its lowered costs, but assures quick delivery, which is many times a vital factor. Further, the matter of blank size and depth of cut is simple, and a matter of importance when, as often is the case, the best of help is not procurable. If an interchangeable system results in less spoiled work, this factor should be considered in weighing the matter. With the obvious advantages of a standard for gear teeth and an interchangeable system, it seems conclusive that a standard interchangeable system is desirable. This would insure interchangeability of the different gear members made up in various plants. Further, the customer could easily specify his requirements and know whether his order brought him the proper gear or not.

The involute curve stands pre-eminent in the field of gearing. With teeth shaped to involute outlines, gears are to-day performing feats which a few years ago with other shapes seemed impossible. The involute is not alone responsible for this advance, but it has been a great factor, due to the comparative ease of its duplication and ability to operate properly at various, and sometimes varying, center distances. We, therefore, turn with interest to the study of this curve.

## Theory of the Involute

The involute is that curve traced by a point on a cord as the latter is unwound from a cylinder. This cylinder is known as the base circle. Fig. 1 makes this plain. The pencil point fastened to the cord traces the involute curve as the cord is unwound from the base circle. In Fig. 2 a card is attached to a base circle of the same size and a cord carried by the same is passed over an idler

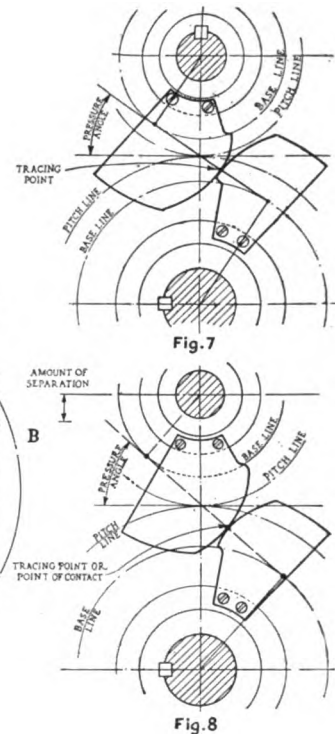
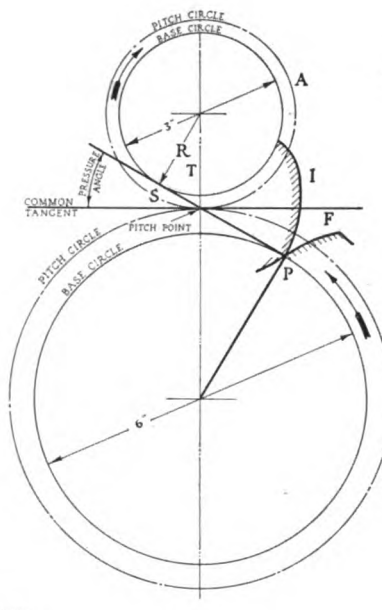
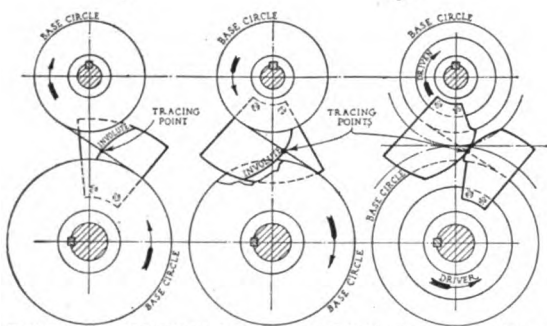
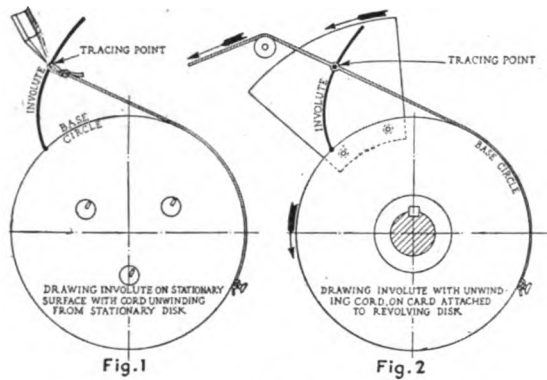
pulley. If the cord is pulled in the direction of the arrow, with a frictional resistance applied to the base cylinder, thus keeping the cord taut, the base circle with the card will rotate in the direction of the arrow, and a tracing point in the cord will draw a curve on the card. Obviously, the curve developed is identical to that traced in Fig. 1, since each curve has been traced by points on a cord unwound from base circles of identical diameter.

## Involute Traced on Recording Card

Fig. 3 shows a pair of disks, the upper being two-thirds the diameter of the lower. If the cord with the tracing point be wrapped about the two disks and the lower provided with the recording card, an involute will be drawn upon that card as the upper disk is rotated, winding up the cord and unwinding from the lower member. In similar fashion an involute is traced on a recording card mounted upon the smaller disk, as shown in Fig. 4. If the cards are cut carefully on the involute line and mounted as in Fig. 5, it is plain that as the cord is wound upon the one disk and unwound from the other, the two cards will be in continuous contact at the tracing point, since the curves are simultaneously traced by that point. If the travel of the cord is uniform—that is, moving constantly an exact distance in an exact period of time—it follows that the contacting of the involutes takes place uniformly along the path taken by the tracing point. If the cord is removed and one disk member is rotated uniformly, the other disk will also uniformly rotate, since its rotation is brought about by contact of involutes developed by the same tracing point. The straight portion of the cord is called the line of action, because contact of the involute surfaces takes place along this line.

In Fig. 6 are shown two base circles of 3- and 6-in. diameter. A cord wound about the two and tightly drawn is assumed to have developed the two involutes shown through the medium of a tracing point therein. It is apparent that two complete revolutions of the 3-in. circle will wind up an amount of cord equal to the circumference of the 6-in. circle, and will thereby cause one complete revolution of the latter. It is also known from previous demonstration that involutes I and F will be in continuous contact along the line of action, the contact beginning at P and ending at S. If several involutes, as I and F, are properly spaced about their base circles, and the base circle of 6-in. diameter is rotated continuously, it follows that the set of involutes carried on the larger, engaging those on the smaller, will at each revolution cause two revolutions of the smaller. The

\*Condensed from a paper recently presented before the American Gear Manufacturers' Association. The author is chief engineer of the Fellows Gear Shaper Co.



two base circles cannot be brought into contact, for in that case the tracing point on the cord wound about the two will follow around these cylinders, defining the same. The two would appear as rolls in contact, the one being driven by the other only through friction. If an appreciable load is to be carried, projections must be provided to assure positive contact. In order that these projections may be utilized the base circles must be separated. If from the base circle centers other circles having the same diameter ratio as the base circles are drawn tangent to each other, we may consider them as a pair of properly proportioned disks upon which may be located involute projections developed from the base circle, thus effecting a positive drive. These circles are called the pitch lines. Their point of tangency is called the pitch point. The pitch point is also defined as the point at which the line of action crosses a straight line drawn through the base circle centers. The common tangent is a line at right angles to the line of centers and passing through the pitch point. The pressure angle is the angle which the line of action makes with the common tangent.

In Fig. 7 is shown a pair of base circles with templates and involute shape obtained as in Fig. 5. The cord wound about the two disks represents the line of action. If the two centers are further separated, as in Fig. 8, and both disks are free to rotate upon their centers, the cord will inevitably keep the profiles in contact, since the involutes cannot possibly escape from the tracing points which define them. It is apparent, too, that the line of action makes an increased angle with the common tangent, denoting increased pressure angle. The pitch point also appears in a new position.

Fig. 9 shows two base circles, A and B, of identical diameter. Involute I and F have been developed from these base circles by methods previously described. It is assumed that the two involutes are securely fastened to the base circle. If involutes I and F are mounted on the back face of the disks, they may act as means of rotation, permitting the installation of a recording card and tracing cord with tracing point as shown. As F is rotated in the direction of the arrow, thus driving I, contact of the two involutes takes place along the line

of action. The recording card is of rectangular shape, running on guide pins, and free to move endwise. In Fig. 10 is shown an end view of the recording card, having a fin of infinitesimal thickness. This fin is tightly pressed by the pitch cylinders at K, and it is assumed that their rotation causes endwise movement of the recording card at exactly the peripheral speed of the disks and at right angles to the line of centers. If the tracing point is pulled along a distance E, any point in the base circle obviously moves the same distance; but a point in the pitch circle moves a greater distance by an amount in direct proportion to the ratio of the radius of the pitch circle to that of the base circle. Therefore, when the tracing point moves a distance E, a point on the recording card moves a distance S. Evidently then

$$S = \frac{R}{T} \times E.$$

It should be plain that line M is traced on the recording card as the tracing point travels the distance E, and the starting point on the card moves distance S. M is the resultant of both forces acting in a straight line. Therefore, M also is a straight line.

#### In Simultaneous Contact

The involutes I and F and the straight line M have all been traced by a point in a cord being wound upon A and unwound from B, and the three are in simultaneous contact in any position along this line. Note the contact at C. It can be mathematically determined that line M stands perpendicular to the line of action. It will be noted from observation of the straight line JJ that this line has been drawn at an angle other than 90 deg. with the line of action and tangent to involute F. It does not pass through the point of contact of involutes I and F, and, therefore, does not meet the conditions for satisfactory operation with the involute curve. From all this it is evident that a member traveling in a straight line tangent to a circle struck from a base circle center must be provided with a straight edge or tooth to properly engage a surface of involute outline. This straight tooth member is known as the involute rack.

In Fig. 11 is a base circle X, and tangent to the same is drawn a straight line P representing the line of action. Straight lines perpendicular to line P will evidently function properly as involute rack teeth, since they fulfill the conditions already set forth of being straight and at right angles to the line of action. The line OO is drawn through the intersection point of one of the straight lines and the line of action. The center of circle X' is the same distance from this intersection point as is the center of circle X. Circles X and X' have the same diameter. The line of action becomes also tangent to X'. Here is a condition like that in Fig. 9, and it is evident that the pitch point P is determined by the distance in a straight line from the center of the base circle to the intersection of line B with line of action. This is represented by line N. The common tangent of the gear pitch circles becomes the pitch line of the rack. The pressure angle, being the angle which the line of action makes with the common tangent, is determined by the direction in which the straight line

acting as a rack tooth moves. Obviously, the length of the gear pitch radius (as line N) determines the common tangent, thereby establishing the direction of travel and pressure angle. It is interesting to note the effects of the lengths M, N, J and K. They result in the various rack pitch lines indicated, and the pressure angles 60 deg., 45 deg., 30 deg. and 15 deg. If the radius Z were used as a pitch radius, the straight line representing the rack tooth becomes a point. Its direction of travel is that of the line of action, and its pressure angle is zero. The gear pitch radius must intersect the line of action. Base circles must have radii of some length, as, for example, Z. It is, therefore, apparent that, however great we may imagine the pitch radius to be, it must still make an angle (admittedly slight) with the line of action. We conclude from this that the greatest theoretical pressure angle is almost 90 deg., but never quite so.

It has been demonstrated that a change in base circle center distance affects the pressure angle of two involute

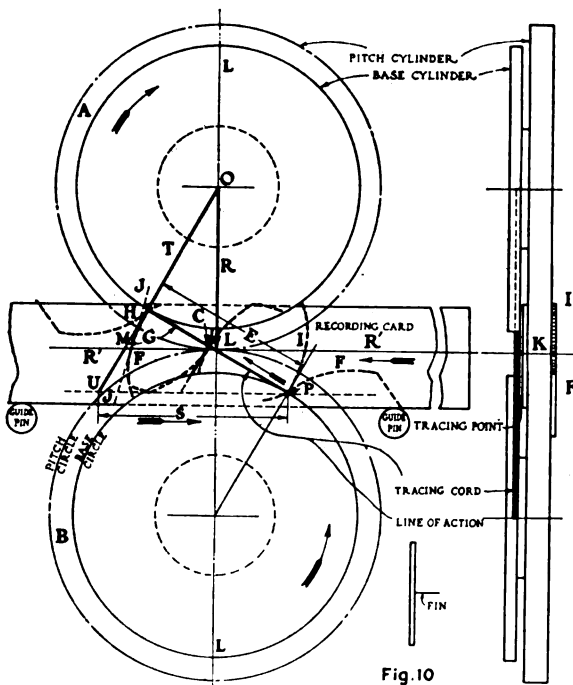


Fig. 9

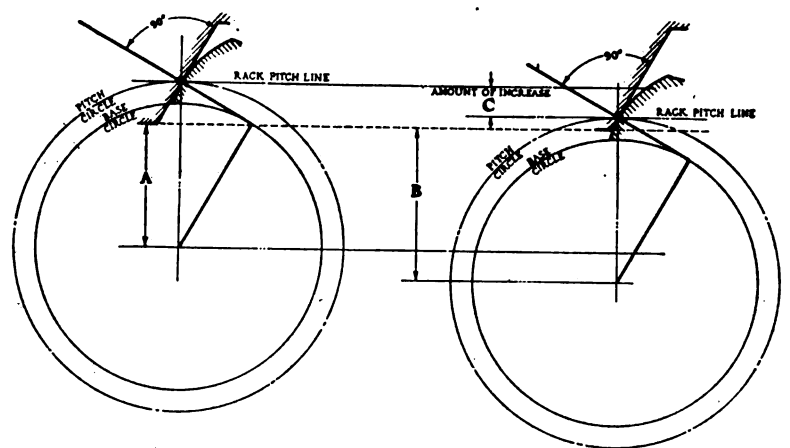


Fig. 12

Fig. 13

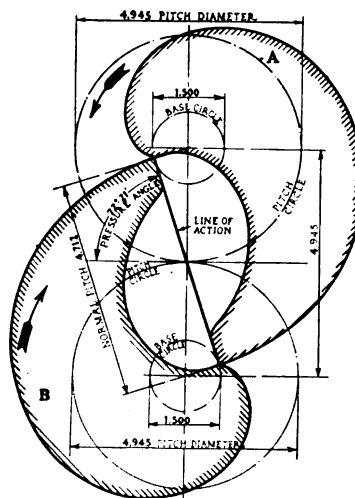


Fig. 14

DIAMETRAL PITCH = .0022 = 2.054  
CIRCULAR PITCH = 3.1416 = 15.537

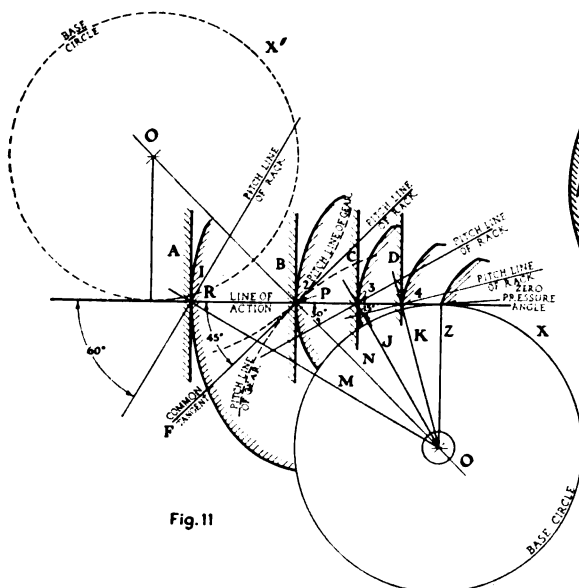


Fig. 11

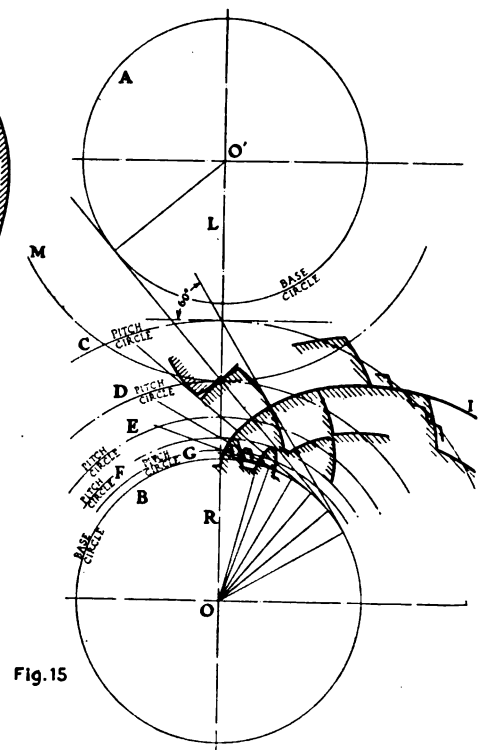


Fig. 15

curves developed from these circles. This is not true when involute and rack are brought into contact. It has been demonstrated and laid down as fundamental that the line of action must lie at right angles to the rack tooth line. Fig. 12 shows these members in mesh at distance A. Fig. 13 shows distance A appreciably increased and indicated by B.

In order to keep the line of action at right angles to the rack face, the pitch point has moved a distance equal to C, and established a new position for the rack pitch line. It is noteworthy that increasing the distance of base circle center from rack has not affected the pitch circle of the involute. From the foregoing we may make the following conclusions concerning the involute curve, the term involute being used in a broad sense, as being of an indefinite length, and not confined to our usual conception of a gear tooth:

#### Properties of the Involute

The involute is wholly determined by the diameter of the base circle.

An involute moving about its base circle center imparts rotative motion to a contacting involute in the exact ratio of their respective base circles.

An involute has no pressure angle until brought into contact with another involute or a rack.

The pressure angle is determined by the center distance of the base circles.

The pressure angle once established is constant.

An involute has no pitch diameter until brought into contact with another involute or a rack.

The pitch diameter of an involute contacting another involute is determined by the center distance.

The pressure angle of an involute contacting a rack is unchanged when the base circle center is moved toward or away from the rack.

The pitch diameter of an involute contacting a rack is unchanged when the base circle center is moved toward or away from the rack.

The pitch line position of an engaging involute and rack is determined by the intersection of the line of action with a line passing through the base circle center and perpendicular to the direction of rack travel.

#### Fraction of the Involute Used

The involute curve has its origin at the base line, but its length may be anything from zero at the starting point on to infinity. The tracing point carried in a cord, being many times unwound from the base cylinder, may extend the involute to any desired length. An example of involutes developed by unwinding the cord one complete circumference of the base circle is presented in Fig. 14, which results, as shown in a pair of one-tooth gears, in theoretically perfect action. The application of the involutes as here arranged offers an interesting study. Although of little or no value as actual driving members, the extremities at which involute action may take place are here made plain, and the nature of the curve made clearer.

It will be noted that each of the two involutes constitutes an unsymmetrical tooth. If A acts as a driver, turning in the direction indicated by the arrow, B will rotate in the opposite direction. Contact will take place along the tracing cord exactly as in cases previously cited. The length of the line of action represents the circumference of the base circle, and in this case is the normal pitch of the involute. It is rather startling to realize that the circular pitch of these two involutes developed on a base circle of only  $1\frac{1}{2}$  in. is 15.537. It is of passing interest to note that the pressure angle must

always be 72 deg. 21 min. when a single involute effects complete rotation of a single engaging involute. The pressure angle of 72 deg. 21 min. is excessive, and these curves are obviously incapable of transmitting any but the lightest loads. The diagram, however, is of value in explaining the possibilities of the involute.

Practically to transmit power smoothly and positively from one pitch line to another it is necessary to provide a number of teeth, thus permitting a selection of that part of the involute best suited for the purpose. In Fig. 15 a long involute I has been developed from the base circle B. Any point on this involute may be taken as determining a pitch diameter upon which teeth may be produced, the number of teeth being determined by the service required. Circles C, D, E, F and G. represent such pitch lines. Upon these pitch circles teeth have been drawn and one side of a tooth upon each pitch circle is composed of involute I. Teeth of various pitches have been drawn to make plain the possibility of a wide choice. The pressure angle increases as the larger pitch diameters are utilized. In the case of circle C it has reached 60 deg. If, after due consideration, it is decided to produce teeth on circle D to run with similar teeth on a pitch circle of identical diameter, it is necessary first to establish the center distance. Since the two gears are to be of equal pitch diameter, this center distance is determined by making L equal R. Then the center of the mating gear is at O'. A base circle A described from O' and having the same diameter as B becomes tangent to the line of action. Involute developed from this second base circle A and so spaced on line M as to accord with the tooth spacing on D will operate satisfactorily, provided—

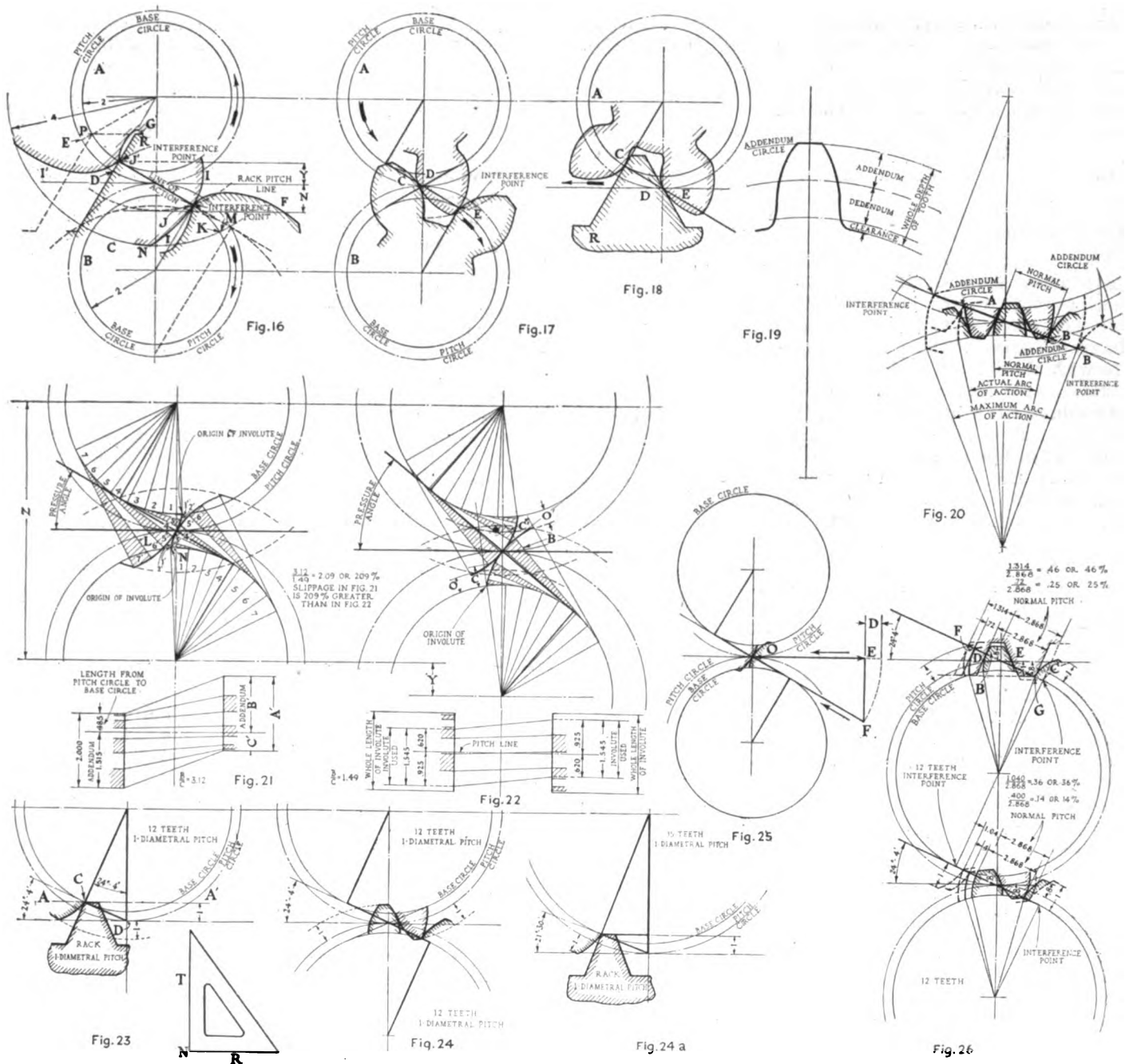
1. That there is no involute interference.
2. That there is an ample arc of action.
3. That excessive slippage is avoided.
4. That a proper pressure angle is selected.

These four points are of vital importance in our standardization work, and each will receive careful attention.

#### Base Circles and Center Distance

The use of diagram 15 is an effort strongly to emphasize that the base circle is root and seed of the involute and is an attempt to ground our thinking in terms of base circles and center distances. These are the fundamentals, and they should not escape us. On the other hand, it is not recommended that the procedure followed in Fig. 15 be used as common practice. The base circle-center distance attitude of mind is most important in determining the standards. Once the best portion of the involute is determined, center distances may be standardized, determined from the diametral pitch employed, thus following present-day practice.

Two engaging involutes contact along their line of action, and the driver, if uniformly rotated, imparts uniform rotation to the driven. If, however, the involute length is so great as to extend beyond the point of tangency of the base circle and line of action of the mating gear, the uniform rotation of the driven member ceases. The involutes are said to interfere. The point of tangency is called the interference point. In Fig. 16 two involutes, I and F, are assumed to have been contacting steadily along their line of action, the driver I causing uniform rotation of F. When point J is reached, all involute action ceases, since obviously involute F cannot extend below the circle upon which it has been developed. The continued, uniform rotation of A causes I to drive B, the contact of F being always at J. For purposes of illustration the involute length is determined by a 4-in. radius. The base circle radius is 2 in. With



these radii it is plain that as A is rotated a point at the 4-in. radius will move twice as far as a point at the 2-in. radius. A tracing point carried on the line of action will, after arriving at J, be wound upon base circle B, its path thus bending inward and away from the straight line representing the line of action. If this tracing point is assumed to have traveled from J to K (which is the intersecting point of base circle B with circle C) it is apparent that a point in C will have moved twice this distance. If, then, a distance twice JK, indicated by NM, is laid off on circle C, beginning at point N, which represents the end of involute I, it is found that M, representing the extremity of this line, lies outside the base circle B. To have moved in unison J and N should have come together at K. Actually when J has reached K, N has arrived at M. This means that, as A is uniformly rotated, the rotation of B is gently accelerated.

In this same figure a rack tooth R is shown engaging involute I'. If a point on base circle A moves from J' to P, a point on the pitch diameter moves the distance DE, as does also any point on the rack pitch line. Laying

off this distance on a line parallel to the rack pitch line and passing through the end of the rack tooth at G, the left-hand extremity is located outside the base circle at P. This again evidences interference. To entirely avoid interference the rack tooth should be shortened to length Y when operating with I'. When I and F are operating together, the involute length should equal to N. The difference in Y and N is appreciable, indicating the greater tendency of the rack tooth to interfere.

When involutes take the form of symmetrical teeth, employed in the transmission of power, the presence of interference prevents operation. This is made plain by Figs. 17 and 18. The acceleration of the driven member B, Fig. 17 (as explained by Fig. 16), is prevented by positive contact of teeth C, D and E; likewise, in Fig. 18, the rack R driving A cannot accelerate the rotation of A by reason of the contact of teeth C, D and E. This assures that gears and racks with teeth extending beyond the interference point will positively lock, becoming inoperative.

The addendum of a gear tooth is known as that tooth length which extends above the pitch circle. The deden-



dum is the tooth length below the pitch circle and equal to the addendum. The clearance represents extra depth of cut to assure space between the bottoms of the teeth and the ends of the mating teeth. The sum of the addendum, the dedendum, and the clearance equals the whole depth of tooth. The circle representing the outside diameter of the gear is sometimes called the addendum circle. Fig. 19 makes plain the application of the various terms.

### Arc of Action

The arc of action is that arc through which a gear tooth moves from the point at which it first contacts a mating tooth to the point at which the contact ends. Fig. 20 indicates two gears in mesh. Contact in this diagram begins at the intersection of one addendum circle with the line of action (note points B and B'), and ceases at the intersection of the line of action with the addendum circle of the mating gear. (Note points A and A'.) It is important that a pair of teeth shall remain in engagement until another pair can engage, thus taking up the load. If this does not occur, the gears operate with a bumpy, jerky motion, and they are said to fail of continuous action. The convenient term, "normal pitch," has been used to define the distance from one side of a tooth to a corresponding side of the next tooth measured on the line of action. This obviously is the circular pitch of the gear measured on the base circle, since these corresponding sides are traced by points fixed in a cord unwound from the base circle. The normal pitch arc is established by a length on the base circle equal to the normal pitch. It is evident that the actual arc of action must be greater than the normal pitch arc to assure continuous action. In the case shown the actual arc of action greatly exceeds the normal pitch arc. The maximum arc of action is obtained when the addendum circles pass through the interference points, as indicated by the dotted lines in the drawing.

### Reduction of Sliding Action

The slippage is an element which deserves careful investigation. It obviously should be reduced to a minimum, approximating rolling action as nearly as possible. In Fig. 21 two involutes developed on base circles at center distance Z are in contact at the pitch line. Beginning at the involute origin the base circles have been spaced in equal divisions, as indicated by Nos. 1, 2, 3, 4, etc. If we still think of the cord with its tracing point, it is plain that when unwound from arc No. 1 it has developed the involute length 1'. It is of great importance to note that although 7 exactly equals 1, the length of involute 7' is several times greater than 1'. It is also plain that when these angles have moved to such a position that lines L and N, representing the tracing line, lie in the line of action, length 1' will begin to pass over length 7'. An angular movement equal to 1 of the base line divisions causes 7' to pass completely over 1'. The difference in these two lengths evidences excessive sliding. From this it is evident that the extremely short length 1' is responsible for a very considerable arc of movement. It is noteworthy that lengths 4' contacting near the pitch line are identical, but due to the position they take a slight slippage occurs. The straight line diagram shown in the lower position of this figure furnishes a simple and convenient means of comparison. The percentage of slippage is here indicated. In Fig. 22 the same base circles and involutes are employed, but the center distance is increased an amount Y. The effect of this is to greatly increase the pressure angle, and it results, as reference to the lower diagram will evi-

dence, in a great reduction in slippage. Although the total length of the involute is identical with Fig. 21, less of the involute is utilized, having the effect of a shorter tooth.

Attention is called to the marked bend of the involute near the base circle. The straight length C laid off on a radial line passing through the origin of the involute departs markedly from the involute. The same length C', laid off perpendicular to line B, deviates but little from the curve. It is plain that the farther the involute extends from the base circle the more nearly it approaches a straight line. The nearer two mating involutes approach a straight line, the less they slide upon each other, as has been evidenced by the slippage diagram. The greatest curvature is near the base circle. Therefore, this portion is most responsible for tooth slippage. It may be logically concluded that the active profiles of engaging teeth should be kept as far as practicable from the base circle.

The pressure angle is of great importance in determining an interchangeable system. Together with the addendum, it determines the possible range of involute action between the various members. It is common to make the addendum equal the reciprocal of the diametral pitch. For example, the addendum of an 8-pitch gear is made  $\frac{1}{8}$  in. As a starter it may be well to determine the necessary pressure angle to secure interchangeability of all members from 12 teeth to a rack when the addendum equals the reciprocal of the pitch.

### Minimum Pressure Angle

The two extreme members—namely, the 12-tooth pinion and the rack—obviously present the limiting case. In Fig. 23 is shown a 12-tooth pinion of one diametral pitch. The problem is to find the pressure angle which shall fix the interference point in line AA'. Using a right triangle, as shown, let the point N lie in line AA'. Shift the triangle about, keeping N in AA' until side T passes through point O and side R through D. Draw CO and CD. The angle COD is the desired pressure angle. It may be mathematically checked by simple triangulation. In Fig. 24 a pair of 12-tooth pinions is observed to clear the interference points by a wide margin. Obviously a 24-deg. 4-min. pressure angle assures an interchangeable system.

One factor to be considered when determining the pressure angle is its effect on bearing loads. The example shown in Fig. 25 may serve to illustrate this matter. A pitch line force EO coming against the inclined surface of a gear tooth resolves itself into force FO, acting along the line of action, as shown. D graphically indicates the amount of load increase by reason of the pressure angle. It is apparent that the increase is in ratio of EO:FO of the right triangle OEF, and is, therefore, proportional to the secant of the angle. The table drawn up herewith gives the secants of several angles. The column on the right compares the load with 14½ deg. in terms of percentage.

Angle	Secant	Comparison of Load with 14½ Deg. in Percentage Terms
14½ deg.	1.0329	
17 deg.	1.0456	1.2 per cent
20 deg.	1.0641	3.0 per cent
22½ deg.	1.0823	4.8 per cent
24 deg. 4 min.	1.0952	6.0 per cent
27½ deg.	1.1273	9.1 per cent
30 deg.	1.1605	12.3 per cent

In Fig. 26 are shown two 12-tooth pinions in mesh. The pressure angle is 24 deg. 4 min. Above is shown a rack engaging a pinion. In full line the teeth of both pinion and rack are shown having an addendum of 0.8 in. The normal pitch is 2.868, and the excess engagement of the two pinions is 0.4 in. This indicates 14 per cent

more travel than is actually necessary to effect continuous action. The rack and pinion, as shown above, have 25 per cent more than is required. If the addenda are made 1 in., as indicated by dotted lines, the excess action is considerably increased, as is indicated by these figures. It is to be noted that the teeth in both pinion and rack clear the interference point by a good margin when the addendum of both is 0.8 in. When using this pressure angle of 24 deg. 4 min., the load on the bearing is 6 per cent more than when employing the 14½-deg. angle. This increase is little and may be considered negligible.

It appears from an investigation of this kind that a 24-deg. pressure angle with an 0.8-in. addendum may furnish a highly satisfactory interchangeable standard.

It is not believed that this matter can be easily and cheaply settled. Much experimental work should be carried on in a painstaking and unselfish fashion. Undoubtedly it would best be done in a place fitted up for research work, all experiments being made on the same devices, in the same way, and careful records kept of

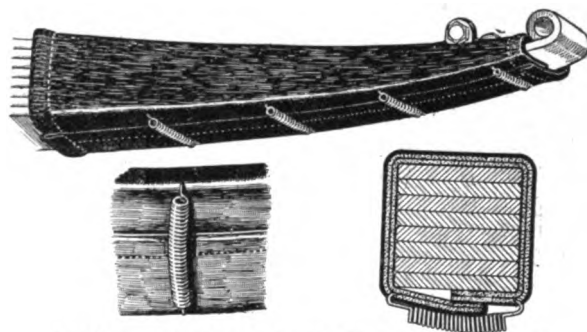
results. In judging the all-around performance of gear teeth, the matters of noise, durability, strength and other lesser factors should influence our conclusions. If we as a society are really sincere in this task, we should make every effort to carry on the work to completion. Unquestionably the money cost of such work would be considerable, and this matter of finance must necessarily receive our attention.

This paper has dealt largely with an interchangeable standard. It is undoubtedly a matter of paramount importance. The special case arises, and recently has been much discussed. It is perhaps timely to direct attention to the fact that formulas assuring the very best pressure angle and tooth proportions for any specified pair or pairs of gears may be easily worked out. Possibly a secondary standard covering these special cases would be advisable, and prove to be part of the work. There is nothing mysterious about these special cases, and, further, they may all be handled by any of the commonly used processes of to-day, thus making the possibility of their production open to all.

## A New Spring Cover

OF late years spring covers have come into use mainly abroad, but also, to a certain extent, in this country. The object of these covers is to exclude dirt from the contacting surfaces of the spring leaves and maintain a film of lubricant between them. If no means are provided for maintaining this film, the leaves become dry and rusty, the flexibility of the spring changes and the spring is very apt to squeak.

A spring cover of very simple design, which is produced by the Ideal Garage, Inc., is shown by the accompanying illustrations. It is made in both leather and pantasote, the latter in two different weights. On the inside the cover is lined with a heavy felt which holds oil in absorption. The covers come in flat form ready to be wrapped around the springs, one cover for each end of a semi-elliptic spring. One side and one end of each cover are lap-seamed, while the other side and end are unseamed, thus making it easy to adapt the covers to odd size springs. These covers are held on the springs by coiled steel springs, the ends of which

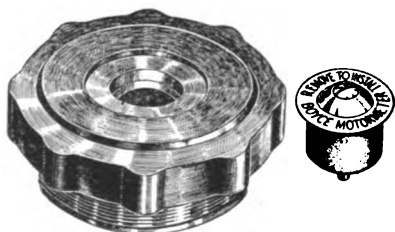


Leather and Pantasote used in new spring cover

hook into holes in the leather, etc. It has been found quite unnecessary to rust-proof the small springs, as they are protected by a light oil film which constantly covers them. The covers are made in three widths and in a considerable number of lengths.

## Merchandising Accessories

INSTALLATION difficulties have often retarded accessories sales to a considerable extent. Accessory manufacturers in an effort to overcome this sales resistance have attempted to get car manufacturers to construct the original vehicle in such a way as to render installation easy. In some cases, the accessory manufacturer has gone further, however, and has offered to bear part of the manufacturing expense necessary to render less difficult the installation of the



How Moto-Meter installation is facilitated

particular device in marketing of which he is interested.

An interesting instance of this kind is the device recently adopted by the Boyce Moto-Meter Co. to render installation easier and to decrease sales resistance. This company has devised a rubber plug with metal top which fits into a ¾ in. hole in a radiator cap. The metal cap bears, in small letters, the words "Remove to install Boyce Moto-Meter."

The Boyce company has offered to supply these plugs free of charge to radiator cap manufacturers who will use them. The plug gives the radiator cap a pleasing appearance and the advertising feature is not visible except upon close examination. Installation of the Moto-Meter is rendered simple, however, since the plug can readily be removed by a slight pressure of the finger. The idea is interesting as a practical sales promotion method.

# High Speed Riveting Hammers in Automobile Production

Many operations accomplished in manufacture of various parts of cars with this tool. Delivers rapid succession of strokes without overheating, is claim. Simplicity and ease of handling make it possible for women operators to work with the hammers. Various operations are described.

**N**O other branch of industry has confronted machine tool designers and the engineering profession in general with so many difficult problems as the automotive industry. Automotive manufacturing has attained its present high standard only as a result of continued research and experiment looking toward improvement in the production of every part which enters into the complete product.

Many production engineers are said to look favorably upon the use of high speed riveting hammers for upsetting solid and hollow studs, rivets, pins, etc. These hammers deliver what is described as elastic vibrating strokes at high speed. The rapid succession of blows does not overheat the riveted stock, as has sometimes been feared they would; the rivets are not subjected to a slow, heavy pressure to fill the rivet hole, but, instead, the action of the high speed hammers causes the shoulders to hug tightly and the revolving peening action of the hammer first makes a wedge of the protruding stock and then quickly forms an oval or a round head, or fills a countersink to form a flush head.

The following notes on methods of application to familiar operations in the automotive industry and time studies in connection therewith may prove of interest. The operations described cover a very considerable

range of work, calling for the delicate strokes necessary for upsetting a 1/16-in. pin or rivet, to the heavy, powerful strokes necessary for heading a 1-in. case-hardened tractor chain pin.

Fig. 1 illustrates the upsetting of circuit breaker spools onto their bases in the plant of the Electric Auto-Lite Corporation. The studs are tightly upset in four seconds each. Tending of the machine is said to involve a low fatigue factor, which makes it possible for women operators to do the work. Another operation in the electrical equipment branch of the automotive industry is the riveting of tungsten contact points to the contact levers, etc., which is done at the rate of one point per second. A tight fit and a good finish are obtained in this operation, and no chipping needs to be done.

In riveting assemblies of automobile hardware (as used on closed car bodies), starters, safety signals, carburetors, etc., women operators are obtaining speeds of one rivet per second on sizes up to 3/16 in. diameter.

Fig. 2 represents the riveting of brackets which hold the lever and link of an internal brake assembly, the photo having been taken in the plant of the Raybestos Co. The length of the brake bands is 18 in. and they are 1/4 in. thick. Sixteen rivets are required per brake band to assemble the lever and link, and 300 rivets are

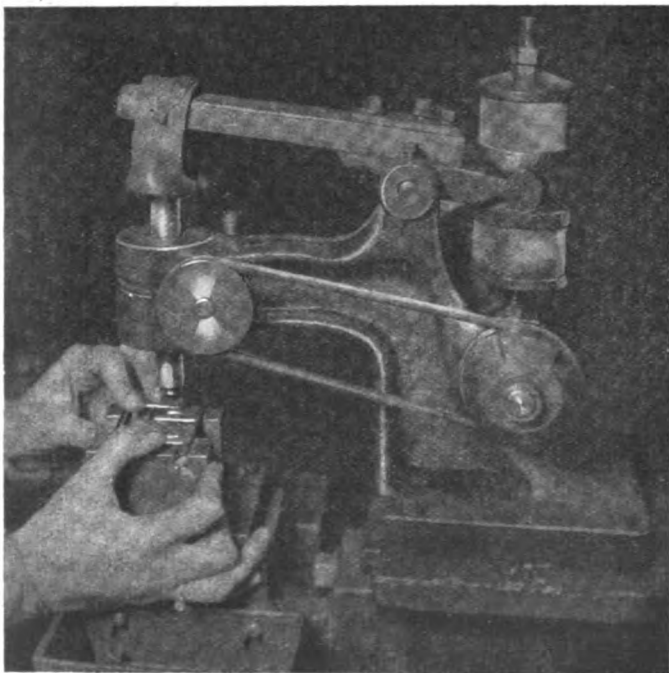


Fig. 1—Upsetting of circuit breaker spools onto their bases

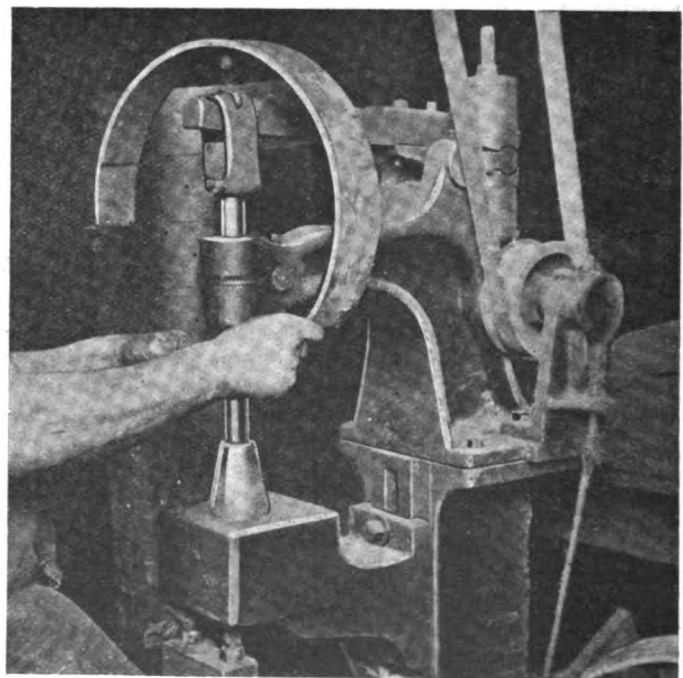


Fig. 2—Riveting brackets that hold lever and link of an internal brake assembly



Fig. 3—Differential gear in the riveting hammer

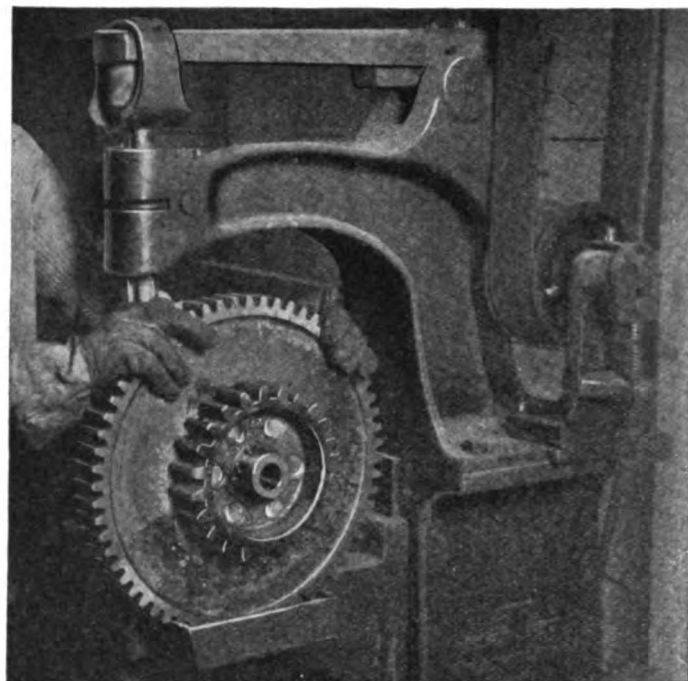


Fig. 4—An operation on tractor gears

headed every hour. Brake lining is riveted with copper rivets and drawn up. For riveting up brake bands, the hammers are sometimes arranged in gangs. Thus, in the plant of the Timken-Detroit Axle Co., where four pieces are riveted to each band with fourteen 3/16-in. iron rivets, the work is done in a number of machines located side by side. First, a malleable brake support is secured to the middle of the band with six rivets; next two clips are secured in position, one on each end, with

three rivets apiece; finally a sheet metal punching is fastened in position with two rivets. A boy loads the rivets into the fittings and keeps two hammers going.

The riveting of automobile rebound clips is performed with a high speed riveting hammer at the plant of the Perfection Spring Co. The shanks of the clips are 3/8 in. in diameter, and though the work is comparatively heavy, production is at the rate of four springs per minute. Actual riveting time is only 8 seconds per spring.

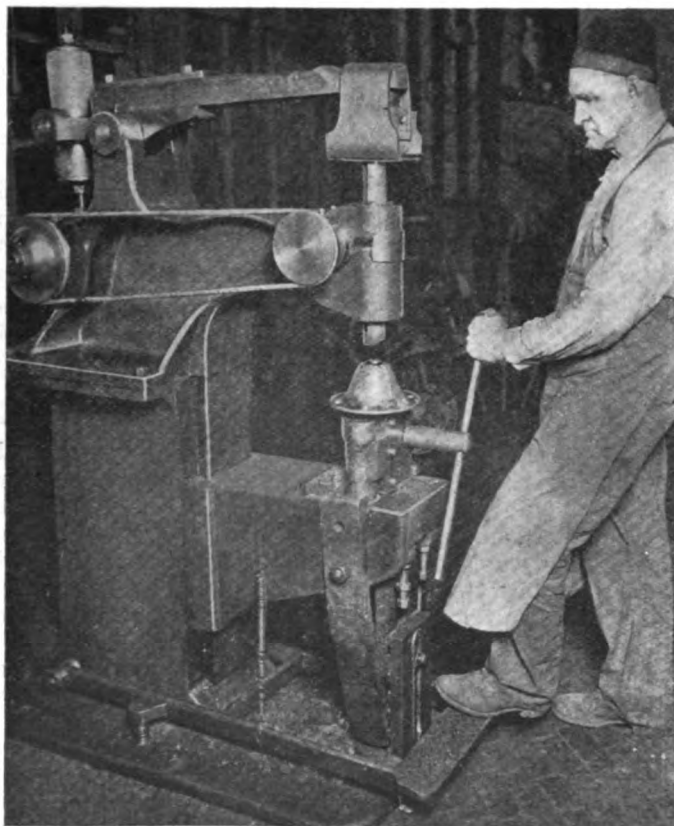


Fig. 5—Securing driving flanges to rear axle shafts of three-quarter floating axle

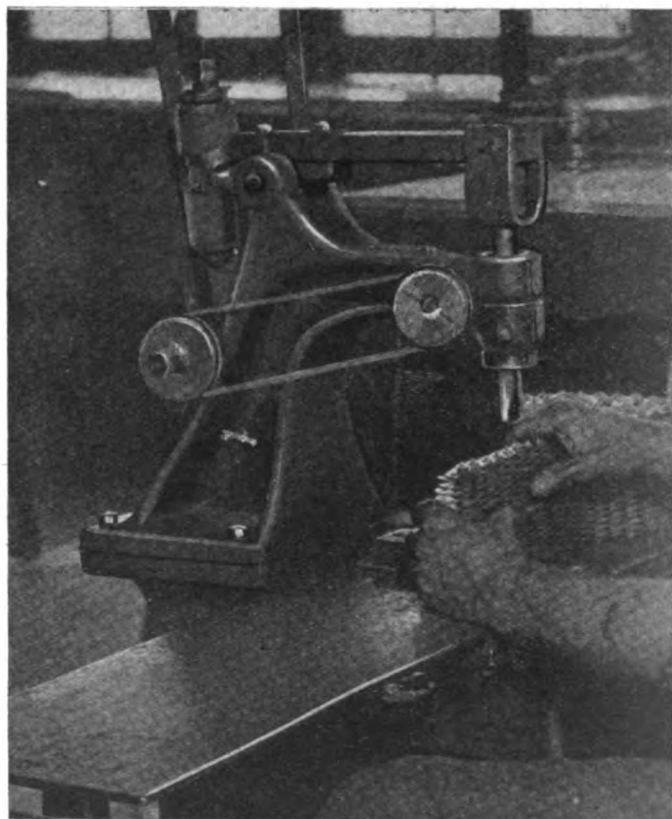


Fig. 6—Upsetting chain link pins with the hammer

At the plant of the Chevrolet Motor Co. three bosses are riveted to each brake flange plate, which is a sheet metal stamping  $\frac{1}{8}$  in. thick. Two of the bosses are of cold-rolled steel of  $\frac{7}{8}$  in. diameter, while the third boss is square. A gang of three hammers is installed, each performing one operation, and in this way the excellent production of 300 bosses per hour is obtained.

In the manufacture of differential gears the New Process Gear Corp. uses high speed hammers for a number of operations. These differentials are of the spur pinion type and eight studs are used for holding the assembly together. First the side plates, pinions and studs are assembled loosely. The operator places the differential thus put together on a fixture, inserts a locking pin vertically through the central hole, and after the assembly is placed in position in the hammer, one stud is riveted. The operator then withdraws the locking pin, turns the differential case around and rivets a second stud opposite the first one. The riveting is continued until eight studs have been riveted on the top side. The work is then turned over and the opposite ends of the studs are riveted. While the riveted heads are being formed the operator constantly manipulates the gears to avoid binding. One man produces eight to ten completely assembled gear cases per hour. The assembled differential gear in the riveting hammer is shown in Fig. 3.

The R. D. Nuttall Co. secured an order for tractor gears which, according to specifications, were to be cold-riveted. To avoid heat stresses the engineers tried riveting by high-speed hammers. The gears to be assembled had outside diameters of  $8\frac{1}{2}$  and  $16\frac{1}{4}$  in., and six  $\frac{5}{8}$ -in. headless iron rods are set in place, both ends being headed over. These  $\frac{5}{8}$ -in. rods were headed at the rate of one every four seconds, and a very tight job was secured. (Fig. 4.)

In the so-called three-quarter floating axles the driving flanges are rigidly secured to the rear axle shafts.

At the works of the Reo Motor Car Co. a high-speed hammer was installed for this purpose and as a result the production was quadrupled as compared with the hand riveting formerly employed. The axle drive shaft is of high carbon steel  $1\frac{1}{4}$  in. in diameter. The shaft ends are cut with four splines and when the cap is in place there is  $\frac{3}{16}$ -in. stock to rivet. By means of the high-speed hammers these shaft ends were upset in one minute each, as illustrated in Fig. 5, whereas formerly when sledge hammers were used, it took exactly four minutes.

Riveting of nickel steel ball studs to steering knuckle arms is done with a high-speed hammer at the plant of the Saginaw Products Co., a branch of the General Motors Co. The ball has a  $\frac{5}{8}$ -in. shank and is forced into the arm by an arbor press. About  $\frac{1}{8}$ -in. stock is left to rivet and the hammer turns the head over to  $\frac{3}{4}$  in. diameter. During a five-hour test run a production of 2200 was attained. This job is of particular interest for the reason that the ball studs are made of comparatively hard material.

Upsetting chain pins is an operation for which high-speed hammers have been used for a long time. At the plant of the American High Speed Chain Co. the pins used for holding together the links of  $\frac{3}{4}$ -in. pitch 4-in. wide chains have ends  $\frac{9}{32}$  in. in diameter. These pins lead through washers over which the ends are headed. An average production of 600 per hour is attained on this size, and on other sizes in proportion. The operation is illustrated in Fig. 6.

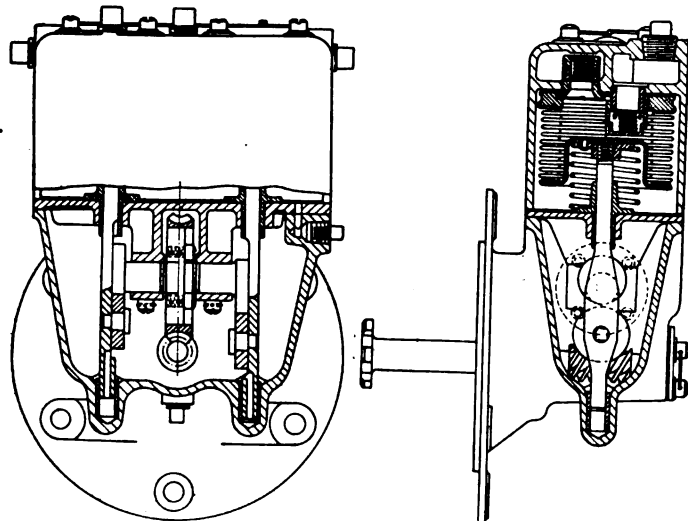
Other parts of motor vehicles in the manufacture of which high-speed hammers are used to advantage are bow top frames, brake drum side covers, roller bearing cages, tire pump plungers, spare tire carriers, folding baggage carriers, lamps, bumpers, oil cup hinge pins, knurled heads on priming valve stems, shackle pins on shock absorbers and automobile jack assemblies.

The above article is based on information furnished us by the High Speed Hammer Co., Inc.

## A Fuel Pump Without Glands

**T**HE Sylphon fuel pump was designed to fill the need for a pump which requires no packing gland. It gives a maximum discharge pressure at high speeds and sufficient fuel at any speed, thus doing away with a relief valve. It is built in duplex form so that in case one pumping unit fails the other unit will maintain sufficient fuel supply for all engine needs.

According to the air service information circular nearly



Sylphon fuel pump for use on aircraft engines

two years in flight at McCook Field and a 1400-hour bench test at full capacity have revealed no failures of any kind.

A four-pitch worm meshes with a 32-tooth worm wheel which drives the cams. These in turn operate the cam followers attached to the Sylphon. As the worm rotates the worm wheel on the camshaft moves the plungers down only, admitting fuel from the main tank to the Sylphon, which is returned to its original position by the spring designed to give a maximum pressure of  $4\frac{1}{2}$  lb. per sq. in. with a closed discharge.

**A** HARDENED steel ring gage 1 in. long was ground and lapped out at the National Physical Laboratory in England until the internal diameter was 1.0000 in. The outside diameter, which was 2 in., was ground true. A plug gage was ground and lapped down until it could be inserted into the ring, using ordinary hand pressure, and with both the gages clean and free from any trace of grease. The size of this plug was found on measurement to be 1.0000 in. A second plug was then made whose diameter was 1.0002 in. This plug refused to enter the ring so long as the surfaces were kept dry and free from grease, but when lubricated with vaseline it was found possible to assemble the two gages by ordinary hand pressure. By measuring over its outside diameter both before and after the plug had been inserted, it was definitely proved that the ring had been stretched in the process of inserting the gage.



# Export Figures Reach High Mark in October

Foreign sales continue to increase in value despite material lowering of prices. New orders make up the shipments instead of old business as was the case a year ago. Spanish and Portuguese countries take 30 to 50 per cent of the total amount exported. An indication of future business.

By George E. Quisenberry \*

THE detailed export figures for the month of October, which have just become available from the Bureau of Foreign and Domestic Commerce, are worthy of careful study by all branches of the automotive industries. They reveal, in the shipments of passenger cars, trucks, parts and tires to all parts of the world, numerous tendencies that should claim the interest and close attention of those executives and export managers who are seeking to build up additional markets and further sales for the products now coming out of American factories.

Several explanatory factors must be kept in mind in any consideration of the foreign business in October. The most important, of course, is that the curve of export sales, according to value, continued through that month the sharp upward trend shown since the low point was reached in July—this despite the fact that prices have been lowered materially in the intervening months. It is necessary to go back to the first part of this year, when old orders were being filled, to find shipments appreciably higher, either in dollars or physical volume, than they were in October.

## Shipments Are New Orders

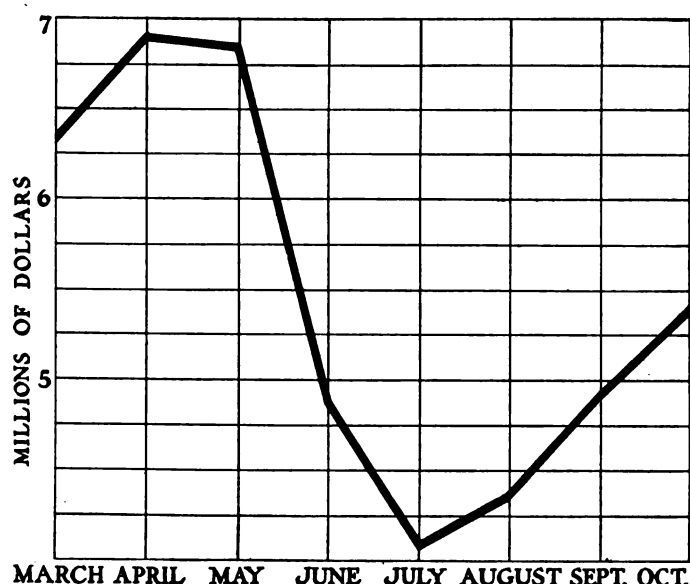
Furthermore, sales in that month consisted entirely of new orders. If we could have a curve representing current orders as received by all the producing factories of this country, undoubtedly we would be forced to return to the latter half of 1920 to find a similarly high position. The heavy shipments shown in November, December, January, February, March and perhaps later can be attributed not to new business but to shipments made on old accounts and postponed while domestic demand continued high. But the early months of 1921 saw the completion of all these old contracts, and since the late spring or early summer our foreign sales have been in response to new demands from the automotive centers of the world. That the total was so high in October is ample testimony that our foreign trade is again in the ascendancy. This condition is amply borne out by the statements of different exporters who are frank in admitting that present inquiries, orders and shipments are steadily increasing.

The October figures also must be read with an understanding of the Ford distribution system. The statement has been made previously, but it is worthy of repetition, that all American exporters should keep themselves closely posted on all the activities of this pioneer of foreign trade. Thus the October shipments show that Ford is continuing the shipment of parts to Argentina

in keeping with the reopened business in that southern country. Ford sales revived in Argentina in September and, as a consequence, the shipment of parts to that republic increased 1000 per cent (from \$47,000 to \$479,000) between August and September. The demand continued into October and at a high level, which, according to a recent Ford statement, means the difference between 2150 cars and trucks in September and 1650 in October.

The Ford plant in Brazil increased its output in October and the parts shipments to that country went up from \$14,000 in September to \$95,312 in October. Ford maintains an assembly branch in Denmark and the parts shipped to that country more than tripled the September total. As Spain is the location of another Ford plant, we see a similar enlargement of shipments, the increase having been nearly five-fold. France more than doubled the purchase of parts, and only England and Japan, in each of which assembly branches are located, showed declining purchases in the latter month, although the output still remained at a high level.

The figures for the various countries speak for themselves and any study of them will reveal emphatically that world automotive development again is going for-



MARCH APRIL MAY JUNE JULY AUGUST SEPT. OCT.

The ascending curve shows the value of exported passenger cars, trucks and parts from the United States, the territories of Hawaii, Alaska and Porto Rico not being included.

March	.....	\$6,314,498	July	.....	\$4,140,130
April	.....	6,948,808	August	.....	4,486,266
May	.....	6,872,756	September	.....	4,923,294
June	.....	4,800,252	October	.....	5,410,739

\*Managing editor *El Automóvil Americano*.

## Exports of Automobiles, Tires and Motorcycles for October, 1921

COUNTRIES	COMMERCIAL		PASSENGER		Parts	TIRES			All Other Tires	MOTOR CYCLES					
	Complete Cars	Chassis	Complete Cars	Chassis		Casings	Inner Tubes	Solid Tires							
Europe															
Austria						\$315									
Azores and Madeira Islands						512									
Belgium	1	\$1,000	40	\$30,395	36	\$13,720	12,034	\$2,453	\$500	\$6,793					
Bulgaria						25									
Czechoslovakia			24	20,753		338,482	43,899	2,241	\$1,592	396					
Denmark			1	1,250		245									
Finland			7	19,971		41,425	143,335	110							
France	1	535	2	3,081		529		49		1					
Germany						50				300					
Gibraltar			1	1,200	1	2,500	1,081	5,096	334						
Greece						41		250							
Iceland and Faroe Islands			2	1,100		843		872		34					
Italy								47		2					
Latvia							1,214	202							
Lithuania			9	4,523		303				1					
Malta, etc., Islands			30	33,325	1	668	18,391	5,287	60	225					
Netherlands	56	48,502	4	\$2,807			242	300	57	6,536					
Jugoslavia, etc.			4	4,350			8,281	13,764	658						
Norway			1	700	4	5,060	5,381	1,478	388						
Poland and Danzig							1,273								
Portugal	2	874	2	668			6,360		125						
Romania			11	7,368			59,272	39,618	437						
Spain			17	25,275	1	1,001	5,392	29,769	823	520					
Sweden			2	3,900	1	175	4,163	65,985	235	65					
Switzerland	1	715	7	4,203	1	591	5,465	384	101	2					
Turkey in Europe			43	46,904	176	78,648	494,427	254,765	19,341	4,015					
England	17	17,530	36	40,997			3,720	160		600					
Scotland							11,158			10					
Ireland			2	1,657						2,925					
North and South America															
Bermuda			1	920			315	515	30	281					
British Honduras															
Canada	35	45,973	33	59,820	231	305,906	771,999	11,876	1,260	1,639					
Costa Rica			3	4,500	10	15,526	508	324	21	22					
Guatemala			2	2,500			1,523	1,372	23	424					
Honduras	2	13,924	6	7,950			3,512	1,143	76	574					
Nicaragua							643	1,083	54	3					
Panama	6	2,482	31	31,843			3,694	4,972	902	1					
Salvador			1	2,439			1,432	6,372	60	169					
Mexico	82	35,279	95	35,229	617	364,421	82,763	35,257	4,105	3					
Newfoundland and Labrador					8	1,947	299	269	24	666					
Barbados			2	1,325			1,394	2,046	130	632					
Jamaica			17	12,402			6,431	4,944	419	920					
Trinidad and Tobago			17	10,912			8,122	12,982	1,562	499					
Other British West Indies	1	400	6	3,225			2,443	838	82	286					
Cuba	13	6,817	1	460	72	71,532	31,505	114,748	12,665	1,845					
Virgin Islands of U. S.			1	350			791	2,028	151	2					
Dutch West Indies			3	1,200			450	1,746	248	1					
French West Indies			2	2,300			627	3,396	1,033	350					
Haiti			2	2,300			3,238	3,434	351	210					
Dominican Republic			1	3,300			7,414	3,826	447	427					
Argentina	3	10,600	1	1,164	26	39,256	357,083	92,240	3,857	1					
Bolivia							299	800	175	277					
Brazil			75	283,750	5	5,900	95,312	7,397	13						
Chile	1	2,620	11	5,512			14,082	4,160	1,479						
Colombia			11	12,902			5,747	5,075	543	129					
Ecuador			2	3,900			326	2,078	260						
British Guiana			3	2,424			833	902	133						
Dutch Guiana							187								
Peru							7,809	10,521	550	1					
Uruguay			10	2,900	2	3,448	2,772	17,479	800	165					
Venezuela	2	11,340	16	17,102			8,729	8,898	1,476	6					
Asia															
Aden			5	2,890			535	1,328							
China	6	11,738	1	1,643	10	11,317	10,854	7,863	332	2					
Kwantung, leased territory	8	13,650			2	2,550	54			350					
Chosen			1	100				132							
British India	1	1,164	73	74,601	3	2,700	32,540	86,663	301	17					
Straits Settlements							4,749	9,462	1,757						
Other British East Indies			1	976			1,531	281							
Dutch East Indies	2	2,393	5	10,142	45	69,826	29,938	29,983	1,413	46					
French East Indies								2,960		12,288					
French Indo China							572								
Far Eastern Republic							300								
Greece in Asia							154								
Hojas, Arabia, etc.			9	35,857			7,983			189					
Hongkong							2,565	6,144	190	1					
Japan			50	25,000	17	15,840	40,454	11,808	3,303	1,670					
Palestine and Syria	4	7,701	2	1,150	45	25,789	6,631	4,671	1,533	1,860					
Persia					1	500				62					
Siam			2	2,500			1,379			1					
Australia			19	33,786	83	65,456	31,526	7,153	324	28					
New Zealand			2	2,959	16	17,933	15,489	19,937	119	110					
Other British Oceania					191	155,672				5					
Other Oceania							675			1,359					
Philippine Islands			7	5,037			558			26					
			3	2,750			11,658	31,385	1,390	2,906					
Africa															
Belgian Congo										1					
British West Africa	5	4,556	1	808			2,862	1,168	121	10					
British South Africa	1	3,000	83	96,296			32,436	22,409	643	16					
British East Africa			16	15,478			1,756	8,261	530						
Canary Islands			11	9,977			3,773	5,136	675						
French Africa			2	882			7,276								
Morocco					2	912	350								
Portuguese Africa	1	565		520			1,086			3					
Egypt	3	1,311		27,269	54		11,025	10,723	136	15					
Total	254	\$244,669	341	\$510,427	1,791	\$1,621,471	538	\$331,170	\$2,703,002	\$1,239,589	\$71,530	\$136,149	\$21,074	443	\$115,271

ward. The following compilation, however, made up from the October totals of cars, trucks, parts and tires, will show the relative standing of the leading automotive purchasers.

Canada .....	\$1,226,397	Cuba .....	\$262,381
England .....	956,627	India .....	248,263
Mexico .....	561,105	France .....	203,846
Argentina .....	506,082	Japan .....	149,298
Denmark .....	408,968	Dutch East Indies....	145,944
Brazil .....	392,754	Netherlands .....	129,384
Australia .....	298,211	Spain .....	127,603

The total value of the October foreign trade on cars, trucks and parts was \$5,410,739,\* with an additional \$1,447,268 on tires. No month of the entire year, except January, has shown a larger value of tire shipments than October. June, July, August and September were each exceeded by the value of the car, truck and parts shipments.

Analyzing the figures somewhat further, the detailed information in the accompanying table shows that the Spanish and Portuguese-speaking countries contributed much in running up the surprisingly high totals. In each of the major products these Spanish and Portuguese countries were responsible for from 30 per cent to more than 50 per cent of the total, the comparisons being:

	Cars		Trucks		Parts	Tires
	No.	Value	No.	Value	Value	Value
Spanish-Portuguese†	822	\$638,435	294	\$413,765	\$700,600	\$461,995
World total.....	2,229	1,952,641	595	755,096	2,703,002	1,447,268

To complete the study of the October figures it is necessary to consider also the financial and economic aspects of the various countries. An analysis of past business is of no value unless it points the way to the future or reveals something of present value. The October business is past, but what does it show for to-day and to-morrow?

The international political, economic and financial situation is vastly different to-day than it was in September and October, when orders for the latter month's shipments were placed. The Irish problem, fraught as it was with such grave dangers for the peace of England, Europe and the world, has been settled, or is in an immediate way to be settled. The Washington conference is

arriving at an international understanding that will be of lasting benefit to every country. France and England are reported near an accord on European problems, and Germany, according to the latest newspaper reports, will pay the next indemnity installments due early in 1922 and then will be accorded a three-year moratorium, with stoppage of the printing presses and a consequent stabilization of her finance. None of these things and many others had come about, or were in immediate prospect, to show the foreign buyer in September and October that more settled conditions were in the offing. To-day they are signposts along the road to international stability and a return of world-wide prosperity.

What has been the result? At the beginning of October the British pound sterling was quoted in the United States at, roughly, \$3.73, with automotive exporters declaring that should it reach \$4 (less than 20 per cent below par) they would be assured good business to all of the English dominions. As this article is written, in the second week of December, the pound has climbed upward to \$4.08,\* and some financial publications are talking about its further increase to \$4.25. French exchange is pointing upward, and the currency of Spain has progressed so much since October that now it stands at a record height for the year. All of the other neutral countries of Europe are appreciably higher in the foreign exchange markets, and Germany has passed "Black Thursday," with all that it may mean to international finance. Some South American currencies are quoted higher or have reached a certain stability that will enable her importers and dealers to gage their future business and handle it with less fear of violent fluctuations. The same is true of the Far East, and this betterment, in all except a few countries of the world, is borne out by the weekly and monthly cable and mail reports of trade associations, banks and governmental agencies.

Export managers and executives are determining now their sales and production policies for the coming year. Upon the analysis made of the present evidence must depend their decisions and none of the factors shown here should be overlooked.

\*Hawaii, Alaska and Porto Rico not included.

†Porto Rico not included.

\*Sterling exchange touched \$4.24 on Dec. 12, standing then just 12 per cent below par.

## Cracking Increases Gasoline Production

IN a recent issue of the *Wall Street Journal* it was said that in the first eight months of 1921 gasoline produced in American refineries represented in quantity 28 per cent of the crude oil run to stills, compared with only 13 per cent in 1915. The percentage has increased gradually each year, but has been accompanied also by a decrease in volatility.

Gasoline became the chief product of crude oil in 1915 in value. In 1918 the value of gasoline produced equalled that of all other products combined. Its value totalled \$684,000,000. Since 1918 it has become an increasingly important factor, until now the gasoline market goes a great way toward determining the status of the oil industry as a whole.

During the early part of 1921 the oil industry suffered a decided slump. Consumption of oil products here, with the exception of gasoline, was unusually low. Exports of all products, including gasoline, fell off considerably, but gasoline consumption in the United States continued active. This fact has played a large part in the current recovery in the oil industry.

The steady increase in consumption of gasoline in this country is in line with the gain in number of automobiles in use. It is estimated that 90 per cent of the cars in use are in the United States.

Domestic production of gasoline has increased four-fold during the last six years. Consumption has increased to a corresponding degree. The following table shows in barrels the production in the United States, domestic consumption, exports and percentage of gasoline to crude run through refineries by year since 1915 (giving first eight months of this year):

	Production	Domestic consumption	Exports	Gasoline produced to bbls. crude run in U. S.
1st 8 mos., 1921..	81,542,000	70,269,000	8,766,000	28%
Year 1920.....	116,251,000	101,343,000	15,633,000	27%
" 1919.....	94,235,000	81,781,000	9,098,000	26%
" 1918.....	85,007,000	74,512,000	12,538,000	25%
" 1917.....	46,719,000	34,783,000	9,902,000	21%
" 1916.....	49,021,000	27,087,000	8,473,000	19%
" 1915.....	31,755,000	26,077,000	6,943,000	13%

# The Sales Promotion Movement of the A. E. A.

Some of the methods adopted in the campaign to increase sales of equipment might apply to other branches of the automotive industry. "Ask 'Em to Buy," is the slogan of the movement which includes educating all the salesmen in the business. Success will mean increased factory output.

By Neal G. Adair\*

THE automotive industry has been made the laboratory for an experiment in merchandising which is going to attract constantly widening attention as it progresses. It is the sales promotion movement of the Automotive Equipment Association, which is only half a year old, but which already has made its influence felt in half the American states and several Canadian provinces.

The movement is unusual in that it is a joint undertaking by manufacturers and wholesale distributors of a group of products. The object, of course, is to build the businesses of both manufacturers and wholesalers by broadening the market for these products, a process which brings into the plan the thousands of retail agencies which furnish the industry's points of contact with the consuming public—automobile and truck dealers, garagemen, repairmen and equipment dealers.

Necessarily the basis of the plan is education. Obviously the focal point for the application of the educational process is the point of contact with the consumer. If the retailer is a better merchant he will sell more goods to the consumer and the wholesaler and manufacturer will benefit along with the retailer. But the sales promotion organization has not made the mistake of trying to "uplift" the retailer. It has studiously avoided any implication that it was going to do something to him. More than that, the sales promotion leaders have put the manufacturing and wholesaling elements of the industry on record as confessing that they need merchandising education as well as the retailer. Confession is not only good for the soul, but it makes friends for the confessor, and the A. E. A. has got away to a flying start in its newest and greatest work because it has made the retailer a partner in, rather than a mere object of, the better merchandising campaign.

## Campaign Working on Salesmen

Manufacturers' salesmen doing missionary work in the wholesale and retail field, jobber salesmen and retailers and their salesmen are primarily the subjects upon which the campaign is working, but even the manufacturer and the jobber have been included as needing education—and they are getting it.

This article will attempt to tell something about the methods by which the sales promotion campaign is being worked out. It will suggest some possible applications of the sales promotion idea to the automotive industry in general.

\*Editor *Motor World*.

The sales promotion organization has hit upon two things which have attracted attention to its work, humanized it and popularized it. One is a slogan; "Ask 'Em to Buy" is the campaign watchword. The other is a string of numerals after a dollar sign, which he who runs always reads and wonders how many he can corral for his own pocketbook; \$250,000,000 is set up as a year's business for the industry to aim at.

## A Gratifying Response

There is more than a slogan in "Ask 'Em to Buy." The manufacturer and jobber have spent years urging retailers to sell. The retailer has sold some, mainly what customers asked him to sell and sometimes a little more, but largely he has been answering injunctions to sell by inquiring how. The answer is "Ask 'Em to Buy," and there has been a gratifying and somewhat surprising response to this information by dealers and garagemen who have been selling cars, repairing cars and garaging cars and, through force of habit, stopping there while automotive equipment collected dust on their shelves until people asked them for it. The slogan by no means is all there is to the campaign, but it furnishes something to talk about and center interest in, and a practical yet human motion picture has been built around the phrase as one of the chief tools for doing the work of the campaign.

As for the figures, they represent sales of \$25 worth of automotive equipment per year to each of the 10,000,000 cars in the United States and Canada—a potential market of \$250,000,000 for the campaign and the industry to aim at. This is just a rough estimate, but it is something definite to talk about.

The campaign organization and methods are simple. We have become so used to finding a ponderous "secretariat" connected with almost everything in the way of organization that it is refreshing to discover that the staff which has undertaken extension of sales promotion in the equipment field all over the United States and Canada has only four members. There is the merchandising director, Ray W. Sherman, an assistant and two secretaries. They constitute the entire paid organization. In general supervision is a committee of five members of the association, serving without pay.

This leads to the question—Who is doing the work? The answer is as refreshing as the discovery of the smallness of the staff. The industry is doing the work. There are to be in this undertaking no hundreds of thousands of dollars spent on field workers and propaganda. The automotive equipment industry is organizing itself to do its own work of broadening the outlet for

its products and increasing the profits made from them. The ultimate goal is to make every manufacturer and jobber sales executive a promoter, through his executive position, of the educational work of the campaign, and to make every manufacturer's and jobber's salesman an active educator, carrying to retailers the story of the campaign with its admonition to "Ask 'Em to Buy" and its information as how this can be done.

The association could have spent upward of \$100,000, perhaps more, on an army of field men who might have been able to reach each of the retailers once within a year with the sales promotion story. The story would have been told once and by a man whom the retailer did not know nor trust. Instead it is training the jobber salesmen and those of the manufacturer who come in contact with retailers to deliver the message. They will deliver it many times within a year and the delivery will be made by men known and trusted by the retail trade.

### Relaying the Message

The merchandising director is touring the country, presenting the sales promotion message in person as rapidly as possible to territorial groups of jobber salesmen and manufacturer salesmen whenever the latter are available. Jobbers and their sales managers who have heard the story are using the prepared address of the department to present the story in territories which the merchandising director has been unable to reach. The jobber salesmen, in turn, are carrying the message in person to their customers. In addition, there is a supplemental work in the appearance of the merchandising director, jobbers and salesmen before dealer meetings. The organization of state vice-presidents of the A. E. A. is handling the details of the work, territory by territory, arranging meetings of jobber and dealer groups. And always reinforcing the spoken word is the "Ask 'Em to Buy" film, which has been duplicated several times and which will go the rounds of the various distribution territories until the entire trade has watched it unfold the story of the jobber salesman who showed a garageman the profit opportunities in automotive equipment merchandising and demonstrated how they could be turned into money in the cash drawer.

The campaign is presenting to the trade practical, concrete information about successful methods of advertising, displaying, demonstrating and selling automotive equipment. Details are not necessary here.

The enthusiasm with which the A. E. A. membership, manufacturers and jobbers, recommitted itself at the November meeting to the sales promotion movement inaugurated in mid-summer promises country-wide co-operation of a nature that gives the headquarters staff, small as it is, a little more than an even chance of accomplishing its task.

### Will Aid the Industry

The enthusiasm of the membership is not difficult to understand. There is nothing philanthropic about the campaign. It won't hurt the motoring public, which is being asked to buy only tried and proved equipment which will improve the operation of its cars. It will help manufacturers, jobbers, retailers and their employees, which is fundamentally the only reason for the campaign, a selfish reason and, when all is said and done, the only kind of reason that will hold men and corporations together in any sustained co-operative effort.

The campaign is not wholly without propaganda, or something that approaches it. For the manufacturer and jobber, members of the A. E. A., there is a merchandising department in *The Leader*, bi-weekly organ of the

association. For the manufacturers' and jobbers' salesmen there is a bi-weekly merchandising organ, *The Automotive Equipment Merchandiser*. For the retailer there is an illustrated book of 32 pages on automotive equipment merchandising. These publications go only to people who will use them. A. E. A. members naturally follow *The Leader* issue by issue. Their salesmen get *The Merchandiser* regularly through their sales managers. Dealers receive the merchandising book only after they have become sufficiently interested in the campaign to ask a jobber salesman for a copy, and then they have to pay 15 cents for it. In addition there is the "canned" address for meetings, which headquarters sends out to jobbers or their salesmen who ask for it to use in their territories.

Briefly, this is the story of the sales promotion movement, which has drawn some observers from outside the industry. It is a plan particularly applicable to an industry comprising many products of many manufacturers marketed through wholesale distributors and retailers, who, in turn, handle a diversity of products, some represented in the association, some from outside. There is none of the exclusive element which prevails in the distribution of automobiles. But there are features of the campaign which deserve the study of the automobile industry.

### Adaptability of the Plan

Chief among these is the education of traveling salesmen. The automobile field employs this class of workers: territorial men for manufacturers and branch houses or distributors. Dealers generally concede that these men, particularly the factory travelers, are working along more intelligent lines than they were a few years ago. Not so many of them breeze into distributor's or dealer's office as formerly with two questions on their tongues: "How many cars are you going to take this month?" and "Where is the party to-night?" But not enough of them yet are capable of helping distributors, dealers and their sales staffs broaden their knowledge of the car they represent and the means of selling it. Not enough of them can answer a dealer's questions nor prompt him to ask questions about the reasons for the latest changes in the design of the car. Not enough of them can go down the street with the dealer and help him convince his banker of the essentiality and stability of the automobile business and his business. Not enough of them have the understanding to grasp the fundamentals of their dealers' problems and take back to the factory a story of those problems that would assist the factory in appreciating the dealer's situation and helping to make it more bearable.

The passenger car industry needs merchandising education in manufacturing and dealer establishments. It needs more origination of merchandising ideas in factory sales organizations. It needs men, possibly a re-educated set of travelers, possibly an entirely new class of men, to take these ideas to the wholesale and retail field.

Perhaps the passenger car industry can see in this work of the Automotive Equipment Association, which is trying to educate the retailer by first educating the sales representatives of the manufacturer and wholesaler, an idea which can be adapted to its own predicament. It may be an association job or possibly a job for individual manufacturers or groups of manufacturers under kindred ownership or control.

The Automotive Equipment Association is applying sales promotion not merely to equipment, commonly called accessories, but to re-equipment or replacement products and to shop equipment and tools. The entire process is educational. It is worth watching.



# Marketing Costs Determined by Many Factors

An analysis of these factors, together with a close study of methods of elimination of observable waste will enable the business man to concentrate his efforts along a higher plane of efficiency. A definition of the major terms and variations covered by the single term of merchandising.

By Harry Tipper

**I**N the study of marketing fundamentals it is necessary to arrive at a definition of what is meant by marketing, and also what are to be observed as factors of its cost, with a definition of their meaning, so that some basis of calculation may be established.

Marketing, distributing, merchandising, selling, advertising and similar terms have acquired a more or less indefinite meaning, so that some of the factors are similar in all examinations, but the practice of definition varies to such a degree that it is impossible to lay costs side by side under any one of these headings and make a comparison which will be effective.

Items that are to be included in advertising depend upon the practice of the individual concern, and a similar condition prevails in selling.

The term merchandising, as also the term sales promotion, covers a multitude of variations in the practice and the considerations of cost.

The student of marketing who endeavors to discover the avoidable wastes and compare their cost with the total cost, finds himself hampered by the lack of any practical standards and definitions which would give him a basis of final consideration.

It is possible to indicate some of the elements of analysis that should be a part of the examination of the marketing developments, and these, together with the definitions of the major terms, provide a basis for reconsideration of the marketing which will enable the business man to eliminate some of the more observable wastes and concentrate his efforts along a higher plane of efficiency. In these articles the definitions of the terms will be as follows:

- 1—*Marketing*. The word *marketing* will be used to designate the actions necessary to transfer the goods from the factory door to the user.
- 2—*Distribution*. The word *distribution* will be used to indicate the physical requirements of transportation, storage, handling, etc., connected with the physical transfer of the goods.
- 3—*Selling*. This term will be used to designate all those operations necessary to the transaction of securing an order by the personal contact of the salesman and buyer.
- 4—*Advertising*. This term will be used to denote those operations necessary to effective selling conducted with buyer of product by means of paper and ink.

- 5—*Sales Research*.—This term will be used to denote those operations devoted to the more accurate analysis of markets, the consideration of new markets and the coördination of the product with the market; in other words, the accumulation of accurate information as to sales necessities.

Sales promotion will be dispensed with altogether. This term relates either to advertising, selling or to sales research, and does not describe a function in marketing at all.

In effect, the marketing necessities are divided into the following groups which accord with the definition of the term:

- 1—The goods must be actually transferred from the point of manufacture to the point of use, and this transfer represents the physical distribution.
- 2—The buyer of goods must be convinced of their usefulness and their application to his work. Part of this work is done by the individual method of personal selling, corresponding to the work of the individual handworker who makes the product.
- 3—Part of this work is done by the advertising, which makes no attempt to individualize the operation, but rather takes advantage of the economy of mass work, in order to lessen the amount of work to be done by the individual units. Selling is an individual matter; advertising is a mass operation and is really selling in the mass.
- 4—Sales Research represents the laboratory, where the value of the operations, the objective of the operations, the efficiency of the operations may be determined in their possibilities.

All these groups of operations function in a complementary manner.

The work of distributing and marketing the goods consists of a number of related individual operations. With the exception of the physical distribution, the actual operations themselves are concerned with more or less intangible developments, so that their values remain controversial and subject to many variables.

The whole business of selling and advertising is concerned with the intangible necessity of persuading the buyer to direct his buying to the particular product. A good many operations are necessary to complete this work, and the number of elements included in the work makes

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**M**ARKETING costs are not hypothetical. The graveyard of business is filled with the buried remains of those organizations who have been misled by improper sales research, careless of their sales and advertising efficiency and apparently without knowledge of the factors that make up their total cost and how they can be governed.

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it difficult to measure the exact value of each of the subordinate operations in their influence upon the total sale.

What is the value of a salesman's call in the total array of operations he must go through in order to make a sale which the company can accept?

How far is a salesman justified in calling upon all possible users or customers without respect to their buying power and consequently their ability to purchase?

What is the minimum limitation upon the number of calls a salesman should make, as well as the maximum?

These matters all depend upon psychological averages in the final analysis, and therefore the practice of estimating them has come mostly out of traditional development and not out of the attempt to discover their relative importance.

The same thing is true in advertising:

What is the value of reaching a subscriber to a publication?

What influence is exerted upon him by the character of the message?

What are the limitations of reading attention and how do they affect the value of the advertising or its efficiency?

Why do people observe only one or two things out of a thousand that pass the vision?

How do we know in what category our advertising is to be placed?

To what extent does a visible indication of interest by inquiry or other form represent the actual effect of a piece of advertising copy?

These matters again are dependent upon human reactions, and consequently they have been assumed largely because of tradition. Little attempt has been made to determine and analyze scientifically the character of the average reaction and how we may expect to meet it. One promotion letter has been known to exceed in value another promotion letter by 1000 per cent.

What were the factors that made up this difference in efficiency and how many of them could be controlled by the writers of the letters?

These are all elements of marketing cost. Every call that is made, usually by a salesman, must be paid for. Every effort of his work that is not properly directed adds to the cost of his actual production. Every element of the office system, supporting and coordinating the sales work, that is not valuable is inefficient and must be eliminated sooner or later. Every piece of promotion matter sent through the mail that finds its way into the waste basket of the recipient adds to the total cost of effectiveness in that department. Every advertisement issued in a publication which does not interest the right people at the right time adds its cost to the sum total. Each research into marketing that is based upon insufficient statistics or improper examination of the factors not only adds its own experimental cost to the result, but may

lead the sales and advertising work into unproductive and costly channels of experiment.

It is not as though these items of cost were hypothetical. The graveyard of business is filled with the buried remains of those organizations who have been misled by improper sales research, careless of their sales and advertising efficiency and apparently without knowledge of the factors that make up their total cost and how they can be governed.

Tradition has operated to produce more methods of sales organization and more methods of advertising and sales research expenditure than all the analyses of marketing put together. What the competitor is doing and what the trade has done in the past remain the first and most important questions when a new sales problem is confronted and organization budgets or changes are considered.

This is not analysis. No engineering development would have taken place on that basis alone. The past history and the competitive history is of importance only as it provides a basis for analytical consideration and improvement.

This basis cannot be secured entirely from these sources. Further research, further careful consideration of the individual factors and a careful arrangement of their cost consideration is necessary.

Even after this is done, however, the value of these motions depends very largely upon a knowledge of the principles which govern the action of the buyer and the particular reasons for the direction of his buying activity.

Furthermore, the analyst must beware of assumptions that have been accepted merely because they have become the usual practice.

Not so very long ago a friend of mine, in describing his experiences over a period of years in the deserts, referred to the fact that he had ridden about 7000 miles on camels at various times. One of his hearers asked him if he was not very sick at first, although he supposed that he got used to it. The explorer replied that the ordinary camel had a very easy motion. He did not know how the impression of sickness had arisen, except that Herodotus had spoken of it and that probably every authority since then had copied Herodotus' statement.

There are many assumptions in marketing having as little basis of fact as the effect of camel riding in this story. Those assumptions are accepted just as readily—in fact, quoted just as firmly.

So long as these traditions are included and much of the so-called analysis of the market accepted without question, marketing efficiency will increase very little and the cost of marketing will continue to increase.

In order to determine the factors of marketing cost, it is necessary that the principles of marketing be thoroughly understood. These can be discussed upon the definitions considered in this article, and further articles will enlarge upon these principles.

## Eliminating Waste in Industry

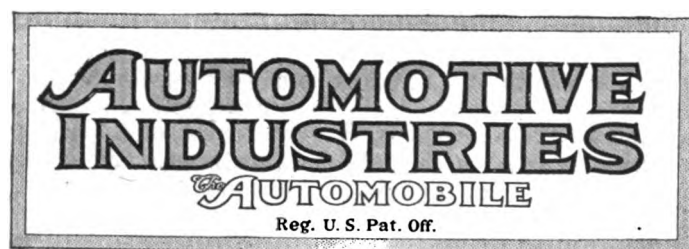
**A** REPORT of the Committee on the Elimination of Waste in Industry of the Federated American Engineering Societies has been embodied in a book that has recently been published. This book contains a complete statement as to the aims and purposes of the committee and a description of the way in which it went about conducting the investigation.

Secretary Hoover of the Department of Commerce, in his foreword to the book, that "it contains a message for government officials, financial, industrial and commercial

leaders, labor organizations, economists, engineers and research groups, the general public and the press."

In a general review of conditions the report places a high percentage of waste at the door of management and declares that the average management is much below the standards set by certain individual executives who have achieved notable success. The labor problem is also entered into thoroughly.

The book, which is entitled "Waste in Industry," is published by the McGraw-Hill Book Company, New York.



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## Export Cooperation

ONE of the most significant announcements that has come before the automotive industry in recent months is that the export managers of the National Automobile Chamber of Commerce will consider, at their annual New York meeting in January, a plan for combined merchandising and sales efforts to develop our foreign trade in passenger cars and motor trucks. The fact that such a plan is even in prospect should stir the industry to a careful study of the possibilities and opportunities for enlarging, through combinations of the producing companies, the sales abroad of American-made automotive products.

The foreign trade department of the N. A. C. C., unfortunately, has not seen fit to make public the details of the proposed movement so that it might be analyzed by company executives and export managers in advance of its consideration at the annual meeting. However, it is apparent that the plan involves a grouping of various companies, under the Webb-Pomerene law, for cooperative effort in building up sales outside of the continental limits of the

United States. Several forms of combinations are possible under this law and whichever one is chosen would seem to insure, at least to a majority of the companies, stronger and more intelligent foreign trade representation than they have formerly had.

The Webb-Pomerene law has been on the statute books for some years and its provisions, which permit competing companies to band together for common activities in fostering foreign trade, are fairly well known to every exporter. Numerous combinations of this sort have been organized and, according to reports, have functioned very satisfactorily to their members. Mainly, they have consisted of companies producing raw materials, such, for instance, as coal, grain, etc., but some have been for the sale of semi-manufactured or manufactured articles that are analogous to automobiles. These have been of factories producing steel and iron products, railway locomotives, textile machinery and other highly competitive lines and these combinations have been so successful as to make probable a similar success in the automotive field.

## Developing Commercial Aviation

THE prospects are growing brighter for the establishment of a government Bureau of Aeronautics as provided for in the Wadsworth-Hicks bill now before Congress. President Harding in a recent note to Congress says, "I urge upon the Congress the advisability of giving heed to the recommendations of the Committee, the first and most important of which is that a bureau be established in the Department of Commerce for the regulation and development of air navigation."

This note of the President's referred to the general recommendations of the National Advisory Committee for Aeronautics which recommended a Bureau of Air Navigation similar to that proposed in the Wadsworth-Hicks bill.

The development of commercial aviation in the United States has been disappointingly small. The passage of this bill would mean a definite step in promoting its further growth and advancement. It is encouraging to have this definite favorable opinion from the chief executive.

## Unit Production Costs

HARD times, with the accompanying evil of unemployment, place the employer in an advantageous position as regards dealing with his workers, when industrial relations are viewed as a matter of balance of power. In another sense, however, the employer is in a less advantageous position.

Business depression brings with it the necessity for reduced manufacturing expenses, lower prices, and, consequently, for decreased production costs per unit. The attitude of the individual worker toward his work is an important factor in bringing about lower cost per unit. Overhead expense, cost of materials, etc., affect that unit cost materially, of course, but the individual worker has it within his power to influence it considerably.

Thus the manufacturer who looked ahead during boom times, who sincerely attempted to adjust his industrial relationships fairly and intelligently has been able to cash in on those efforts during the recent business depression when he was most in need of the effective co-operation of every man working for him. A certain amount of increased efficiency has accrued to every manufacturer through fear of unemployment, but employers such as those referred to have benefited more fully. They have gained, not only the general increased efficiency, but have preserved the good-will and enthusiastic co-operation of their workers through a difficult period of necessary wage reductions. All this is a distinct manufacturing advantage at the present time and, in addition, is a sound basis upon which to rebuild an organization as business picks up.

## Taxes and Industry

**F**URTHER revision of internal revenue laws, as suggested by President Harding in his message to Congress, warrants thorough study by the automobile industry. One of the chief stumbling blocks to the extension of the industry is the excessive taxation to which it is subjected under Federal, State and municipal laws. The principal objection is against the excise tax, which has been aptly styled a "stigma" tax. A determined effort will be made to bring about an equitable adjustment during this session. However, there are other taxes which are burdens to the trade. The new tax law, which becomes effective Jan. 1, 1922, carries an increase in the flat tax on net corporate income, making the rate 12½ per cent. At a glance this rate appears reasonable, but the attitude changes when it is considered that there is a capital-stock tax which amounts to approximately 2 per cent of the net income. The Secretary of the Treasury is not pleased with this form of assessment which he believes to be detrimental to persons engaged in productive business.

Practically every organization in the automobile trade is carried on under a corporate form and the net income in most cases is distributed in dividends. These dividends are subject to a surtax in the hands of persons receiving them. The owner of stock in an automotive corporation subject to a surtax of 10 per cent would in reality pay about 25 per cent to the Government. The flat tax on net corporate income and the capital-stock tax amounts to at least 15 per cent, and in addition there is the 10 per cent as a surtax on dividends. Larger stockholders subject to a 50 per cent tax would be taxed about 65 per cent on such profits.

## Larger Diecastings

**A** PROGRESSIVE manufacturer of diecastings recently informed us that he expects, within a comparatively short time, to make diecast gearboxes for passenger cars. He is already making gearboxes for washing machines, castings which weigh about 11 lb. each, and considers it but a short step to make a slightly larger box, suitable at least for the smaller passenger car.

Inasmuch as most diecastings require little or no machining—that is, are practically finished when they come from the die—a possibility of this kind should not be overlooked by those manufacturers who are interested in quantity production at minimum cost.

The diecasting industry has not stood still, content with confining itself to the manufacture of small parts and fittings, but has been developing its processes until to-day it is producing thousands of parts, considered almost beyond the bounds of possibility in the diecasting field but a few years ago. There are still, of course, certain limitations, but many of these are being overcome by the use of improved diecasting machines, better alloys, more durable die material and the intelligent use of metallurgical and other research facilities. The possibilities of future development seem to be still greater than they were thought to be a few years ago.

## The Underpan

**T**HE majority of cars other than the Ford have an underpan beneath the engine and gearbox, the object of which is to protect the lower parts of these mechanisms from splashing mud. It accomplishes this object quite well, but it has so many disadvantages that it is a serious question as to whether or not it is worth while to thus protect the parts mentioned. What difference does it make, after all, whether mud cakes on the bottom of the crankcase or on the bottom of the mudpan? European engineers seem to have reached the conclusion that the disadvantages of the device overbalance its advantages and have begun to discard it.

Perhaps the greatest objection to the underpan is that it gets exceedingly dirty, even more on the upper than on the lower side. It is practically impossible to make the crankcase absolutely oil-tight, and any oil that leaks out through the bearings or joints drops into the underpan and there soon collects enough road dust to make a sticky mass which covers the whole inside bottom of the pan. If any oil is spilled in replenishing the crankcase supply it also runs into the underpan. The pan, moreover, renders the crankcase draining plug cap or cover plate less accessible and adds to the difficulty of an already irksome job. In many cases the pan lies so close to the oil pump of the crank chamber that in case any small parts, such as nuts, studs, etc., drop into it, it is almost impossible to get them out again. A greater space between the two parts is not permissible as it would inordinately reduce road clearance.

It is, of course, most desirable to protect the accessories located at the sides of the engine against splashing mud, flying stones, etc., and this can be readily accomplished by the use of either integrally cast webs between front and rear supporting arms or by filler plates of aluminum or steel sheet which fasten to the flanges of the frame side members and of the engine at the parting line of the crankcase. Such a construction makes a much neater job than that usually obtained with the underpan, and eliminates the pit into which small articles almost invariably drop when it is attempted to remove them.

## Manufacturers Look to January Trade

Are on Solid Foundation Ready  
to Meet Keen Competition  
in 1922

Production of passenger automobiles and trucks in the United States for October by companies representing more than 90 per cent of the output of the industry was approximately 150,000.

The estimated total production of cars and trucks for November was 118,000.

NEW YORK, Dec. 13.—Motor vehicle manufacturers have adopted a conservative attitude, pending developments after the turn of the year, and the output for December will be the lowest of any month since the tide turned at the end of February. This is the usual seasonal condition, however, and not in any sense surprising. Inventories Reduced

All manufacturers are preparing, however, for an upturn with the New York show the second week of January. They have gone into the market for the purchase of parts and supplies on a moderate scale so they will be prepared to meet the demands of their trade. As the year nears its end it is gratifying to note the very substantial reductions which have been made in inventories, especially by makers of passenger cars. Nearly all of them have taken their losses and are in position to go ahead on a solid foundation in an era of exceedingly keen competition.

### Important Announcements Expected

The slowing up in production this year has been delayed much longer than was generally expected, especially in view of the unusually large number of important announcements which are expected at the big shows. It is probable the number of new models which will be displayed for the first time at the New York exposition will establish a new record. They also will embody greater value for the money and will evidence a determination on the part of engineers to keep down maintenance costs in the way of fuel and servicing.

Reports of combinations, especially in the parts and truck fields, are becoming more definite, and announcements are expected in the near future. It is probable the next few months will bring important changes in the automotive map. One of the

## FORD PLANS PURCHASE OF PLANT IN GERMANY

DETROIT, Dec. 12.—A factory in Germany, for the manufacture of automobiles for German, Russian and other western European fields, is being planned by the Ford Motor Co. Charles E. Sorensen, a member of the Ford organization, left for Germany a fortnight ago. At present he is in London, following a visit to the Ford plant at Cork, Ireland. He will start for Germany within a few days, according to information here.

The present plan provides for the purchase of a large plant in Germany and conversion of it into a Ford factory. Announcement as to the size of the plant and output and number of employees is withheld at this time.

most important of these impending announcements relates to a plan under which some of the most important unit parts makers will group themselves together for the establishment of service stations and substations at strategic points. A second combination of this character is under way.

Predictions that November shipments would exceed those of the same month last year proved correct, and they ran over the mark by approximately 10 per cent. Another gratifying point was that they fell off less than last year in comparison with October.

Production in January probably will be expanded by new and reorganized companies which will be getting under way by that time on something of a quantity basis. Among the newcomers in the field, Durant expects to be turning out at least 200 cars a day by January 1.

## Willys-Overland Ships Two Trainloads of Cars

TOLEDO, Dec. 10.—Two trains left here yesterday for Atlantic and Pacific coasts each carrying Overlands and Willys-Knight cars to dealers. The value of the shipments was placed at \$1,275,000.

The shipment to the East sets the record for automobile shipments for the year. It is the largest trainload of automobiles hauled in 1921. The train consists of 100 cars and in them are 615 motor cars for New York, Boston and Philadelphia. The value of this load was \$875,000 and freight charges alone amounted to \$58,000.

The Western shipment contained 80 cars carrying 281 Overlands and 109 Willys-Knights valued at \$400,000.

## See Administration Support of Sales Tax

Attitude Taken by Mellon May  
Mean Broad Extension of  
Excise Levy

WASHINGTON, Dec. 12.—Indications that the Administration is preparing to swing its support to a manufacturer's sales tax is found in the annual report of A. W. Mellon, Secretary of the Treasury, in which he outlines his views on revenue reforms for the next fiscal year.

In discussing recommendations for a reduction in the surtax rates, Mellon says:

"If this loss of revenue could not be met by rigid economy in expenditure, the revenue required could be raised either by placing a tax on certain specific articles, or by a low-rate general tax on a broad class of articles or transactions.

"Such taxes as those now imposed on automobiles and tires have been found simple and inexpensive of administration and the collection is always substantially current; they have been steadily productive of revenue and have been without injurious effect upon the country.

"In view of past experiences, a general tax either of this or like character upon a broad class of articles or transactions could be readily administered; and the rate could be made sufficiently low as not to bear unduly upon any class and at the same time produce a large amount of additional revenue."

### Smoot Hopeful

If this proposal is adopted it probably will mean the elimination of the obnoxious excise taxes which the automotive industry now is paying while almost all other important industries have been exempted.

Senator Smoot, who is the foremost advocate of the sales tax, told AUTOMOTIVE INDUSTRIES to-day that until he had read Secretary Mellon's report carefully he would not venture an opinion on it. He added positively, however, that "a sales tax is coming."

"I wouldn't go so far as to say it would come at the present session, but once adopted I know it never will be dropped."

### Most Easily Applied

Senator Smoot said the manufacturers' sales tax was the form most easily applied and that it would be as good as any. He does not believe the revenue raising possibilities of a sales tax should be applied for a soldier's bonus, but that when a bonus plan is adopted, as it undoubtedly will be at this session, a specific appropriation should be made by Congress to provide for it.

### SHORT DRIVEAWAY MADE

NEW YORK, Dec. 12.—One of the shortest driveaways on record here took place when the Poertner Motor Car Co., New York distributor, took away 50 cars from the Long Island City plant of Durant Motors.



## Meyer Will Address Export Convention

Asked to Discuss Aid That War  
Finance Corporation Can  
Give Industry

NEW YORK, Dec. 12—The tentative program of the export managers' convention of the National Automobile Chamber of Commerce, to be held in New York on Jan. 10, during show week, names the speakers as Eugene Meyer, Jr., director of the War Finance Corp.; S. T. Henry of the Allied Machinery Corp., a representative of the United States Bureau of Roads; Gordan Lee, chief of the automotive division of the Bureau of Foreign and Domestic Commerce, and G. F. Bauer, secretary of the N. A. C. C. foreign trade committee. In addition, several topics of immediate importance are named for discussion by the attending export managers and factory executives.

Meyer has been asked to discuss how the War Finance Corp. can aid in financing foreign shipments of automotive products, and Henry will tell what the American exporter can do in promoting road construction in Latin-America. The representative of the Bureau of Roads will discuss governmental assistance in road building, and Lee will take up the work that the new automotive division is doing in aiding the industry in building up foreign sales.

The talk by Bauer will be the presentation of a plan for consolidation under the Webb-Pomerene law of the export activities of all N. A. C. C. members. Although the plan has not been made public, Bauer has worked out an organization that will be put up for consideration and action.

The topics to be discussed are:

What should be done to create and protect good will for American automotive products shipped abroad?

What can be done to obtain more intensive distribution of American motor vehicles in foreign countries?

What uniform practice should be followed by manufacturers with regard to requests of foreign dealers for omission of certain standard equipment?

## Kraus Engine Taken Over by Fuel Oil Motors Corp.

NEW YORK, Dec. 12—The Fuel Oil Motors Corp., a New York corporation, has taken over the business of the Kraus Engine Co., which holds a controlling interest in the Kraus Auto Oil Motor Corp. This latter concern is developing the Kraus fuel oil engine for marine and similar purposes.

The principle on which the Kraus engine works is substantially as follows: In a four cylinder engine, for instance, two of the cylinders constitute an air compressor, the air from which is fed into a crude oil burner of the spraying type. The combustion chamber of this burner is of L shape and is water jack-

## DEALERS CONDEMN USED CAR BONUSES

NEWARK, N. J., Dec. 12—The board of trustees of the Newark Automobile Trade Association has adopted a resolution in which it asserts that the automobile business throughout the country is being harmed to a considerable extent by the practice of certain manufacturers in offering special bonuses to be used as additional discounts when trading in used cars.

The resolution states that investigation shows that these special bonuses are exerting a demoralizing influence, and as a consequence the custom is "most heartily condemned" by the association. Copies of the resolution will be sent to every motor vehicle manufacturer in the country with the request that these bonuses be discontinued so that business conditions may be more quickly stabilized.

eted. At the end of the combustion chamber farthest from the fuel nozzle, water which has been preheated by the exhaust is forced into the burner and is converted into steam by admixture with the hot gases of combustion.

This mixture of steam and gases of combustion is used expansively in the two remaining cylinders. The exhaust consists mainly of steam which, of course, can be condensed. Unusual economy of operation is claimed, due to the use of a fuel selling at a very low price. The speed and power of the engine are controlled by a throttle valve in the passage from the burner to the engine inlet valves. The two power cylinders operate on the two stroke principle, every down stroke being a power stroke.

## Barco Battery Changes Methods of Distribution

DETROIT, Dec. 12—Barco Battery Co. has made a complete change in its distribution methods and in the future will handle its sales through permanent district managers who replace the former factory sales representatives.

The following district managers have already been appointed: Alvan W. Dodge, Connecticut, with offices in Hartford, formerly assistant sales manager Chevrolet Motor Co. of Connecticut; George R. Flinn, New England except Connecticut, offices in Worcester, Mass., formerly with B. F. Goodrich Rubber Co.; Pierson R. Cummings, New York State, offices in New York City, formerly with Baker R. & L. Co.; C. W. Russell, New Jersey, offices in Newark, formerly with National Scale Co.; Harold W. Harwell, Pennsylvania, offices in Philadelphia, formerly with Henderson Tire Co., and Saunders & Wetmore, offices in Cleveland, Wetmore formerly being with Carbon Seal Co., Pittsburgh.

## Seiberling Appoints His Sales Personnel

Chooses Former Goodyear Associates—Will Make New  
Tire at Portage

AKRON, Dec. 14—The complete sales personnel of the new \$10,000,000 Seiberling Rubber Co. includes district managers for branches in twelve of America's largest cities. I. R. Bailey, formerly with Goodyear, is Seiberling's sales manager, and H. L. Post is assistant sales manager. All of the district managers are former Goodyear field representatives and officials.

W. A. Golden will be branch manager at Boston, Wade Aydelotte at New York, J. E. Vail at Philadelphia, H. E. Langdon at St. Louis, L. C. Gates at Chicago, J. L. Cochran at Detroit, W. H. Ector at Dallas, R. L. Ritchie at Kansas City, W. F. Ong at Cincinnati, F. E. Argus at Los Angeles, W. T. Stanley at Minneapolis, and H. I. Walters at Atlanta, Ga. C. C. Jones will have charge of the Akron branch.

## Installs New Equipment

Seiberling is transferring all fabric tire machinery from the Portage plant at Barberton to the Lehigh tire plant at New Castle, and is installing new equipment so as to build the new Seiberling cord tire exclusively at the Portage plant.

Seiberling as yet has not revealed the nature or design of his new cord tire. A statement issued by the company, however, intimates that the new tire will be something unusual and an important contribution to the automobile industry.

Seiberling, as an inventor in the early days of the tire industry, devised the first tire-building machine and demonstrated the superior uniformity and lower cost of the machine-made tire. He also introduced the cord-tire fabric adopted by practically all cord tire builders.

Announcement of the new tire is to be made about the first of the year.

## Independent Motors Co. Consents to Receiver

YOUNGSTOWN, OHIO, Dec. 12—Charles G. Smyth has been appointed receiver for the Independent Motors Co. upon a petition filed by the Wilson Avenue Land Co., which has a claim for rent unpaid since August as well as a bill of \$600 for work done. It was asserted in the petition that many other creditors having large unpaid bills were threatening to levy on the property.

The corporation consented to the receivership. It was stated that the company has a large number of trucks in process, but that if levies were made upon the property it would cause sharp depreciation of property value, which would not be the case if the business was kept running.

## Opens Specialized Vehicle Campaign

### Continental Motors Takes First Step to Overcome Any Existing Prejudice

DETROIT, Dec. 10—Pursuant to a plan agreed upon among the larger units parts makers to place cars and trucks made of specialized parts in a stronger position to compete with cars made all under one roof, Continental Motors Corp. is firing the first gun in a campaign of education in which it says:

"Specialized vehicles are composites of superior parts—designed and manufactured by organizations of specialists. They represent the best engineering and productive brains of the industry. Therefore, experienced users of motor cars and trucks purchase specialized vehicles.

"The parts embodied in specialized vehicles are the products of highly developed organizations, each one of which has concentrated all its skill and effort upon perfecting just one part. On the superiority of such parts, great organizations, working in harmony, stake their business futures.

"From specialized vehicles, backed by national parts service, buyers of cars and trucks expect maximum efficiency and economy. And they get it. They get it because specialized vehicles are qualified, part by part, to deliver the utmost in performance—qualified for instance, by such units as the power-plant that bears on its crankcase that ultimate symbol of motor-building specialization—the Continental Red Seal."

The various phases of this argument for specialized unit vehicles will be carried to the motor car buyer in turn by the other manufacturers of units who are united in the movement over their own signatures. The campaign will be carried indefinitely until the companies are assured that any possible former prejudice against the so-called assembled vehicles has been overcome.

### Coupe Proves Popular in Columbus Territory

COLUMBUS, Dec. 12—With the approach of real winter weather and the holiday season, the demand for passenger cars in Columbus and central Ohio territory has slowed down materially. But this usually happens at this time of year and has been discounted by dealers and distributors generally.

Enclosed cars are still the best feature of the passenger business. Dealers are reporting many sales of enclosed jobs, including sedans, limousines and coupes. The coupe is probably the most popular body at this time, although there are a number of calls for sedans.

### FINDS LITTLE KAR SOLVENT

HOUSTON, Dec. 12—A jury in District Court here has decided that the Little Motor Kar Co. was solvent at the time a receiver was appointed and that it still is solvent. In their petition to the court, the trustees of the company charged that Everett S. Owens was ap-

## PENNSYLVANIA FARMS USE 8,500 TRACTORS

HARRISBURG, Dec. 12—That the use of the tractor on the farms of Pennsylvania is being well maintained, is indicated by the fact that on Nov. 1, of the present year, there were approximately 8500 farm tractors in use throughout the State.

One year ago there were approximately 6800 tractors on the farms of the State. That there is plenty of sales opportunity is found in the fact that the horse still maintains its supremacy, as less than 5 per cent of the State's farms have machines.

Since the smaller tractors are being sold quite extensively in the cities for industrial purposes and as some of the larger have also been put to such use, the figures do not cover all the tractors in use in Pennsylvania.

pointed upon the request of holders of "gratuitous stock." The trustees have applied for the lifting of the receivership and have obtained an injunction prohibiting the sale of the plant as proposed by the company.

### New York Holds Back for Show Offerings

NEW YORK, Dec. 12—Though a fairly good run of pre-Christmas buying has helped to stimulate business this month, the New York passenger car market generally speaking is in its usual condition this time of year of waiting to see what is new at the shows. Most dealers have had a better first week in December than the average November week but they do not expect the month as a whole to come up to November because after the 15th or at the latest the 20th, practically no Christmas sales are made and the show is so near that it is difficult to get contracts signed.

November registrations of new cars in ten counties in and around New York as reported to dealers by Sherlock & Arnold, publishers of the *Automobile Sales Analysis*, were 2793, as compared with 3931 in October. The summary of the year to date follows:

	Approximately below \$2,500	Approximately above \$2,500	Total
January .....	483	146	629
February .....	1,409	210	1,619
March .....	3,396	488	3,884
April .....	4,811	575	5,382
May .....	5,468	584	6,052
June .....	6,522	495	7,017
July .....	5,457	386	7,017
August .....	4,216	350	4,566
September .....	4,004	331	4,335
October .....	3,506	426	3,931
November .....	2,425	368	2,793
Total to date....	41,732	4,359	46,091

## Eight Sales Daily Are Made in Atlanta

### Other Cities in Southeast Show Same Ratio—Country Business Slack

ATLANTA, Dec. 12—Retail automobile sales in Atlanta during November, including new and used passenger cars and new and used trucks, averaged about eight per day, total sales for the month being materially less as a whole than during October. The primary demand was for low priced and medium priced cars and light trucks, mainly Ford, Dodge Brothers and Buick. Ford sales are holding up unusually well, and there is also a fair demand for enclosed cars. As a whole, conditions are much better than they were at this time a year ago, and the outlook for the coming year is many times better than it was in December, 1920.

In the larger cities of the Southeast, including such centers as Savannah, Macon, Augusta and Birmingham, passenger car and truck sales during November have been in about the same ratio as in Atlanta, but in the smaller and rural communities comparatively few sales are being made. Agricultural conditions in the Southeast are at an exceptionally low ebb and the outlook does not portend any immediate improvement.

Tractor sales are holding up fairly well, especially in industrial lines, and there is promise of improvement shortly as lumber mills of the section are expected to start up operations again in the next 30 or 60 days. As this has been virtually a closed market for the past year or more, dealers are expecting to sell many tractors to the logging interests when conditions merit resumption of operations.

### G. M. Will Draft Code of Practice for Shows

DETROIT, Dec. 12—A code of practice governing the exhibition and sale of General Motors Corp. cars at the national shows and the local shows of 1922 will be drafted by the advisory board of the corporation following a meeting of sales executives of all units this week.

In the exchange of experiences valuable suggestions on the arrangement of exhibits, presentation of cars and selling helps were received. These will be embodied in the show code which will be printed and issued to all dealers and distributors.

### LOCKWOOD ASKS BANKRUPTCY

KANSAS CITY, Dec. 12—John F. Lockwood has filed a petition in bankruptcy, listing obligations around \$300,000, which are his endorsements on paper of the Lockwood Mfg. Co., of which he was president and which went through bankruptcy this year.

## Road Engineering Syllabus Approved

Work Prepared for Use of Students in Colleges Is Submitted

WASHINGTON, Dec. 12—A tentative syllabus designed to meet the need for a short university course in highway engineering and highway transport engineering has been prepared by Prof. Lewis W. McIntyre of the University of Pittsburgh. It is not yet in final form but it is the most complete work of its kind yet prepared.

The syllabus was considered and approved by the Highway and Highway Transport Education committees headed by Dr. J. J. Tigert, United States commissioner of education, at a meeting here Friday. There are at present no text books on this subject although one is in course of preparation by Professor Blanchard of the University of Michigan.

Suggestions will be welcomed by the committee in the final outline of the syllabus which has developed an outline for a course of study with references which will permit use of all the available information on the subject. This information is being assembled by the committee and co-ordinated for the use of colleges.

The education committee made tentative plans for the holding early next year of the second national conference on highway engineering education. Reports will be made at this meeting of the substantial progress which has been made since the first convention two years ago. All groups interested in this phase of educational work will be invited to send representatives. The date for the meeting has not been determined.

H. W. Alden, vice-president of the Timken-Detroit Axle Co., met with the committee for the first time as a representative of the Society of Automotive Engineers. Alden was in charge of the Government tank program during the war.

## Greene to Direct Sales of Thompson Wheels

NEW YORK, Dec. 12—W. M. Greene, New York branch manager and eastern representative of the Wire Wheel Corp., has resigned to become manager of sales for the Thompson Lattice Wheel Corp., incorporated in New York for \$100,000. Six years ago Greene joined the staff of the George W. Houck Co., the original manufacturer of triple laced wire wheels in America whose interests were later absorbed by the Wire Wheel Corp. in America.

The Thompson Lattice Wheel Corp. is the name of the new selling corporation that has taken over the distribution of the Thompson lattice wheel invented by Lewis Irvine Thompson. As its name implies, the wheel is a steel structure of two conical shaped perforated discs.

## OXEN KEEP MORE MEN BUSY, VILLA SIGHS

DALLAS, Dec. 12—Pancho has returned to the ways of his fathers.

No longer does the automobile buzz or the tractors hum on the big ranch of Francisco Villa, former Mexican bandit.

The old mule and the one-horse plow have supplanted the big tractors in the cultivation of his acres. The ox cart has taken the place of the automobile and trucks about the big plantation.

"You see," Villa explains, "I have a large number of men following me and depending upon my big plantation for support. They depend upon me for a living, and I had to furnish them with it or they would probably organize bands and start trouble in my territory or elsewhere in Mexico.

"I found that one tractor would do the work of a dozen men on my place. Every tractor I had at work just kept eleven other men out of work. Every truck I used did the work of a half dozen ox carts, but each one left five men idle to loiter about the country and stir up strife. I have done away with them to keep my followers employed."

These two discs are fastened at the rim which is made of either the demountable or quick detachable type and are also securely fastened at the hub. This is an expanding hub which, when expanded, places the desired tension upon the lattice spokes and by means of one adjustment all of the spokes can be tightened at one operation.

Thompson is president and general manager; Charles H. Carter, vice-president, and Greene, secretary and treasurer as well as director of sales.

## Bethlehem Creditors to Get Small Return

PHILADELPHIA, Dec. 9—Creditors of the Bethlehem Motors Corp., in the hands of a receiver for a year, will not receive more than twenty cents on the dollar, according to a statement by C. E. Woods, receiver, at a meeting of the creditors in Allentown. The claims total \$3,000,000.

The hearing in the case before the United States District Court in this city, postponed from Dec. 7, was again postponed to-day. A decree for the sale of the property on March 15 will be entered next week. A master will be appointed to audit the receiver's account as to the validity and effect of a lien filed by the Truscon Steel Co., and as to the extent of the property.

It has been decreed that any rights of the steel company in the case are transferred to the proceeds of the sale of the Bethlehem corporation's property.

## Flange Alterations Suggested to S. A. E.

Other Recommendations Made of Particular Interest to Tractor Engineers

NEW YORK, Dec. 12—Engine and carburetor manufacturers are planning a further simplification of carburetor-flange mountings by the combination of certain carburetor-flange sizes. At the present time four different nominal carburetor-flange sizes are used under 1 in.: ½, ¾, 1 and 1 ¼ in.

At the suggestion of a tractor engine manufacturer the engine division of the Standards Committee of the Society of Automotive Engineers has recommended that the flange dimensions for the ½ in. carburetor size in the present S. A. E. Recommended Practice for carburetor flanges shall be the same as the flange dimensions for the ¾ in. carburetor size and the dimensions for the 1 in. size the same as the dimensions for the 1 ¼ in. size. The adoption of these revisions in actual practice will make possible the elimination of two sizes of patterns and castings which will result in cutting production costs of these parts, especially so for carburetor manufacturers.

The revisions will be acted upon by the S. A. E. standards committee at the annual meeting on Jan. 10 in New York, and subsequently by the members of the society by letter ballot. Other recommendations which will be acted upon and which are of particular interest to tractor engineers and users are: annular ball bearings, roller-chain sprocket-cutters, flexible conduit, fan belts and pulleys, mufflers, iron and steel and non-ferrous metal specifications, lock-washers, clutch facings and tractor drawbar heights.

The recommendation as to tractor drawbar heights is an extension of the present S. A. E. standard which specifies that the height of vertically fixed drawbars on tractors of capacities up to and including four plows shall be 15 in. and of vertically adjustable drawbars on tractors of all capacities from 13 to 18 in. with the tractor on level ground.

## U. S. Products President Asks for Receivership

KANSAS CITY, Dec. 14—Ragner A. Roscoe has asked for the appointment of a receiver for the U. S. Products Co., of which he is president, in a suit filed in the Jackson County Circuit Court. He alleges that the management of the company has diverted receipts and profits to personal uses and that the company is insolvent.

Roscoe states the chief asset of the company to be a contract in the sum of \$36,000 with the Wharton Motors Co. of Texas, part of which has been executed and states that the contract is of reduced value because of the inability to make collections.

## Withholds Financing of Export Shipments

### War Finance Corp. Not Sold on Essentiality of Automotive Industry

WASHINGTON, Dec. 12—The War Finance Corp. has decided definitely not to finance at this time foreign shipments of automotive vehicles and equipment. No statement has been made covering the grounds for this decision and none is expected for it is not the policy of the corporation to explain in detail its decisions.

It is generally believed, however, that the officers of the corporation have not been "sold" on the essentiality of the industry and its importance in the industrial life of the United States. They apparently have absorbed the idea that automobiles are luxuries and no concerted effort has been made to make clear to them the fact that the automotive industry ranks second in importance only to iron and steel.

The automotive trade division of the Bureau of Foreign and Domestic Commerce will seek the co-ordinated co-operation of the industry to reopen the case and present to the War Finance Corp. the importance to the country of fostering exports and thereby taking up the slack in production which spells the difference between prosperity and the reverse.

### Asks Premier Receivership to Speed Reorganization

INDIANAPOLIS, Dec. 12—A petition asking for a receiver for the Premier Motor Corp. has been filed here by Hiram A. Whitman, a stockholder of the corporation who holds promissory notes of the company aggregating \$4,000. Quincy A. Myers, attorney for Whitman, asserts that the petition was filed to hasten the reorganization which is now under way. I. E. Schaeffer, secretary and treasurer of the corporation, agrees with this statement.

It is claimed that the assets of the corporation are \$2,000,000 in excess of liabilities. A hearing on the receivership petition has been set for Dec. 19.

### Patent Office Conditions Are Set Forth in Report

WASHINGTON, Dec. 13—The report of the commissioner of patents for the fiscal year ended June 30, 1921, sets forth plainly the lamentable conditions prevailing in that office arising from the congestion of applications and the insufficient number of examiners.

Enormous losses of capital result from the holding up of applications for patents which it is necessary to have acted upon before inventions can be financed. Business interests of the country are strongly urging Congress to pass pending legislation increasing the number and sal-

aries of technical men in the patent office and to induce those now employed to remain.

The patent office lost 163 examiners, scientifically trained and members of the bar, from July, 1919, to June 30, 1921, it is pointed out, and these were replaced by inexperienced men, fresh from college, without any knowledge of patent laws or legal training. In the same period, the number of applications for patents increased 34 per cent, while applications for trademarks increased 85½ per cent. At the end of the fiscal year there were approximately 50,000 patent applications awaiting action, as compared with 18,000 in July, 1919.

### Engines in New Oakland Model 34D Guaranteed

PONTIAC, Dec. 12—The Oakland Motor Car Co. has announced that it will guarantee the motors in its new 34D models against what is known as "oil pumping" for 15,000 miles, or over a period not exceeding two years. This special written guarantee will be given by every Oakland dealer. The main provisions of the guarantee is contained in the following paragraph:

"Should the engine of this car fail to perform properly due to the presence of excess oil in the combustion chamber (commonly known as 'oil pumping' and evidenced by oil on the sparks), the Oakland dealer who delivered this car to you will remedy the cause of the trouble without cost to you of either material or labor."

### To Redesign Line

DETROIT, Dec. 12—The Oakland line of General Motors will be redesigned along the lines of the sport model recently introduced which has proven to be the popular member of the Oakland family and mainly responsible for that company's continued high production. New models in all Oaklands will be shown at the New York show, all displaying the sport features, and these will be the only new models exhibited by any General Motors unit. A production mark of 18,000 Oaklands has been set for the first eight months of 1922.

### GEAR RECEIVER NAMED

BOSTON, Dec. 13—A receiver has been appointed for the Crofoot Gear Works, Inc. An inventory of the property is being taken and as soon as it is completed a report will be filed showing the condition of the corporation. An effort will be made to liquidate the company at the lowest possible expense. Creditors holding a majority of the unsecured claims have signified their approval of the appointment of George E. Howe as receiver.

### BATTERY DEALERS ORGANIZE

DETROIT, Dec. 10—A battery chapter of the Michigan Automotive Trade Association was organized here this week with about twenty battery dealers and distributors signing as charter members.

## Body Company Buys Old Moore Factory

### United Automotive Consolidates With L. C. Graves Co. and Locates at Danville

DANVILLE, ILL., Dec. 12—The United Automotive Body Co., which has been consolidated with the L. C. Graves Co. of Springboro, Pa., manufacturer of commercial car and truck bodies, has purchased the plant of the defunct Moore Motor Vehicle Co. in this city and will operate it under the name of the United Automotive Body Co.

The Cleveland offices of the United Automotive Body Co. have been closed and offices established here. The personnel of the Ohio corporation has been retained. F. O. Darling continues as general manager, W. R. House will be manager of the branches, W. H. Paul will continue as manager of the Lansing assembly plant and E. W. Windsor will be sales production manager. A. H. Palm, secretary of the L. C. Graves Co., will be secretary of the new corporation and will supervise the accounting. Other men in the organization are C. E. Rupe, formerly general manager of the Champion Wagon and Waterloo Body companies, will serve as factory manager, and John Fixott, formerly with Traffic Truck Co. as special bus representative. The United Automotive Body Co. has branches at Detroit, Lansing, Toledo and Youngstown. It is expected that operations in the Danville plant will be started within 60 days.

A bulletin sent out by the new corporation states that it is proposed to merge with it many other body builders and that no less than 30 already have signified their interest in the project.

### British Company Joins with Champion Ignition

LONDON, Dec. 2 (*By Mail*)—The Champion Ignition Co. of Flint, Mich., maker of "AC" plugs, whose British interests have hitherto been in the hands of the AC Sparking Plug Co., London, has joined forces with the British Sphinx Plug Co., well known Birmingham manufacturer of mica and porcelain plugs since 1904.

It is intended to continue the manufacture of Sphinx plugs conjointly with the production of British-made "AC" plugs. The British-made "AC" plugs will incorporate all features of the American plugs including electric welding of the side electrodes to the body of the plug and of the central nickel electrode to the screwed terminal and electric sealing of the insulator in the metal body.

### TAKES OVER BOLLSTROM PLANT

DETROIT, Dec. 12—The Ruggles Motor Truck Co. has arranged to take over the plant of the former Bollstrom Motors, Inc., at St. Louis, Mich.

## Trend Moves Toward Exclusive Handling

### Manufacturers Desiring Such Representation of Products Are Rounding Out Lines

DETROIT, Dec. 12—Insistence on exclusive representation by many of the leading companies of the industry is mainly responsible for many of the new models slated for introduction at the national shows. Makers who have been known for years as the manufacturers of heavy and medium priced cars are bringing out light and lower priced cars intended to round out their lines and give their dealers complete lines from the one company.

Some of the older companies, Dodge Brothers, notably, came out some time ago for exclusive representation on the part of their dealers. The theory of exclusiveness has been adopted by other manufacturers and considerable competition has developed to retain the substantial dealerships.

#### Some Retain One Model

A few manufacturers are carrying through on the one model basis. Ford, Dodge Brothers and Lincoln are in this class, as are Hupp, Reo, Earl and Dort. Rickenbacker Motors is starting out in the one price class. General Motors with its line of Chevrolet, Oakland, Buick, Oldsmobile and Cadillac contains a varied assortment of models and prices.

Nash and Studebaker have lines corresponding closely to the Buick and Oldsmobile assortment embracing fours, sixes and big sixes. Others in the four and six field in the Detroit district but operating as separate entities are Hudson and Essex and Maxwell and Chalmers. Chandler and Cleveland have been operating in the big six and little six field as has Columbia, and to this field is now being added the Jewett by Paige, the Hanson and perhaps Liberty.

#### Movement Progresses Quietly

The movement to bring about exclusive representation of companies has been proceeding quietly but nevertheless it has been proceeding and 1922 will see more progress in this direction than the industry has known before. The theory back of the movement is that cars are being bought to-day mainly on a dealer personality basis and an owner switching to a higher priced vehicle will buy from the dealer who sold him a satisfactory low priced car.

## Continental to Produce Two New Lines of Engines

DETROIT, Dec. 10—Continental Motors Corp. is about to start production on two new distinct lines of engines, a light six to be known as model 6-Y which is designed to enable manufacturers who have been building big sixes exclusively to build a smaller vehicle rounding out

their line, and a special bus model for vehicles of  $4\frac{1}{2}$  to  $5\frac{1}{2}$  tons, which will be known as model 4-L.

Manufacturers using the light six engine will build it into cars selling at about \$1,000 to \$1,200 and it is expected that cars thus equipped will be seen at most of the shows of the 1922 season. With the light six the Continental passenger line will now include the light, medium and big six in addition to its special models manufactured for special factory designs.

The bus model is especially designed to meet speed requirements and lubrication facility. The truck models made by the company are also undergoing revision along lines permitting of greater speed.

## Greater Tractor Sales Reported in Southeast

ATLANTA Dec. 14—Tractor sales in the Southeast during October and November were materially better than the same two months in 1920, according to factory branch managers in the Atlanta territory.

In east Tennessee sales have been unusually good all summer because of the fact that agriculture is more diversified in that section than anywhere else in the Southeast, and the farmers therefore are more prosperous. In Georgia and North Carolina industrial sales have been unusually good as these two States lead the Southeast in road construction work now in progress.

Thousands of acres of swamp lands in Florida are being reclaimed this year, and tractors are being largely purchased for this work in the southern part of the State. Alabama sales have increased materially the past two months due to the fact that crop diversification was more widely practiced in that State this year than ever before.

South Carolina is the only State of the section where sales are far below normal because of poor cotton and tobacco crops this year. The outlook for winter business is many times better than it was at this time last year.

## Substitute Complaint Filed in Rockwell Suit

HARTFORD, CONN., Dec. 14—Permission to file a substitute complaint has been granted by Judge Avery in the Superior Court in the suit of Albert F. Rockwell against the New Departure Mfg. Co., the company's counsel, John T. Robinson, having a notation made that a pending counter claim of \$30,000 for over payments to Rockwell shall stand.

In his original action, Rockwell sued for \$2,000,000 damages, asking for reformation of his contract with the company for the reconveyance of certain patents to him, the issuance of an injunction restraining the company from using certain patents, and seeking damages for being deposed as president of the company.

## Hercules to Enter Motor Car Field

### Will Produce "McCurdy", 6-Cylinder Automobile, Early in New Year

INDIANAPOLIS, Dec. 14—The Hercules Corp. of Evansville will enter the motor car production field early in 1922 with the "McCurdy," a 6-cylinder car with standard parts and a wheelbase of about 126 in. It is not likely that the car will be ready for the automobile shows, but it is confidently hoped that it will be in readiness for spring delivery.

#### Well Financed

The Hercules corporation, which will launch the car without going outside its organization to finance it, has long been known as one of the largest industrial establishments in its line, that of the making of buggies and carriages, gasoline engines and bodies for trucks and commercial cars. It started 31 years ago in Cincinnati, but moved to Evansville about 20 years ago, and has advanced to the position of one of the largest industrial establishments in Indiana.

It has a record of having produced in one year 84,000 buggies and carriages, 62,000 gas engines and 40,000 bodies for trucks and commercial cars. Its factories cover 31 acres and its sales organization is represented in every part of the country and in Canada, Mexico, Central and South America, and Europe. Last year's sales are said to have exceeded \$12,000,000.

#### Evolved from "Gale"

Col. W. H. McCurdy, head of the corporation; J. D. Crafts, general manager; Lynn McCurdy, son of Colonel McCurdy and vice-president of the concern; and Gard Gale, sales manager, have spent a year in the development of the "McCurdy," which has been evolved from the "Gale," a car designed by Gard Gale and exhibited at the 1920 March Indianapolis Automobile Show. Both Gale and Lynn McCurdy have long been identified with the automobile industry, McCurdy having served as head of a motor transport division during the war. Detailed announcement of the specifications of the car is not yet ready.

## Apperson Branch Replaces Distributor in St. Louis

ST. LOUIS, Dec. 12—In keeping with its policy of establishing factory branches in principal cities throughout the country, the Apperson Bros. Automobile Co. has purchased outright the assets and liabilities of the Apperson-St. Louis Motors Co., former distributor of Apperson cars in St. Louis.

The branch will retain the name and premises of the former company and L. F. Jalageas will be manager.



## St. Louis Discusses Chicago Air Service

### Plans for Reopening of Route Made at S. A. E. Meeting

ST. LOUIS, Dec. 12—The restoration of the airplane mail service between St. Louis and Chicago, which was abandoned July 1, 1921, because of lack of funds, was planned at the first meeting of the Society of Automotive Engineers ever held in St. Louis, which took place at the Claridge Hotel last night.

All the speakers touched on the future of the airplane, the principal speaker being Col. J. G. Vincent of Detroit, vice-president of the Packard Motor Car Co., past president of the S. A. E. and one of the designers of the Liberty motor for war airplanes.

Postmaster Colin M. Selph said that he had a conference with Representative L. C. Dyer before the latter departed for Washington, in which the congressman stated he would introduce a bill for the reestablishment of the St. Louis-Chicago air mail service as soon as possible.

The meeting pledged its co-operation in urging the passage of the bill and in improving the landing field in Forest Park to permit the use of large airplanes capable of carrying more than the 150 lb. of mail which was the limit of the previous airplanes. Colonel Vincent expressed approval of the plan and declared that the air mail service would form a great nucleus about which the development of the airplane would center.

Colonel Vincent showed motion pictures of flying scenes at several leading fields and explained recent improvements such as the reversing of the propeller and the action of the airplane parachute.

The St. Louis Automobile Manufacturers and Dealers Association joined with the society in promoting the meeting. George P. Dorris, president of the Dorris Motor Car Co. and Western representative of the S. A. E., presided.

## To Get Export Data by Questionnaires

WASHINGTON, Dec. 12—The export committee of the National Automobile Chamber of Commerce has agreed to bear the expense of obtaining from greatest foreign potential trade centers definite information concerning the possibilities for the sale of American automotive products. The work will be done through the automotive trade division of the Bureau of Foreign and Domestic Commerce.

The plan as outlined contemplates obtaining the services of reliable men who will answer by cable once a month a questionnaire which will be sent to them. The information contained in these replies will be analyzed and tabulated here. It then will be supplied to the en-

## WALLIS TRACTOR WINS IN PLOWING CONTEST

RACINE, Dec. 12—The fourteenth annual plowing contest under the auspices of the Pilot-Rock Association in Cherokee County, Iowa, was won by J. E. Bushlow driving his own Wallis tractor and pulling a genuine J. I. Case three bottom plow. He also won the first prize last year with the same outfit. The second prize in this class was won by a Twin City tractor, while the third and fourth prizes were taken with Wallis tractors.

tire industry. Although the N. A. C. C. will bear the expense, the information will not be for the exclusive benefit of its members.

The automotive division of the bureau is preparing to send to all automotive manufacturers a questionnaire which will give detailed information on their exporting practices. The individual replies will be held strictly confidential, but the general results will be analyzed carefully and made available to the entire industry.

## Employment in Industry Increased 2.7 Per Cent

WASHINGTON, Dec. 14—Increased activity in the automobile industry was the one bright spot of the industrial situation for November, according to an analysis of reports received from special agents of the United States Employment Service, Department of Labor, from 1428 firms usually employing 501 or more, located in 65 principal industrial centers of the country.

The data show that employment increased in the industry 2.7 per cent in November, as compared with the previous month, the actual increase from the firms reporting to the Government amounting to 4531 workers.

Reports from 70 automobile firms in Detroit show that 4398 workers were recently added to their forces, bringing the total employed up to 115,802. Half of this number are working on part-time schedules.

In Dayton, automobile industries are working on a conservative basis. The report shows that part-time employment in Toledo is more prevalent in the automobile industry and accessories. There is the usual seasonal falling off in the parts and accessories industry in Milwaukee.

## CHARGE RIVER ENCROACHMENT

ROCKFORD, ILL., Dec. 12—The Cotta Gear Co. and Charles Cotta, manager, have been indicted by the Federal grand jury in Freeport for encroachment upon the Rock River. It is the first indictment of its kind ever returned against a Rockford firm.

## Goodyear President Visiting Argentina

### Will Conduct Survey of Tire Trade Conditions in South America

AKRON, Dec. 14—E. G. Wilmer, president of the Goodyear Tire & Rubber Co., has left for South America, where he expects to conduct an extensive survey of tire trade conditions, especially in Argentina, the central South American distributing point for Goodyear tires. Wilmer will also inspect Brazilian property acquired some time ago by Goodyear for the erection of a South American tire building factory.

During Wilmer's protracted absence, affairs at Goodyear will be in the hands of H. A. Springford, who has been elevated from the position of treasurer to that of special assistant to the president. P. H. Hart, assistant treasurer and formerly with Price, Waterhouse & Co., in charge of the Goodyear audit prior to the company's reorganization last May, has been elected treasurer.

Personnel changes made to fill vacancies created by the resignation of many Goodyear veterans who have joined F. A. Seiberling in his new rubber company, have been announced by Sales Manager L. C. Rockhill. H. J. Thompson succeeds H. L. Post as manager of the sole and heel sales. K. W. Wolcott is made assistant to Thompson. H. P. Post becomes assistant manager of the mechanical goods department, succeeding C. A. Jones. F. W. McConkey succeeds H. I. Walters as southern division manager of tire sales and D. O. Kinney succeeds L. C. Gates as manager of motorcycle tire sales. T. J. Moorse assumes the editorship of *The Triangle*, the Goodyear salesmen's bulletin, succeeding H. A. King, now director of sales personnel for Seiberling.

Arthur Spore, formerly with Goodyear, returns as assistant advertising manager, succeeding Frank Griffin, now advertising manager of the new Seiberling company.

## Policy for Membership in N. A. D. A. Changed

ST. LOUIS, Dec. 12—Future membership in the National Automobile Dealers Association will be limited to those merchants who have been in business two years, who have first-class credit and financial rating and who carry not only the endorsement of their fellow dealers, but the confidence of their buyers.

Membership dues in the organization are to be changed from the payment of \$10 per year to a grade of classification of \$50 per annum as the lowest dues and \$250 as the highest. The new regulations are effective Jan. 1, 1922.

"The change is made to meet the economic condition" is the statement issued by the association and signed by the board of directors.

## Willys Receivers Hold Conferences

### Inventory of Assets Likely to Be First Step in Their Ad- ministration

NEW YORK, Dec. 14—C. O. Miniger, president of the Electric Auto-Lite Corp. of Toledo, who is receiver for the property of the Willys Corp. in Ohio, New Jersey and New York, arrived here yesterday for conferences with Colonel Francis G. Caffey and Clifford I. Voorhees, who are his co-receivers in the southern district of New York and in New Jersey.

Details of procedure in each district will be worked out while he is here. It is probable the first step will be to take a careful inventory of all the assets. Inasmuch as the productive units of the corporation usually would be closed about this time for inventory taking, no hardships will be involved by this process. The most important of these units are the Electric Auto-Lite and the New Process Gear Corp. at Syracuse.

#### To Continue Operations

After the inventory, operations in these plants will be continued virtually as before the receivership, although all possible economies will be instituted. The next step probably will be an attempt to sell the Chrysler plant at Elizabeth, which is the cause of all the corporation's financial difficulties. So far as can be learned no negotiations for the purchase of this property are pending.

No steps looking to a reorganization and possible refinancing have been initiated thus far and it is probable several weeks will elapse before anything definite is done along this line.

Miniger was reappointed a co-receiver of the New Jersey property yesterday by Federal Judge Bodine, who removed him two weeks ago upon the petition of bank creditors who have since then agreed to co-operate fully in the receivership.

#### Other Courts Act

Miniger and F. P. Kennison, one of the receivers for the Ohio property, and Mayor George R. Lunn of Schenectady have been appointed by Federal Judge Cooper receivers for the holdings of the corporation in the northern district of New York. This includes the New Process Gear plant.

An order signed by Federal Judge Knox in the southern district of New York removed Kennison in this district and left Miniger and Caffey as receivers.

Federal Judge Killits appointed Colonel Caffey receiver to work with Miniger and Kennison in the Ohio district. Mayor Lunn visited Toledo the early part of the week and conferred with Kennison on plans for reorganization.

Notwithstanding opposition by attorneys for the corporation, Federal Judge Morris, sitting at Wilmington, appointed

## FORD PRODUCTION WILL SURPASS 1920

DETROIT, Dec. 14—The Ford Motor Co. will continue operations on its four days a week schedule up to Dec. 21, when it will close for inventory and will remain closed until shortly after Jan. 1. Completion of its year's schedule will show a slight increase over 1920, which totaled 1,023,552. Indications for 1922 business are regarded as highly favorable by executives, and production will resume after the inventory, taking on at least as heavy a schedule as marked the closing of 1921.

Robert H. Richards, former attorney general of Delaware, as receiver in that State. Only one receiver was named and it is possible Miniger may be appointed to serve with him unless it is decided to lift the receivership in that State.

A receivership petition was filed in Delaware by the bank interests before the signing of the "treaty of peace" last week. The action was taken upon the ground that inasmuch as the Willys Corp. is incorporated under the laws of Delaware, receivers named in that State should take charge of all its assets wherever they may be located.

#### Oppose Delaware Motion

In opposing the Delaware application, attorneys for the company took the ground that there are no tangible assets in that State and that all assets of the corporation are already in the custody of the receivers. Judge Morris held that under the laws of Delaware, as interpreted in a long line of decisions, no course was open to him except to appoint a receiver. He fixed the bond of Richards at \$20,000.

Robert A. Thatch, of counsel for the corporation, in arguing that there was no necessity for a Delaware receiver inasmuch as there were no assets in that State, pointed out that two alternatives faced the defendant. One of them is a successful plan of reorganization and the other the winding up of its affairs. If the latter course became necessary he believed it possible there would be a residue which would come into the hands of the Delaware courts for distribution. It also was stated that inasmuch as all interested would profit by continuing the business, the bank creditors would be willing to defer the appointment of a Delaware receiver.

Judge Morris held, however, that he had no option but to appoint a receiver.

#### SUES FOR BODY RECEIVER

INDIANAPOLIS, Dec. 14—Suit for a receivership for the Indianapolis Body Corp. was filed in Superior Court here by Peter M. King, who asks judgment for \$10,000 alleging that a balance of \$3,563 on five notes is due him.

## Oregon Completes Study of Road Cost

### \$3,000 Necessary to Maintain One Mile of Pavement for Year

PORTLAND, ORE., Dec. 14—Figures relative to cost of maintenance of highways in the State of Oregon were issued here to-day by Herbert Nunn, State highway engineer, who recently completed an exhaustive study of the subject to secure data upon which to base a law regulating for-hire truck and bus operation, and the subject is now demanding the keen interest of automobile and truck men throughout the entire State.

Cost to the public of Oregon for maintaining one mile of pavement for one year is \$3,000, while the cost of maintaining a mile of macadam is \$1,675, according to Nunn's report. The cost for each vehicle mile is given as 0.01 cent for pavement and 0.015 cent for macadam. For trucks, each ton mile on pavement costs the public 0.01 cent, and on macadam 0.015 cent. The cost per passenger mile is figured at 0.002 cent.

The figures take into consideration all kinds of depreciation, Nunn explained, not only to the pavement itself, but to the grade, cuts, fills, drainage, and interest charges on road bonds.

What the new regulations governing for-hire trucks and buses will be cannot yet be foretold, but it is said the truck men offer no objection to the present regulation limiting the total load to 22,000 lb. nor to the present speed regulations. A system of insurance for passengers and for granting licenses to bus lines on the basis of continuous and satisfactory service, eliminating the fly-by-night driver, are considered sure of incorporation in the new law.

## South African Demand for New Cars Improves

NEW YORK, Dec. 12—Automotive conditions in South Africa are summed up as follows in the current business review of the National Bank of South Africa:

"The tendency of the market for new cars is toward a decided improvement. The country districts are displaying more interest, and it is stated that a fair number of sales has been effected. The used car market is not so good."

The review was written at Pretoria, on Sept. 30, before the present upward movement began in sterling exchange, which has brought that currency upward to its quotation to-day of slightly less than \$4.15, at which rate it is less than 15 per cent below par. The South African bank statement adds to the foregoing that reports from Johannesburg are "optimistic in tone, and better conditions are looked for even during the remainder of the year."

## Waste Elimination Movement Started

### Secretary Hoover Creates Division —Automobile Manufacturers to Meet with Him

WASHINGTON, Dec. 14—In an effort to co-ordinate and forward the movement for the elimination of waste in the automobile industry, a meeting of automobile manufacturers may be called within a few days under the general direction of the Department of Commerce for the purpose of instituting a variety survey and other studies necessary for eliminating excess sizes and varieties.

A division has been established in the Department of Commerce by Secretary of Commerce Hoover for the purpose of assisting industry to decrease sales resistance and obtain better service through the possible elimination of any duplication of parts where questions of dimension, not of style, are at issue. It is expected that in the event this program is carried out it will assist in reducing the production costs of passenger cars, trucks and tractors.

#### Durgin in Charge

Secretary Hoover has placed William A. Durgin, for several years public utility expert for the Commonwealth Edison Co., Chicago, in charge of this activity. Mr. Hoover has made it clear that the department's policy in this matter is almost a complete reversal of governmental policies, for, instead of ordering industry to put into effect certain reforms, the department is asking business what the Government can do to help it in its problems.

The Secretary describes the movement briefly as follows:

"There is a great area of waste in American industry that can only find correction at the hands of the manufacturers, and can only find it in a purely voluntary action on their part."

#### No Compulsory Methods

In other words, Mr. Hoover insists that the simplification proposals must be inspired by the manufacturers themselves, as it is not the desire of the Department of Commerce to enter into any compulsory methods. In this connection, he says:

"I do not believe that the impulse and progress of American industry can come from Government legislation or interference; but there are occasions, I think, when the friendly help of the Government can furnish a center point for the communication and discussion of manufacturing groups and those professions and trades with which they must also come to some conclusion have been well selected."

The movement indorsed by the Department of Commerce covers such questions as nomenclature, dimension, simplification, and variety, without interference with style. Suggestions for simplification have been submitted to the department but their consideration will be postponed until a conference is called

## AUTOMOBILE INDUSTRY IS FIRST IN BUFFALO

BUFFALO, Dec. 12—Automobiles, bodies and parts now lead Buffalo industries.

This is shown in the Yearbook of Buffalo, containing the 1920 industrial census of the Buffalo-Niagara industrial zone, which is now being prepared for publication.

The report shows that for the first time the automobile industry has replaced flour and grist mill products and slaughtering and meat packing as the leading industry in the city. These two now run second and third.

between representatives of the automobile industry and the Government. These proposals involve tire dimensions, dimensions of starting and storage batteries, sizes of seats, steering wheels, etc.

If a survey is undertaken by the industry, it will cover cost of car and service to owner and other details which are necessary for the information of a conference. The department will undoubtedly ask the assistance of the Society of Automotive Engineers and use the handbooks of the society.

As an instance of simplification, it is stated that tractor seats can be reduced from 9 sizes to 3, owing to slight differences in width. It is also stated that the survey will deal more particularly with sizes rather than with the number of parts.

(Continued on next page)

## Secretary Denby to Speak at N. A. C. C. Dinner

NEW YORK, Dec. 14—Secretary of the Navy Denby, who formerly was one of the principal owners of the Denby Motor Truck Co., will be the guest of honor at the annual dinner of the National Automobile Chamber of Commerce which will be held at the Commodore Tuesday evening, Jan. 10. The only other speaker of the evening will be Irvin S. Cobb, the celebrated humorist. Colonel Charles Clifton, president of the N. A. C. C., will preside as toastmaster.

The arrangements for the dinner are in charge of a committee of which Pierre S. duPont, president of the General Motors Corp., is chairman. Associated with him are A. R. Erskine, Alvin Macauley, David S. Ludlum, William Robert Wilson, W. C. Marmon and A. G. Seiberling.

#### Aero Club to Dine

NEW YORK, Dec. 14—The annual banquet of the Aero Club of America will be held at the Hotel Commodore Monday evening, Jan. 9. The dinner will be for members of the Aero Club of America and affiliated aero clubs, the Society of Automotive Engineers, the Automobile Club of America, the Automobile Club of New York and others.

## N. A. C. C. Suggests Contract Changes

### Provision Made for Protection of Dealers in Event of Cancellation

NEW YORK, Dec. 14—Directors of the National Automobile Chamber of Commerce have transmitted to automobile manufacturers certain suggestions for contract changes which the dealers, represented by a special committee of the National Dealers Association, believe will prove mutually beneficial in the distribution of motor cars. While these changes are suggestions only, the directors of the N. A. C. C. believe they are proper ones for consideration by those engaged in the manufacture and distribution of motor vehicles.

#### Maker Must Repurchase

The most important suggestion is that when a contract is cancelled or terminated by the manufacturer, he obligates himself to repurchase at the net price originally charged the stock of the new cars and regular models and such parts as were originally purchased from him which may remain in the hands of the distributor at the date of cancellation. The text of the suggestions follows:

The distributor must furnish to the manufacturer an order for motor vehicles for the period of 12 months in advance for distribution in his territory, covering the allotment of models by months. The manufacturer may ship motor vehicles according to such statement unless the distributor shall notify the manufacturer from 60 to 90 days in advance of a change in the shipping schedule for any month or months. By the giving of such notice, unfilled shipments may be automatically cancelled, provided, however, that every distributor must, during each quarter of the contract year, take at least 50 per cent of his aggregate order for such quarter.

If, for any reason, the manufacturer does not ship during any month the orders specified for that month, such unshipped orders for that month may be automatically cancelled by the manufacturer and be deducted from the allotment to the distributor as specified for that month and in such case the manufacturer and distributor will be released from any further liability for such month on such unfilled order.

#### Excess Orders Optional

Any orders submitted by the distributor in excess of the monthly allotment as above provided may be accepted by the manufacturer at his option and when so accepted shall be deemed to be subject to all the conditions to which motor vehicles ordered by annual allotment are subject.

This agreement shall remain in force and effect until cancelled or terminated with or without cause by the giving of notice by either party to the other party in writing of 15 to 30 days and at the end of the time specified in such notice, this agreement shall be deemed to be in all respects cancelled and terminated.

In the event of a cancellation or termination of this agreement such cancellation or termination shall be the act of a corporate officer,

(Continued on next page)

## New Zealand Imports Decline During Year

### Industry Feels Effects of Efforts to Equalize Balance of Trade

LOS ANGELES, Dec. 12—A radical break in imports during the closing months of the period greatly cut into the total imports of motor vehicles by New Zealand during the first nine months of 1921, as compared with the first nine months of 1920. There were 3560 motor vehicles valued at \$1,100,363 in the first nine months of 1921, as compared with 8479 cars valued at \$1,930,893 in the same period in 1920.

Automobiles suffered with all other lines of merchandise in the campaign waged by the banks and the Government authorities to curtail imports in order to bring about a more equalized balance of trade. Business conditions are rapidly improving in New Zealand, and this market, long noted for its great purchasing strength, will soon be resuming its imports of American automobiles on a healthy scale, providing British manufacturers do not succeed in their efforts to have the preferential rate of duty increased and the general duty increased.

## Fire Damages Templar Plant; Loss, \$250,000

CLEVELAND, Dec. 14—Fire that swept the Templar Motors Co. property at Lakewood, for three hours last night, destroyed property valued roughly by M. F. Bramley, head of Templar, at between \$250,000 and \$300,000.

The main fireproof plant of the Templar property was the only structure that remained untouched by the rain of sparks. The old main plant, a frame structure composed of three buildings, which was built four years ago and in which the parts used for building cars were stored, was completely burned down and about 30 automobiles were lost.

Besides this, he said, about 300 new windshields were lost. He estimated that there was about \$75,000 worth of service stock alone stored in the building. Firemen report the cause of the fire is unknown. President Bramley announced the entire plant will be closed all day to-day. After to-day, however, he said work will go on as usual.

### TO AID FOREIGN TRADE

NEW YORK, Dec. 15—The directors of the Motor and Accessory Manufacturers Association have decided to appoint a foreign trade committee of five to act "as the co-ordinating clearing house and point of contact between the Government officials and the members of the association in carrying out the foreign trade program" of the Bureau of Foreign and Domestic Commerce. The president will select the chairman of the committee who will name his associates.

## PRODUCTION FOR 1921 WILL TOTAL 1,700,000

NEW YORK, Dec. 15—Careful estimates of the total production of motor vehicles by American companies for 1921 indicate that the final figure will approximate 1,700,000. This will include the foreign assembling of cars by Ford and other American companies which have assembly plants in other countries.

Domestic production will aggregate 1,604,000. The domestic production for the first nine months of the year aggregated 1,200,000. The estimated domestic production for the last quarter with figures for October and November practically complete is 403,000. In all instances the figures include both passenger cars and trucks.

The total production for 1920 was 2,205,000 so that the output for this year will be only approximately half a million less than in 1920. The most optimistic estimates made at the beginning of 1921 did not exceed 1,500,000.

## N. A. C. C. Suggests Contract Changes

(Continued from preceding page)

sales manager or other person duly authorized to cancel or terminate sales agreements.

It is agreed that in the event of the cancellation or the termination of this agreement by the manufacturer, said manufacturer obligates himself to repurchase at the net prices originally charged to the distributor, the distributor's stock of new saleable cars of regular models of the current serial year shipped by the manufacturer within six months before, and such parts as were originally purchased by the distributor from the manufacturer, which car or parts are in the hands of the distributor at the date of said cancellation by the manufacturer.

In the event of the cancellation of this agreement by the distributor, the manufacturer at his option may purchase such stock of new motor vehicles or parts, sold by him to said distributor, and on hand at the date of the cancellation or termination of this agreement by said distributor.

It is agreed that the distributor shall furnish the manufacturer semi-annually in each contract year an inventory of parts on hand and shall return such parts to the manufacturer as may comprise an over-stock in the hands of the distributor or which the manufacturer has declared to be obsolete.

The suggestions above apply also from the distributor to the dealer.

### TO PRODUCE DURANT SIX JAN. 15

NEW YORK, Dec. 15—It is expected that the Durant Motor Car Co. of Indiana will begin production of the new Durant six about Jan. 15. Production of the Durant four already has begun on a small scale at the Lansing plant and the Durant Motor Car Co. of Michigan proposes to turn out about 500 cars before the end of the year.

## Waste Elimination Movement Started

### Hoover Forms New Division— Automobile Manufacturers to Confer With Him

(Continued from preceding page)

As to the general purpose of these proposals, Secretary Hoover says:

"We are in a broad sense, confronted with a great many economic difficulties—the necessity to maintain a high wage level, the consequent necessity to reduce all processes of manufacture to the lowest possible costs, and under the compulsion of eliminating every possible waste of industry itself.

"There is one thing that stands out about American industry that comes up daily to the Department, and that is the remarkable efficiency of the individual industry and the very considerable inefficiency of collective industry. If we had the same native efficiency collectively in this country that we have individually, we would have no difficulty in maintaining our own in foreign or international commerce, and of maintaining the high wage levels and the high standards of living. It is only by virtue of some prompt action that we can hope to secure some fundamental readjustments that the country must have.

"During the war, the necessity for the elimination of unnecessary employment, the elimination of the use of unnecessary materials, benefited many industries. There grew up a far different cooperation in industry in the simplification of a great many processes and products. The experience gained at that time, I think, convinced most manufacturers that there was something of permanent value in those ideas.

"There has been an attempt on the part of manufacturers since then in a hundred different directions to come to an agreement and conclusion for themselves that would meet these ends. There is the difficulty of entering into such agreements, the possibility that they comprise some violation of the trade Acts. This administration coming to Washington felt that it could perform a service to manufacturers if it acted as a center point around which their own co-operative action could take place.

"There are a number of industries in which the manufacturers are carrying on their own surveys and are in consultation with the Department, but to make any of this work effective does not lie entirely with the manufacturers, who must have the cooperation of outside groups. This is the first time that we have attempted to bring the groups together, first, the manufacturer, then those who dominate his consumption; so that I am in hopes that we can get results."

The Department of Commerce believes that with the help of the United States Chamber of Commerce it will be possible to see how far an agreement can be reached for the simplification of varieties.

### MAIBOHM SALE POSTPONED

TOLEDO, Dec. 12—Further postponement of the reorganization sale of the Maibohm Motors Co. has been made until Dec. 27, due to the filing of a Federal tax claim. The original date set was Nov. 29, at which time, however, the claim was filed and postponement was taken until to-day.

## Committee Appointed for Mexico City Show

Event Will Open April 16 When  
Easter Crowds Visit  
Capitol

NEW YORK, Dec. 12—The 1922 automobile show in Mexico City will open on April 16, a time at which, because of Easter, the city is filled with visitors from all parts of the Republic. Definite advices concerning the show have been received by *El Automovil Americano*, the Spanish automotive publication of the Class Journal Co., which supplement previous information that the automotive division of the American Chamber of Commerce of Mexico City had determined to hold such an exhibition next spring.

A strong committee of representative dealers has been named to supervise and direct the show, the automotive division of the chamber believing that such committee would assure careful and proper management and would obviate some of the mistakes made in holding the first Mexican show last spring.

The committee follows: James G. Shirley, American Motors Co.; William C. Benbow, Cia. Unida de Ventas, S. A.; V. S. Bowling, Shearer Electrical Construction Co., S. A.; S. L. Carrico, United States Rubber Export Co.; Charles B. Crowley, Mayfield Auto Co., S. A.; W. A. DeGress, Mohler & DeGress, Sucs, S. A.; Simeon F. Fuller, the Mexican Trading Corp.; Frank E. Moore; A. F. Robertson, Robertson Motor Co., S. A.; A. Villalba, Jr., Lamborn & Cia., and Carlos Wille, Cia., Automotriz Mecicana, S. A.

## Chandler Directors Declare \$1.50 Dividend

NEW YORK, Dec. 15—The directors of the Chandler Motor Car Co. at a meeting in Cleveland yesterday declared the regular quarterly dividend of \$1.50 a share payable Jan. 1 to stockholders of record Dec. 24.

By this action they fooled the speculators who had been predicting that the dividend would be passed and who sold the stock short. The price declined to 45½ Monday but sold up to 52 yesterday. It is understood that the Chandler company did not earn the dividend but paid it out of surplus. It is felt that the earnings in the next quarter will justify this action.

## Dent Parrett Elected Head of Tractor Company

CHICAGO, Dec. 13—Dent Parrett has been elected president of the Hicks Parrett Tractor Co. Parrett has long been identified with the tractor industry. He was the originator of the Parrett tractor and founder of the producing company. During the war he was dis-

associated with this work through his activities at the Holt plant in Peoria and the Chandler plant at Cleveland, where he served in the capacity of major in the army.

Since the war Parrett has devoted his time to working out engineering plans for tractor improvements and the development of a combination light tractor and cultivator to be sold at a price around \$600. This model, with the improved models of the Parrett three and four-plow tractors, will be shown at the National Tractor Show at Minneapolis in February.

## Gray Will Exhibit Cars During New York Show

DETROIT, Dec. 14—Gray Motor Corp. will exhibit two cars at the Commodore during the week of the New York show which, it is reported, will sell under \$500. Drawings of the car seen in the offices of the company indicate a very high class looking product more commodious than the usual run of car in the extreme low priced class.

The plan of the company to assemble the car in assembly branches in principal cities of the country, means that it will be a specialized unit vehicle, and specifications are being placed with leading unit parts makers seeking the highest possible construction value in the price class.

If the plans of the company are carried through, unit parts makers will have an opportunity to participate in the manufacture of a car in the bottom price class.

## Firestone Preferred Stockholders May Vote

AKRON, Dec. 14—Preferred stockholders of Firestone Tire & Rubber Co. will be entitled to vote at the annual meeting scheduled for Dec. 15, according to a circular letter mailed to shareholders. The reason assigned is that the ratio of net quick assets has not been maintained, which entitles both 6 per cent and 7 per cent preferred to voting powers.

It is only because of the fact that charge-offs for inventory depreciation and complete absorption of losses have been made that net quick assets are below ratio. Inventories have been placed at or under market levels.

All losses have now been absorbed, the company is in a sound financial position and in the best operating and sales position in its history, according to officials.

Firestone Tire & Rubber has \$10,000,000 each of 6 per cent and 7 per cent preferred stocks outstanding. It is provided that net quick assets equal to 150 per cent of 6 per cent preferred outstanding and 250 per cent in net tangible assets must be maintained. It shall also maintain net quick assets equivalent to 125 per cent of the 7 per cent preferred and 200 per cent in net tangible assets. Each class of preferred stock shall have voting power in the event that the ratio of assets is not maintained.

## Peruvian Dealers Reduce All Stocks

Accessories and Tires Scarce—  
No Excess of Popular  
Priced Cars

LIMA, PERU, Nov. 30 (By Mail)—During November dealers in automobiles have either advertised reductions in price or quickly made reductions when effecting sales. Little by little the stock of automobiles, accessories and tires has been reduced, until now in the popular priced car (Ford) there is no excess stock; and in the accessories and tires of the popular priced cars, there is scarcity rather than excess stock.

Two unfavorable, one neutral and two favorable symptoms may be noted in the general situation in Peru to-day. In the valley of Chicana, the heart of the sugar industry, there is industrial discontent, which has hurt the sugar trade and consequently adversely affected business in general. The political uprising against the Government in Iquitos, and the discontent of the native Indians in the region of Puno, although not serious so far, may spread.

The neutral element is the proposed loan from North America. A group of financial experts from the United States is here now examining the resources of the country to see if they warrant the amount sought. As long as there is hope of securing the loan, the present condition will not grow worse; and until the loan is secured present conditions will not improve. So the neutral element is perhaps the predominant one in the Peruvian business world to-day.

The two favorable features are increased movement in business as indicated by heavier advertising in the daily papers. The number and size of the advertisements appearing to-day are far greater than three months ago. Automobiles and accessories come in for their share of the increased advertising.

## AUTOCAR REDUCES PRICES

ARDMORE, PA., Dec. 14—The Autocar Co. has announced a reduction in prices on its standard truck, effective Jan. 3. The type F with a 97-in. wheelbase is reduced from \$2,300 to \$1,950 and type G with a 120-in. wheelbase from \$2,400 to \$2,050. The new 2-ton heavy duty truck with a 114-in. wheelbase is priced at \$2,950 and with a wheelbase of 138 in. at \$3,075. The new 5-ton heavy duty truck with a 120-in. wheelbase is listed at \$3,950 and with a 156-in. wheelbase at \$4,100.

## GARFORD PRICES REDUCED

ELYRIA, OHIO, Dec. 12—The Garford Motor Truck Co. has reduced prices on its entire line of trucks, the cuts ranging from \$100 to \$340. The 1½-ton chassis at \$1,990 is \$100 under previous price and the 2-ton chassis is reduced \$340 from \$3,190 to \$2,750.



## Bureau of Civil Aviation Proposed

### Automobile Industry Approves Bills Introduced in Both Houses of Congress

WASHINGTON, Dec. 12—Two bills have been introduced in Congress, one by Senator Wadsworth of New York, and the other by Representative Hicks of New York to create a Bureau of Civil Aviation in the Department of Commerce to encourage and regulate the operation of civil aircraft in interstate and foreign commerce, and for other purposes.

The bills are practically the same and have the approval of members of the automotive industry interested in aviation, engineers and others, including the National Advisory Committee on Aeronautics, the Bureau of Aviation of the Navy, and the Army Air Service. These measures were drafted in accordance with the recommendations of the President in his message to Congress for the creation of such an establishment. Similar bills were introduced at the extraordinary session of Congress last summer.

These legislative measures provide for the establishment of the bureau with a commissioner of civil aviation as head, who will receive a salary of \$7,500 per annum. The bureau will be charged with the responsibility of fostering civil aviation in every way possible and of co-operating with the industry and governmental agencies.

#### Provisions of Measures

The measure provides that it shall be the duty of the bureau

- (a) To inspect the design and construction and, if approved, to license the operation of civil aircraft, in order to safeguard life and property.
- (b) To regulate the navigation and operation of civil aircraft through the establishment of aerial traffic rules and regulations, in order to safeguard life and property.
- (c) To designate, approve, and lay out air routes.
- (d) To establish and encourage the establishment of landing fields and air stations.
- (e) To make recommendations to the Weather Bureau as to the necessary meteorological service.
- (f) To study the possibilities for the development of civil aviation in the United States, and to collect and disseminate information in relation thereto.
- (g) To investigate, record and make public the causes of accidents in civil aviation.
- (h) To exchange with foreign Governments, through existing commercial attachés, information pertaining to civil aviation.
- (i) To operate such aircraft as the Secretary of Commerce may deem necessary for inspecting, licensing, regulating, and controlling the operation of civil aircraft, and the establishment of air routes, landing fields, and air stations.
- (j) To prescribe the manner of using air routes and to utilize air navigation facilities and appurtenances.
- (k) To prepare and maintain a compre-

hensive survey and inventory of all industrial and civil aeronautical resources under the jurisdiction of the United States.

SEC. 4. That, subject to the approval of the Secretary of Commerce, and for the purpose of making effective the provisions of this Act, the Commissioner of Civil Aviation shall by regulation provide for—

- (a) Licensing pilots and such other persons engaged in the navigation or operation of civil aircraft as may be required for the public safety, and upon good cause the suspension or revocation of such licenses.
- (b) The registration, identification, inspection, certification, or licensing of all civil aircraft, and upon good cause the suspension or revocation of such licenses.
- (c) The registration, identification, inspection, certification, or licensing of all civil landing fields or air stations, and upon good cause the suspension or revocation of such licenses.
- (d) The conditions under which civil aircraft may be used for carrying and transporting persons or property or for the operation of any civil aerial service whatsoever and the licensing of any such service.
- (e) The prohibition of the navigation of civil aircraft over such areas as may be specified for military, naval, postal, or other purposes, either temporarily or permanently, and either absolutely or subject to such exemptions or conditions as may be prescribed.

### Aeronautical Committee Makes Recommendations

WASHINGTON, Dec. 12—Recommendations for Government development and regulation of aviation are contained in the annual report of the National Advisory Committee for Aeronautics, in which it is observed that if there were transcontinental airways, equipped with landing fields, airdromes and meteorological stations, private enterprise would soon see to the establishment of passenger and freight services. It is added, however, that "the first national airways should be carefully planned to serve military as well as civil needs."

Aviation, in the committee's opinion, should be under the direction of a special bureau in the Department of Commerce, which should both control and foster its development.

One of the points to which special importance is attached is the supply of helium. The sources of this supply are limited, but the United States has a practical monopoly of them. As yet, however, the storage of helium in large quantities presents considerable technical difficulties, and the gas is said to be escaping into the atmosphere at a rate sufficient to fill four large airships weekly. The committee accordingly recommends that the Government acquire and seal the best helium producing fields until the experiments now going on for the development of helium-using airships have progressed further.

#### OHIO TO HOLD COURSES

COLUMBUS, Dec. 12—Practical courses in the operation of tractors and gasoline engines, under the auspices of the Ohio Department of Education will be given in many sections of the State.

### BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

During the past week a slight stiffening in the rates for call money was shown. The quotations ranged from 4½ per cent to six per cent as compared with 4½ per cent to 5½ per cent for the previous week. There was little change, however, in the rates quoted for fixed date maturities from sixty days to six months, quotations ranging from 5 per cent to 5½ per cent as against a fixed rate of 5 per cent in the previous week. Prime commercial paper remained unchanged at 5 per cent to 5½ per cent. In general, trading was dull with no special features, and the volume of business transacted was light.

The Federal Reserve statement as of Dec. 7, 1921, showed a further increase in the total reserve ratio from 72.7 per cent to 73.1 per cent. Inter-Reserve Bank borrowing is rapidly being eliminated, according to the last statement, which shows rediscounts of only \$6,175,000 held by the Boston bank and chargeable against the Dallas and Atlanta institutions. The Richmond bank has settled its entire indebtedness to the other banks. A year ago these three Southern banks owed over \$82,000,000.

The total reserves of the New York institution decreased \$37,458,000, while total bills on hand increased \$32,087,000. Total earning assets showed an increase of \$29,186,000, and Federal Reserve notes in circulation \$10,126,000. The ratio of total reserves to deposit and Federal Reserve note liabilities combined decreased from 83.6 per cent to 81.6 per cent, while the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, decreased from 137.5 per cent to 130.7 per cent.

One of the most noteworthy features in the week's financial markets was the further strength and continued activity of bonds, with a strong demand for both old and new securities. During the week, Victory 4½'s sold above par.

On Dec. 12, the Department of Commerce announced the United States foreign trade figures for November. The value of exports during November, 1921, totaled \$295,500,000 as compared with \$343,597,000 in the preceding month and \$676,528,000 in November, 1920, while imports for the month of November amounted to \$211,300,000 as compared with \$188,080,000 in October and \$321,209,000 in November, 1920. Exports have not been so small since August, 1915, when the total amounted to \$260,609,995.

This gradual reduction in the excess of exports through a steady increase in imports, together with the improved favorable trade balance in British foreign trade, may be one of the fundamental reasons for the marked advance in sterling exchange, which on Dec. 12, at \$4.24½, demand quotation, set a high level for the year and the highest since the last week of September, 1919.

## INDUSTRIAL NOTES

Rauch & Lang, Inc., has increased its production output of electric cars. H. H. Doering, general sales manager, has returned from an extensive trip through the West, during which he established a number of new agencies and put those previously established on a more active basis. He reports Pacific coast prospects as particularly encouraging. The company has recently made some large sized shipments to Pasadena and other coast points, and is also doing a good business in the Chicago and Washington, D. C., districts. Its new models will be ready soon after the first of the year.

Western Reserve Mills Co. of Georgia, manufacturer of automobile tire fabrics, has completed development work at its large plant at Quitman, Ga., and started operations early in December. The plant is owned by the Mason Tire & Rubber Co., being acquired recently by outright purchase and the fabric manufactured will be used entirely in Mason tires. About \$85,000 worth of new machinery was installed in the plant. The same company also acquired by purchase a textile plant at Millen, Ga., which will be used for the manufacture of tire fabric.

Huntington Automotive Co. has been formed to take over the Borland piston works, of Huntington, Ind., near Fort Wayne. The new concern will manufacture automobile parts and accessories. The company has a capital stock of \$100,000 and the directors are as follows: Harry L. Slack, Fort Wayne; Jacob B. Neff, Milford; Henry M. Myers, Huntington; William S. Gordon, Converse; George Sever, Columbia City; J. Archie Borland, Huntington; John Betz, Huntington; Perry Miller, Roanoke and Ora and Wilber Highley, Converse.

Inner-Guard Tube & Rubber Co., organized in St. Louis to manufacture and market an inner tube with special puncture resisting qualities, has opened offices in the Bank of Commerce Building that city as a preliminary to locating a factory. Louis Goodhart is president of the company. The other officers are Paul Van Tuyl, vice-president. John H. Heltman, secretary and John S. Hatz, treasurer. The directors are Lew Burnham, R. C. Hinds, Walter Heintz, L. H. Boyd and Charles R. Rawlin.

B. J. S. Products Corp., New York, has elected new officers as follows: President, John C. Baker, consulting chemist of Wallace & Tiernan, Belleville, N. J.; vice-president, S. S. Parsons, Philadelphia; secretary-treasurer, Francis J. Tietz, New York. The corporation reports that it has made considerable strides in obtaining important new business in the last 60 days, and states that production is steadily increasing under new sales direction.

Kelly-Springfield Tire Co. officials announce that all employees at the Cumberland, Md., plant who were given a furlough Nov. 11, will be taken back gradually and the plant which has been operating four days a week will be put on a full time basis. Improved business conditions are stated to be responsible for the resumption.

W. A. Thompson, president of the Crisp County Lumber Co., of Cordele, Ga., heads a new company formed in that city to establish a plant for the manufacture of automobile storage batteries. The main unit is under construction and will be completed in time to start operations by the first of the year.

Miller Rubber Co. has opened a factory branch in St. Louis to handle the wholesale or dealer business on Miller tires, tubes and rubber goods in the St. Louis district. The Fishell Tire Service Co. will continue to retail and give service on the tires in the city. The manager of the branch is G. K. Meeks.

Mueller Electric Co., Cleveland, has disposed of that part of its business under which it acted as manufacturer's agent to J. Ellis Black, a former employee. The sale was deemed advisable in view of the growth of the manufacturing end of the company.

Authorized Motor Parts Corp., incorporated in Missouri has opened a service station in St. Louis for the Continental motors, Spicer propeller shafts and universal joints, Borg and Beck clutches and parts and Timken commercial axles.

Earl Philadelphia Motor Car Co. has been appointed distributor in the Philadelphia district for Earl motor cars. John C. Baggott is president; R. M. McCormick, vice-president and John R. Thomas, secretary and treasurer.

Chadick, DeLamater Corp., authorized distributor for Continental Motors parts, has signed a contract with the Warner Gear Co. of Muncie, Ind. to represent it for service parts in the New York Metropolitan territory.

London Motor Plow Co. is making plans for the removal of its plant from London, Ohio, to Springfield. E. H. Daniels, the inventor of the plow, is backed by Columbus and Springfield interests, it is understood.

Springfield Coach Works, Springfield, Mass., plans an early enlargement of its factory. Orders for bodies for the Rolls-Royce, Lincoln, Mercer and Cadillac companies have kept the concern busy at production.

Buda Engine Service Co., St. Louis, has been appointed by the Buda Engine Co., Harvey, Ill., its official representative and authorized parts distributor in Eastern Missouri and Southern Illinois.

American Southern Motors Corp. has secured an amendment to its charter changing its name to the Irving Automobile Co. This company manufactures the Vaughan car, custom built.

Lorenz Bros. has been appointed Franklin distributor in Eaton, Ingham, Shiawassee and Clinton counties, Michigan, with headquarters in Lansing.

Mutual Truck Co. plant, Sullivan, Ind., will be offered at public sale by the receiver on Dec. 22.

European Race Drivers  
Coming to Indianapolis

PARIS, Nov. 28 (*By Mail*)—Victor Hemery, Albert Guyot, Louis Wagner and Pietro Bordino are among the European veteran race drivers who may be expected to take part in the 500-mile race at Indianapolis. Hemery and Guyot are members of the French Roland-Pilain team and are now assisting in the production of a set of 122-cubic inch cars which have been entered for the French Grand Prix race. Five cars are being built, two of them being intended for Indianapolis and the three others being reserved for the French classic.

Louis Wagner and Pietro Bordino are negotiating with the Fiat Co. of Turin to send two of their eight-in-line, 183-cubic inch racing mounts to Indianapolis.

## FINANCIAL NOTES

Durant Corp. is offering a limited number of shares of common stock of the Continental Motors Corp. at \$6 a share. Terms of payment are \$2 a share with application and \$2 on the fifteenth of each month thereafter until the contract is completed. No subscriptions will be accepted from any one individual for less than five or more than 20 shares.

General Jobbing Co. creditors, Davenport, Iowa, to the number of twenty, have filed suits against the company to collect more than \$7,000 on notes. The securities were issued a year ago at the time of the reorganization. Charles B. Kaufman and Charles C. Kaufman are co-defendants in the suit. The company was formerly the Mid-West Motors Corp.

H. H. Franklin Mfg. Co. announces that its preferred stock will be withdrawn from sale on Dec. 17. Company officials state that since the stock was first placed on sale, Oct. 6, 1919, preferred and common stock to the amount of \$6,289,425 has been sold direct to the public up to Dec. 1 of this year.

Zenith Tire & Rubber Co.'s affairs will be thoroughly investigated by the Federal court at Toledo. Application for a receiver has been made but before definite action is taken the court will require that all books be brought before it and officers testify as to conditions.

Portage Rubber Co., has been incorporated with an authorized capital of \$1,500,000 to manufacture casings and tubes. The incorporators are Francis Selberling, Robert Guinther, J. B. Huber, R. L. Brannan and C. E. Hamlen.

Preston Motors Corp., Birmingham, Ala., a Delaware corporation, has filed with the Georgia Securities Commission an application to sell \$250,000 of its preferred capital stock in Georgia, authorized capitalization \$10,000,000.

International Motor Truck Co. declared the regular quarterly dividends of \$1.75 on the first and second preferred stocks, both payable Jan. 1 to stock of record Dec. 20.

Hupp Motor Corp. declared its regular quarterly dividend of 1% on preferred stock, payable Jan. 1 to stock of record Dec. 20.

Reo Motor Car Co. has declared a regular quarterly dividend of 2% on its capital stock, payable Jan. 2 to stock of record Dec. 15.

Pioneer French Aviator  
Leblanc, Dies in Paris

PARIS, Nov. 27 (*By Mail*)—Alfred Leblanc, pioneer aviator, and general manager of the Bleriot Aviation Co., died here this week at the age of 52. Leblanc, who was a spherical balloon enthusiast and established a world's distance record in 1907, was one of the first men in France to take up flying.

## CADILLAC GIVES SILVER FOBS

DETROIT, Dec. 14—Cadillac employees numbering 270 were given silver watch fobs at a dinner Monday night in token of their having completed five years continuous service with the company. There are now 1174 five year men.

## MEN OF THE INDUSTRY

William H. Klett, for the last three years connected with the John N. Willys Export Corp. has severed his connection with the corporation to become manager of the automobile department of Mohler y De Gresa Sucs., South American distributor for the Overland, Willys-Knight, Chalmers and Cadillac cars in the City of Mexico. Klett has been representing the export corporation in Mexico and Cuba with headquarters in the City of Mexico for the last two years. Prior to that he was identified with the Carhart Motor Co. of Oklahoma City, and, later as sales manager for the Overland Springfield Motor Co. at Springfield, Mo.

John Yoke has been named as commercial manager of the Handley-Knight Co. of Kalamazoo. Yoke was formerly connected with the wagon end of the Studebaker Co. and left that branch in 1910 to become connected with the newly created automobile division. In 1913 he became associated with Maxwell, first as special representative and later as sales manager. He joined the Willys-Overland organization in 1916 and until now has had charge of branch sales activities in Toledo.

G. B. Sharpe for the past fifteen years identified with the farm machinery industry, has been appointed advertising manager of The Burroughs Adding Machine Co. For the last two and a half years Sharpe has been assistant general sales manager of the Cleveland Tractor Co. Previous to going to Cleveland, Sharpe was with the De Laval Separator Co. in New York for nearly ten years and, before then was advertising manager for Studebaker Corp. for four years.

L. C. Alexander has been appointed manager of the Western Ohio territory with headquarters in Columbus for the Eclipse Mfg. Co., manufacturer of the Hercules spark plug. Alexander was formerly Cincinnati branch manager of the Goodyear Tire & Rubber Co., has been connected with the Firestone Tire & Rubber Co. handling national accounts and has been factory district representative of the Pierce-Arrow Motor Car Co.

P. T. Irvin, formerly manager of the drill division of the Greenfield Tap and Die Corp., Greenfield, Mass., has been placed in charge of the recently consolidated small tool and drill division of the corporation. For the past three years Irvin has been sales manager of the Lincoln Twist Drill Co. and prior to that was sales manager of Wells Bros. Co. of Greenfield.

George H. Layng has resigned as vice-president and manager of manufacturing of the Cadillac Motor Car Co. to accept the same offices and responsibilities with the Peerless Motor Car Co. Layng's service with Cadillac extended over a period of nearly 16 years. He joined the organization in 1905 as foreman of the chassis department, making single-cylinder cars.

Peter Brown and Bernard R. Banks, manager of the motor department of Brown Brothers, Ltd., motor and cycle accessories firm in London, England, will be at the Belmont hotel, New York City, from Dec. 27. Their purpose in coming at this time is to visit the national automobile show in New York.

R. B. Kayser, formerly assistant sales manager of the Chevrolet Motor Co., located at the general offices, has resigned to accept a similar appointment with the Durant Motor Car Co. of New York. Kayser has been associated with the Chevrolet organization for the last eight years.

Morris Jones, who has been with the tractor division of the Ford Motor Co. at the Dearborn and Highland Park plants, has organized with John R. Weaver the firm of Morris Jones, Inc., which will be an additional Ford and Fordson dealer in Philadelphia in the Overbrook district.

Julian M. Case, for the past few years identified with Scripps-Booth, United Motors Co. and the Garford Motor Truck Co. as advertising manager, has joined the Fred. M. Randall Co., advertising agency in Detroit, as vice-president in charge of sales and merchandising.

L. R. Clare, formerly connected with the Hudson Motor Car Co. and industrial engineer of Chicago and San Francisco, has become connected with the Leach Biltwell Motor Car Co. Clare will have supervision of the personnel at the factory of the Leach company.

L. B. Southerland has been appointed general manager of the Chicago branch of the Cadillac Motor Car Co., and C. A. Englebeck has been promoted to branch sales manager succeeding him. L. B. Dimond has been named assistant sales manager.

Bertram A. Doran, formerly assistant branch manager in the Orient for General Motors Export Corp. has been appointed special representative of the export department of Maxwell-Chalmers in the Far East.

W. J. Shay, for the last seven years associated with the Champion Spark Plug Co. of Toledo, has been appointed sales manager of the automotive division of the Columbus McKinnon Chain Co.

L. M. Bradley, former general manager of the Motor & Accessory Manufacturers Association, has joined the organization of the C. G. Spring Co., Kalamazoo, Mich.

## American Turn-Auto Co. Obtains Patent Rights

COLUMBUS, Dec. 14—The American Turn-Auto Co., which was chartered under Ohio laws but later formed into a partnership consisting of Howard M. Bettett and R. C. Penfield, the latter of Bucyrus, has taken over the American rights and patents formerly held by the Turn-Auto Co. of Columbus, manufacturer of a device to turn an automobile over on its side while making repairs.

The office is located at 40 West Gay Street and the device is being manufactured by the Hatfield, Penfield Steel Co. of Bucyrus under contract. The Turn-Auto Co. does not go out of existence as that concern owns foreign rights to the device.

## SLIGHT INCREASE IN DALLAS

DALLAS, Dec. 14—The automobile business during the first 15 days of the last month of the year was said by retailers here to be about as good as that of any 15 days of the year. There had been increases in sales, as applied to both new and used cars, during the past few weeks by most of the dealers of Dallas and north Texas. The actual retail sales for the first 15 days of December showed a slight increase of a similar period for November. Dealers said some of the business was holiday trade,

## METAL MARKETS

Activity in the metal markets, so far as business for immediate delivery is concerned, has dwindled to negligible proportions. Consumers are averse to taking on a single pound of metal which they do not need for immediate operating schedules, all wanting to keep raw material inventories as low as possible. A somewhat different viewpoint characterizes the situation with reference to first quarter 1922 requirements.

Pig iron consumers have begun to place contracts so as to be covered, at least in part, for the first three months of the coming year and, while automotive foundries have not been very prominent in the market so far, negotiations are now pending in many instances with a view to providing adequate iron for the first three months' melt of 1922. The outlook as to pig iron prices, largely wrapped up as it is in the shaping of freight rates, is one thing and the extent of the supply quite another.

The blast furnaces now in operation have been able to dispose of their output as the result of the routine demand of the last few months and the placing of a fairly satisfactory quota of orders for first quarter 1922 deliveries implies the going into blast of a number of furnaces that had been idle during the better part of the year. Obvious it is that the pig iron producers are playing close to the cushion in the matter of supply and that they will not permit any excess of stocks over the demand to bear down on values, regardless of what other factors may contribute toward a further downward readjustment of prices.

On the surface the steel market, as is usually the case immediately preceding the holiday season, has gone to sleep. Far-seeing buyers, however, are making good use of the present by attending to the preliminaries of the actual placing of orders. They are sounding the market in a cautious way and, while they are withholding the signature on the dotted line for the time being, they are prepared to reap the benefits that come from being the early bird in a buying movement.

Both steel producers and consumers have come to the conclusion that the one factor which continues to retard the return to completely normal conditions is the continuation of unnaturally high freight rates and the producers are agreed with the public carriers that these rates can not be pared adequately except through further wage cuts.

Pig Iron.—Automotive interests are for the most part deferring the placing of representative orders for first quarter 1922 shipment, foundries being generally supplied with enough iron to carry them beyond the middle of next month. The market is rather steady than strong.

Steel.—Prices remain generally unchanged with the demand seasonably restricted. So far not enough representative 1922 business has been placed to afford a clear picture of the trend of values.

Aluminum.—Rumors are afloat that heavy tonnages of virgin ingots held by Detroit interests are being pressed on the market at sacrifice prices, but it is impossible to verify these reports. The sale of 350,000 lbs. of aluminum castings (now at the International Motors Co. plant in Long Island City) by the Government is also a somewhat depressing market factor. Sheets are in fair demand but sellers and buyers are hard to get together on prices.

Copper.—The market has turned quiet and easier.

# Calendar

## SHOWS

Jan. 7-12—New York, National Automobile Show, Grand Central Palace. Auspices of N.A.C.C.

Jan. 9-14—New York, Motor Car Body Exposition, Automobile Body Builders Association, Twelfth Regiment Armory.

Jan. 28-Feb. 4—Chicago, Automobile Salon, Hotel Drake.

Jan. 28-Feb. 4—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

March, 1922—Santiago, Chili, Annual Automobile Show.

April 16—Mexico City, Annual Automobile Show, Auspices of the Automotive Division of the American Chamber of Commerce.

April 22-May 1—Prague, Czechoslovakia, Fourteenth International Automobile Exhibit.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922—Rio de Janeiro, Brazil, Automobile exhib-

its in connection with the Brazilian Centenary Association Automobillista Brasileira.

## CONVENTIONS

Dec. 20—Philadelphia, American Society of Mechanical Engineers.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

Jan. 17-20, 1922—Chicago, American Road Builders Association.

Jan. 30-31—Chicago, Fifth Annual Convention, N. A. D. A., La Salle Hotel.

Jan. 30-Feb. 2—Boston, Sixth Annual Conference of the International Delivery

Association, Copley Plaza Hotel.

June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

Detroit, Dec. 23, Feb. 24, Mar 24, April 25, May 26.

New York, Jan. 10-13, 1922—Annual Meeting.

Chicago, Feb. 1

Minneapolis, Feb. 8-9—Annual Tractor Meeting.

## Appraise Lincoln Physical Property

### Receiver Has Detroit Figures—Work on Eastern Holdings Not Completed

DETROIT, Dec. 14—Whether Lincoln Motor Co. is to be reorganized and continue the manufacture of motor cars or is to undergo dissolution, will depend largely upon the outcome of the hearing for the cancellation of the \$4,500,000 supplementary Federal tax assessed by the Treasury Department, which will be moved this week by the Detroit Trust Co., Lincoln receiver.

The attitude of the men who have the disposition of Lincoln in hand will be guided to a large extent by the outcome. Should the taxes be waived, or reduced to a figure compatible with the power of the company to pay, reorganization is confidently looked for.

**Creditors Meet Dec. 28**

The appraisal of the physical properties in Detroit has been completed and the figures are in the hands of the receiver. These will be filed in Federal court here and presented in support of the tax appeal at Washington. The filing has been delayed pending the completion of appraisals by ancillary receivers in the East, where the company has properties aggregating several hundred thousand dollars.

A creditors' meeting has been formally fixed for Dec. 28, by which time it is expected determination will be made on the tax claims. The company's financial condition as of Nov. 8 will be presented and definite action decided upon.

Sales of cars at the plant are continuing at the rate of three a day.

## CZECHO-SLOVAKIA ACTIVE

NEW YORK, Dec. 12—A communication from the Automobile Club of Czechoslovakia with headquarters at Prague indicates that there is considerable automotive activity in that country. The 14th international automobile exhibition will be held at Prague, April 22 to May 1.

## New Tariff Regulations Cover Canadian Shipments

WASHINGTON, Dec. 12—Federal authorities have called upon postmasters throughout the country to notify shippers that amendments to the Canadian tariff laws effective Dec. 31, should be noted. The regulations apply to freight, express and parcel post shipments.

The regulations apply to "all goods imported into Canada capable of being marked, stamped, branded, or labeled, without injury, shall be marked, stamped, branded, or labeled in legible English or French words, in a conspicuous place that shall not be covered or obscured by any subsequent attachments or arrangements, so as to indicate the country of origin. The stamping, branding, or labelling shall be as nearly indelible and permanent as the nature of the goods will permit."

## NEW REO TAXI CHASSIS

DETROIT, Dec. 15—The Reo Motor Car Co. has developed a special taxi chassis which will be shown for the first time in the New York Reo branch the week of the New York show. The model is designed to meet the rough use to which a taxicab is subjected, with special attention to acceleration and brakes. The model is the design of H. T. Thomas, Reo engineer.

## CHIEF READY FOR BIG OUTPUT

PORT HURON, MICH., Dec. 15—The Chief Motors Corp., which manufactures engines for the Whitney Tractor Co. at Upper Sandusky, Ohio, has completed the installation of machinery for the production of 500 engines a month. About 100 will be built in January and the organization will be expanded to take care of the larger production after Feb. 1.

## ASK NEW GARY RECEIVER

INDIANAPOLIS, Dec. 15—Creditors of the Gary Motor Truck Co. appeared in Federal Court here to-day and asked for the appointment of a new receiver. Creditors of the company are said to be interested in a reorganization plan under which it is proposed to provide \$150,000 new capital.

## Conferences Held on Truck Loading

### Connecticut Officials to Co-operate With Industry in Wiping Out Evil

HARTFORD, Dec. 13—Representatives of the National Motor Vehicle Conference Committee conferred here yesterday with Motor Vehicle Commissioner Stoeckl on the State law designed to prevent the over-loading of motor trucks. It was made clear to them that the State officials would co-operate to the fullest extent with the automotive industry in its efforts to wipe out the over-loading evil.

### Ruling Led to Meeting

The conference was the direct result of the ruling by the Connecticut authorities that trucks will be permitted to carry more than their rated load whenever their makers will certify that their operation will be entirely safe with the heavier load. This ruling was made at the earnest request of truck operators, but it was opposed by the National Motor Vehicle Conference Committee, which was represented at the conference by D. C. Fenner, its chairman, and F. W. Fenn, secretary of the National Automobile Chamber of Commerce. They do not believe trucks should carry more than their rated load.

### Maker's Word Accepted

It was explained by Stoeckl that if a manufacturer gave formal notice that a 3½-ton truck could safely carry a 5-ton load, the vehicle would be re-rated as of 5 ton capacity and would be taxed accordingly.

The Connecticut authorities contend that not only do over-loaded trucks seriously damage State highways, but also that they are a prolific cause of traffic accidents. It is asserted that the number of highway mishaps has decreased appreciably since rigid regulations against over-loading were adopted in that State.

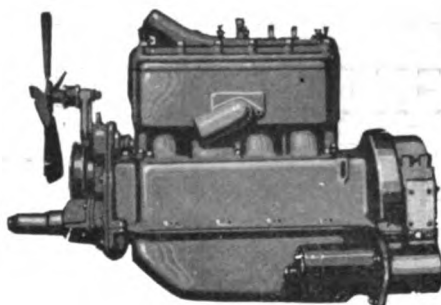
# AUTOMOTIVE INDUSTRIES

## *The* AUTOMOBILE

Vol. XLV  
Number 25

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, DECEMBER 22, 1921

Thirty-five cents a copy  
Three dollars a year



**Simple, durable, economical—the LYCOMING Motor gives manufacturer and buyer alike what they most want in the engine**

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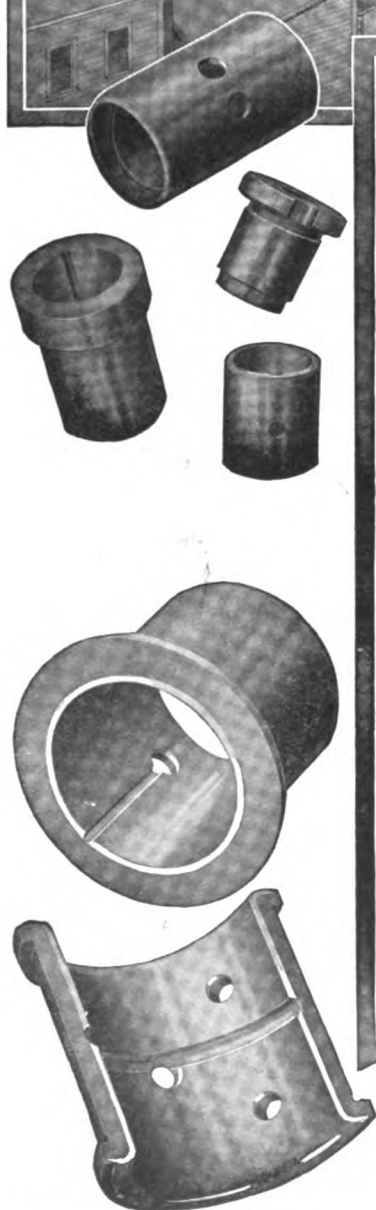
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Write for detailed description to assure yourself of the advantages of this exceptional motor.

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**DETROIT - MICHIGAN**

# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, DECEMBER 22, 1921

No. 25

## 94% of Sales Will Be of Cars Selling Under \$2,000

Statistics given here will aid the executive to plan production and sales effort according to possibilities of his particular market. Price class sales are analyzed. "Over \$3,000" group comprises 2% of total.

By Norman G. Shidle

Charts and Statistics by Raymond B. Prescott

**P**RODUCTION and sales plans made on the basis of accurate data will save thousands of dollars to automotive concerns. In this second article of a series presenting specific information for this purpose, the first step can be taken in segregating the general statistical data into its component parts so that the particular car may be considered as related to its price group.

These results are of vital importance to every car manufacturer, both those who have been in the field for many years and those who have entered the business more recently. Successful operation, especially during the business period which we are entering depends upon a proper relation between manufacturing capacity, sales cost, overhead expenses and market possibilities. Production plans must be based upon facts and upon accurate market analysis, in so far as possible, rather than upon hopes and inspiration.

The first article, published Nov. 17, presented figures showing the probable growth of the passenger car industry during the next five years as regards both sales and production and pointed out how these figures could be utilized in planning. That article dealt with the passenger-car industry as a whole. It

was shown that the industry was in sound condition, that a return to normal might be expected within two or three years, and that an excellent market for passenger cars in general is available in the immediate as well as the more remote future.

The individual manufacturer, however, needs more detailed data upon which to lay more detailed plans. Only in a very general sense can every passenger car be said to compete in sales with every other passenger car. Competition is largely confined to cars in the same price class. Thus in making output plans, the individual manufacturer is concerned chiefly with the market available for cars of his price group.

The figures shown in the accompanying table indicate the percentage of total production or sales for the year in five major price classes. Actual production figures are also included, but the material can best be discussed as regards percentages. The limits of the price groups have been made broad enough so that a year-to-year comparison of percentages is affected only slightly by the changing of cars from one price group to another. Ford, for instance, with its immense production, has always been in the "Under \$1000" group despite numerous price fluctuations since 1905. This is true of most other cars as related

to their specific price group, although the movement of Dodge in 1919 and 1920 from the "Under \$1,000" group in the \$1,000 to \$2,000 group affects the figures for those years. The percentages in the \$3,000-\$4,000 and "Over \$4,000" groups have been considerably affected, however, during the last few years by the changing from one group to the other of the Cadillac, which has, of course, a relatively large production for a car of this price class.

These particular instances, however, are the chief ones in which the percentages are affected in that way. Consequently, it is feasible to compare the percentages of one year with those of another.

From 1905 to 1910 the cars in the \$1,000-\$2,000 class predominated; that is, they formed a larger percentage of the total cars sold during each of these years than any other price group. This marked the early part of the commercial development of the industry, but preceded the real growth of Ford sales. The figures for this period are interesting rather as history than as factors in present calculations, since they cover the period before the automobile had really taken its place as a definite factor in American transportation and social life.

In 1912 the cars selling for less than \$1,000 first took the predominant place in volume sales which they have held ever since. For the practical purposes of determining markets at the present time, the figures from 1912 to 1920 are the most valuable. Studying these figures alone, certain significant facts stand out.

1. Cars selling for less than \$1,000 have comprised more than 60 per cent of total sales in every year.
2. Cars priced between \$1,000 and \$2,000 have never been less than 14 per cent nor more than 30 per cent of the total sales of any given year.
3. Cars priced between \$2,000 and \$3,000 have varied from 2 per cent to 5 per cent of the total sales of any given year.
4. Cars priced between \$3,000 and \$4,000 have varied between 0.4 per cent and 2.2 per cent of the total sales for any given year.
5. Cars selling for more than \$4,000 have varied between 0.3 per cent and 3.8 per cent of the total sales for any given year.

Granting that the figures from the years 1912-1920 are those most useful in making plans at present, they may be summarized in another way to bring out clearly certain trends. Taking total sales for these nine years, the percentage of cars sold in each price class as related to total sales during this period is approximately as follows:

Under \$1,000	.....70%
\$1,000-\$2,000	.....24%
\$2,000-\$3,000	..... 4%
\$3,000-\$4,000	..... 1%
Over \$4,000	..... 1%

These averages should be considered in relation to the list showing the limits of variation in each class. Viewed in this way, it becomes apparent that the averages may properly be considered as indicative of a general and permanent trend. This is true because the fluctuations from year to year are comparatively slight. The chart shown in Fig. 1 illustrates this graphically.

This chart shows the yearly per cent of variation in each price class from the average for the years 1912 to 1920 inclusive. The widest fluctuation is shown in the "Under \$1,000" class, but this maximum is only about 4 per cent. During the years 1914, 1915 and 1918 there was very little fluctuation in any class. This is significant, since these years were nearer to being normal commercial years than any other included in the period.

It is significant, too, that the percentage of total production included in any one price group appears to vary directly in relation to the average wholesale price of all cars produced. Thus the following table shows that in 1912, 1913 the average price of all the passenger cars produced was about \$900, and that in 1919 and 1920 it was approximately the same. A glance at the percentage of cars produced in the various price classes shows that there is practically no variation for these four years. Approximately the same thing is true of the two intervening years, 1916 and 1917, during which the average price was about the same. Thus

on the basis of past records the law may be tentatively laid down that the percentage of cars produced in a given class will vary directly with the average price of all cars produced.

It is interesting to see how this will work out for the year 1921, the comparison being made on the basis of production figures for the first three quarters. The average wholesale price of all cars produced during those first three quarters of 1921 was approximately \$700. Now we may forget, for the moment, the actual production figures and attempt to determine, simply with the average wholesale price as a

basis, what percentage of cars have been produced in each of the various price classes. This can be done by applying the tentative law just outlined. On this basis of determined average wholesale price, the following results are obtained as regards the distribution of 1921 production to the various price groups.

Under \$1,000	\$1,000-\$2,000	\$2,000-\$3,000	\$3,000-\$4,000	Over \$4,000
75%	19%	4%	1%	1%

But it is possible to check the operation of this law in this case, since actual production figures for these first three-quarters of 1921 are available.

Segregating, then, the actual production figures for the first three-quarters of 1921 into price groups, and comparing them with the calculated percentages determined, we get the following:

	Under \$1,000	\$1,000-\$2,000	\$2,000-\$3,000	\$3,000-\$4,000	Over \$4,000
Calculated	75%	19%	4%	1%	1%
Actual	73%	21%	4%	1%	1%

The slight variation which is shown by these figures gives additional stability to the theory that the figures given may properly be used as a sound basis upon which to base approximate future predictions.

The conclusion may thus be drawn that something like 70 per cent of passenger car sales in the future will be of cars which sell for less than \$1,000, while about 24 per cent will be in the \$1,000-\$2,000 class.

About 4 per cent of the total sales will probably be of \$2,000-\$3,000 cars, while cars selling for more than \$3,000 will comprise only about 2 per cent of the total.

In the Nov. 17 article general production and registration predictions were made. This article presents the percentage of the total sales which may logically be expected by a given price group. In making plans, the manufacturer should correlate these percentages with

"Over \$4,000" group retrograded steadily from 1912. Its accentuated growth during 1919 and 1920 was due chiefly to the coming into that class of a relatively large production car which had already attained production proportions in a lower price class.

The uniformity of the percentages of the various price classes during the last nine years indicates, as shown, that the percentage of total sales which may be expected

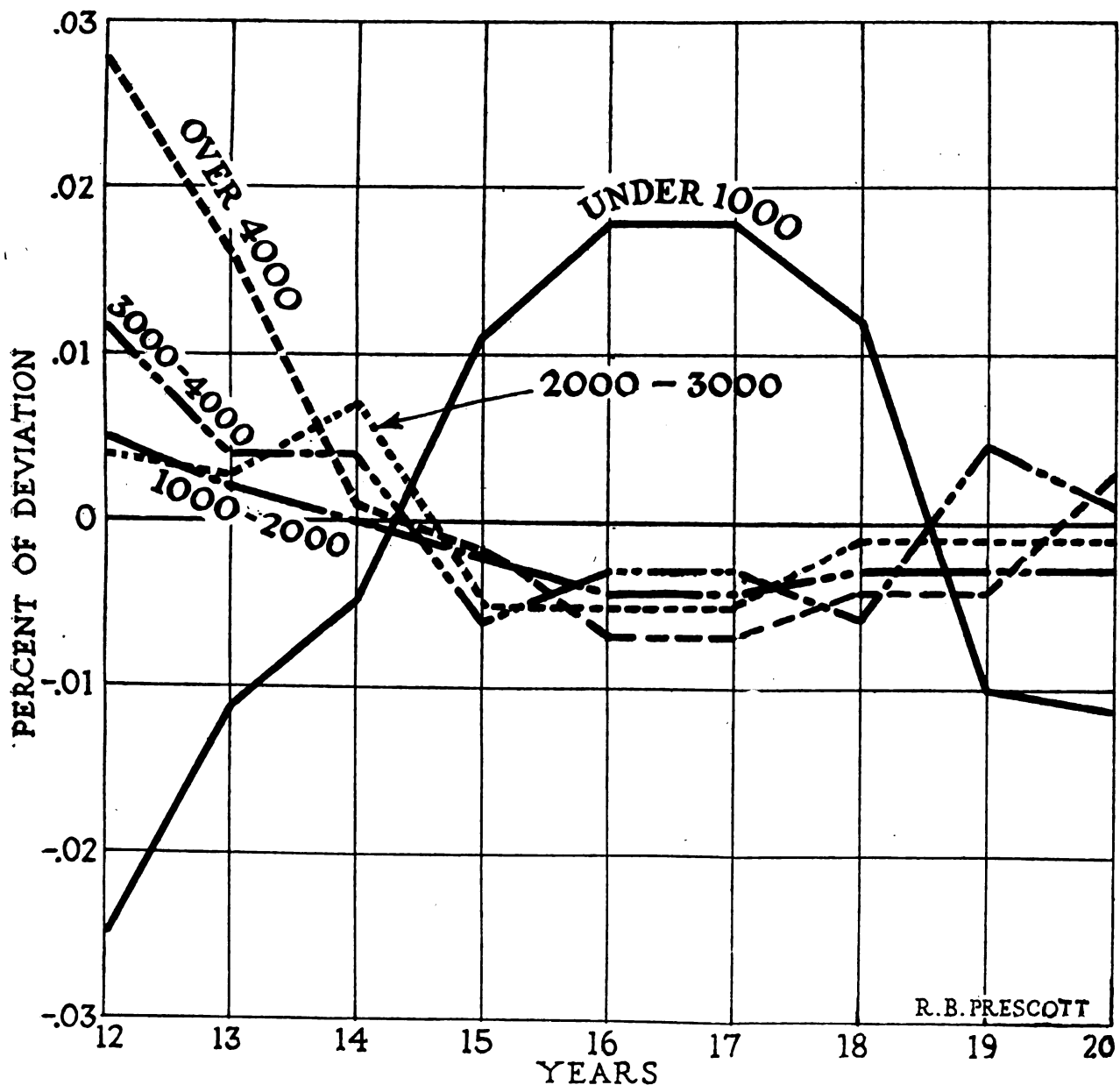


Fig. 1

the total production curve previously given. On this basis, he can determine with a fair degree of accuracy, the number of cars which will probably be produced in any given price class in a given year.

In this connection it is interesting to note the rate of growth of the various price classes as shown in Fig. 2. In constructing this chart the year 1912 has been taken as a basis and rated as 1.00. Then on an index figure basis, the growth of the various price classes from 1912 to 1920 has been drawn.

The curves show that the rate of growth of the low-priced car has been greater than that of any other price class, and that the growth of this lowest price group has been less subject to ups and downs than any other with the possible exception of the \$1,000-\$2,000 group. The

by the various price groups is fairly well fixed within certain limits. The individual manufacturer then can logically expect to increase his market to any material extent only within the limits of his price group. The sale of an individual car can be increased in only three ways:

1. By taking some of the business away from other cars in the same price group.
2. By some other manufacturer in the price group going out of business.
3. By selling to new car buyers, a certain percentage of which are prospects for the given price class car.

No radical or rapid growth in sales can be expected by any individual manufacturer as a result of the first means. It is possible, of course, for a superior product

to make inroads upon the sales of less efficiently made or marketed products. Where these other products are already established, however, they will continue to make many sales simply because of their past momentum. Every manufacturer is attempting to get a larger proportion of his price class market at the same time and the efforts of each one offset to a given extent the efforts of any individual concern, the resistance varying in accordance with the merit of the competing product and the effectiveness of the marketing methods used in selling it.

In other words, material increase in sales volume in one year or two cannot logically be expected from this first source.

Neither can material increase in sales for a given

product be expected from the second source—the retirement from the field of a competitor. In such a case it is reasonable to suppose that all the remaining makers in that price class will absorb a part of their former competitor's sales, probably in proportion to the percentage of entire sales which each competitor previously held.

The third source can be rather accurately calculated on the basis of the figures given in this article and the previous one maintained.

Thus it appears that the data given can properly be used as a basis for production and sales plans by passenger car manufacturers. Economic and human factors affecting the market, correlated with this statistical data, should form a sound foundation upon which to base such plans.



Fig. 2

### Analysis of Passenger Car Sales by Number and Per Cent.

Year	Under \$1,000	\$1,000-\$1,999	\$2,000-\$2,999	\$3,000-\$3,999	\$4,000 and Over	Year	Under \$1,000	\$1,000-\$1,999	\$2,000-\$2,999	\$3,000-\$3,999	\$4,000 and Over
1905	8,023	10,650	1,253	664	941	1914	352,397	128,950	35,480	7,435	5,306
	.372	.495	.058	.031	.044		.665	.244	.067	.014	.010
1906	6,858	13,854	2,611	1,119	2,256	1915	638,333	155,592	16,010	3,407	6,765
	.257	.519	.098	.044	.082		.778	.190	.020	.004	.008
1907	12,321	18,148	4,109	497	4,483	1916	1,129,393	197,144	26,877	11,087	3,984
	.323	.447	.101	.012	.112		.825	.144	.020	.007	.008
1908	19,322	15,801	2,902	559	4,654	1917	1,418,351	247,058	35,728	12,947	4,393
	.447	.366	.067	.013	.107		.826	.144	.020	.007	.008
1909	41,191	44,440	4,131	6,151	6,785	1918	735,346	153,667	33,635	3,290	5,333
	.400	.434	.040	.060	.066		.789	.165	.036	.004	.006
1910	53,320	81,658	8,221	5,854	9,050	1919	1,040,750	499,924	75,502	25,280	9,816
	.327	.516	.052	.037	.053		.630	.303	.046	.015	.006
1911	No figures available					1920	1,185,407	590,780	86,201	23,841	29,753
1912	128,704	87,274	13,360	5,352	9,055		.623	.310	.045	.012	.016
	.528	.357	.055	.022	.033	1920*	1,059,000	305,000	59,000	15,000	14,500
1913	236,092	111,253	18,219	5,233	9,947		.730	.210	.040	.010	.010
	.620	.292	.048	.014	.026	*Estimated for 1921.					



# Italian Manufacturer Reverts to Poppet Valve Engine

Rotary valve abandoned in new 176 cu. in. four-cylinder engine which is said to develop 43 hp. at 2500 r.p.m. Large jacket space, aluminum pistons, tubular connecting rods, four speed gearset are employed. An integral pressed steel housing is used for the axle and propeller shaft.

**P**REVIOUS to the war the Fabbrica Automobili Itala of Italy manufactured a car with a rotary valve engine in which the valves were arranged vertically in pockets at the sides of the twin cylinder castings, the inlet valve on one side and the exhaust valve on the other, each valve serving for two cylinders. This type of engine was manufactured for quite a number of years and seemed to have established the success of the rotary valve. After the war it was reported that the company had ceased manufacturing automobiles, but lately the firm has come out with an entirely new chassis with poppet valve engine, known as the Model 51. This new model has already made its mark in racing, machines of this design having come in first, second and third in the 183 cu. in. class of the Targa Florio race held on the Island of Sicily.

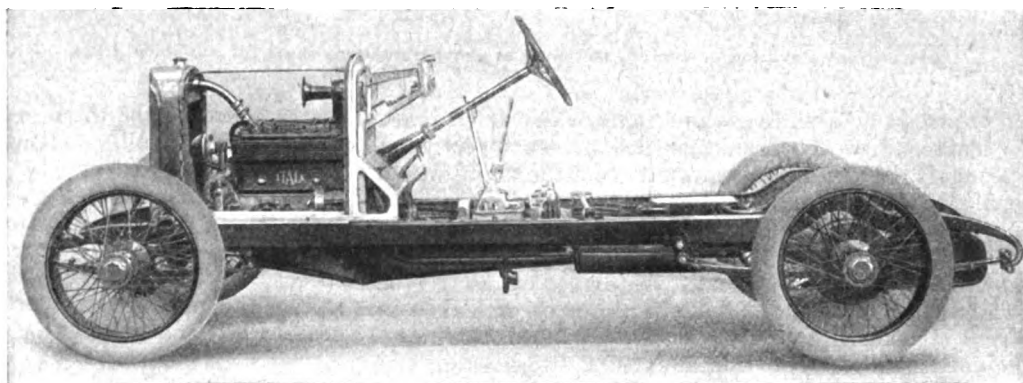
This chassis is made in two lengths of wheelbase, one intended for regular touring bodies and the other, a shorter one for what is known in Europe as a sport type, or what we in this country call a speedster or roadster. In the case of the roadster model some slight changes are made in the engine which tend to increase the power output. As Italian designers have developed a number of distinctive features in automobile design, a description of this latest Italian chassis is likely to be of interest to American technical men.

The engine is a four cylinder one with block-cast cylinders of the L-head type. Bore and stroke are 83 and 130 mm. respectively (3.27x5.12 in.). The cover of the water jacket on the cylinder head is removable and forms the water return manifold. The valve pockets are thoroughly water-jacketed in order to insure efficient cooling of these parts. It will be noticed from the sectional views herewith that the water spaces around the cylinders are very liberal, but there is a common wall between the first and second and between the third and fourth cylinders respectively, which, however, is made of extra thickness.

Aluminum alloy pistons are used, with four piston rings at the upper end, placed two and two in the same ring groove. The piston pin apparently floats in the piston bosses and the top end of the connecting rod, scoring of the cylinder walls being prevented by a snap ring over the ends of the pin. The connecting rods are of the tubular type and are made as light as possible. They are provided with a bronze back, white metal bearings at the

big end and a bushing of drawn bronze at the wrist pin end.

The crankshaft, which is supported by three bronze backed, babbitt lined bearings, carries the flywheel with clutch housing and starter gear ring at the rear end, and the pinion of the helical distribution gearing at the forward end. The driving pulley for the trapezoidal belt of the radiator fan is keyed to the hub of this pinion. The camshaft also is supported in three bearings and actuates the valves through the intermediary of roller type valve tappets which are adjustable as to clearance. A cast aluminum cover plate encloses the valve mechanism.

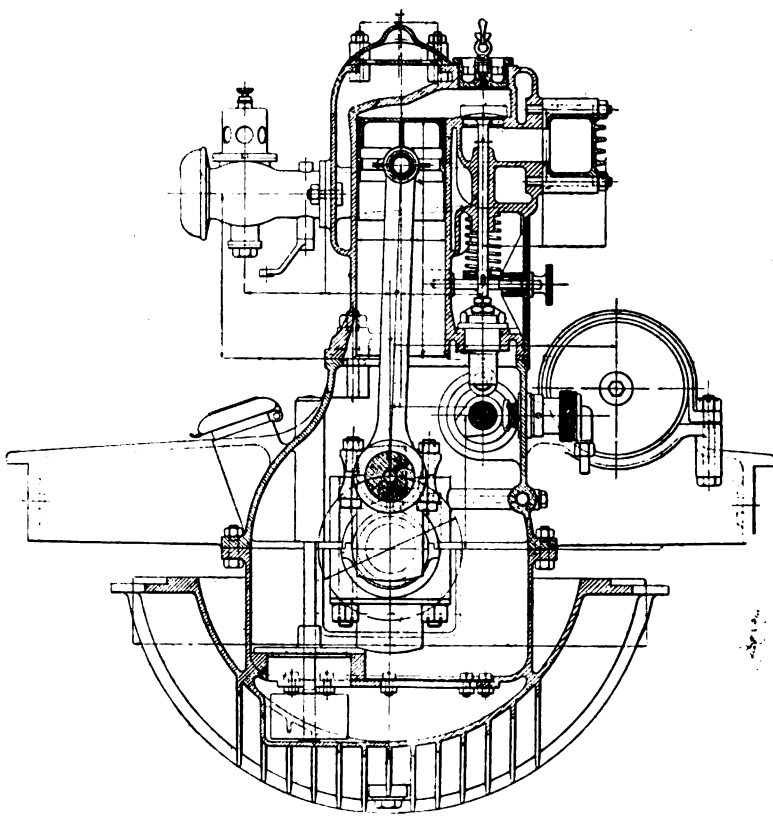
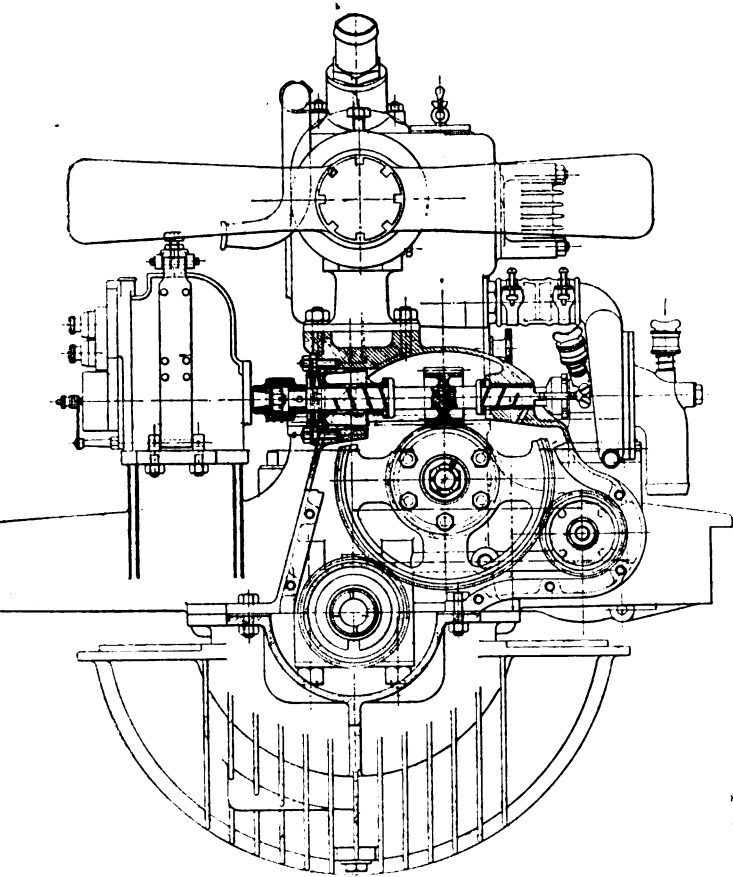


Side view of Itala model 51 chassis

Keyed to the helically toothed wheel on the camshaft is a helicoidal bronze pinion which operates a transverse shaft to which the magneto is coupled at one end and the water pump at the other.

The crankcase consists of two aluminum castings which are joined together in a horizontal plane through the crankshaft axis. The top half is cast with four supporting arms which are sufficiently long to mount the engine directly on the main frame. On the right of the crankcase is located the oil filler which also serves as crankcase breather, while on the left are mounted the electric generator and the starting motor, the latter being located on the rear supporting arm quite close to the flywheel. A noteworthy feature of the crankcase construction is a sort of apron cast onto the lower half of the case. At the rear end of the crankcase there is a semicircular extension to which is secured a sheet metal pan lying close to the flywheel. The upper edges of the apron are flanged for the attachment of filler plates extending to the lower flanges of the frame side members, thus doing away with the need for an underpan. All accessories on both sides of the engine are exceptionally accessible.

Engine lubrication is by a pressure system, the pressure



(Left)—Front elevation of engine, sectioned to show transverse shaft for auxiliary drive. (Right)—Transverse section of engine

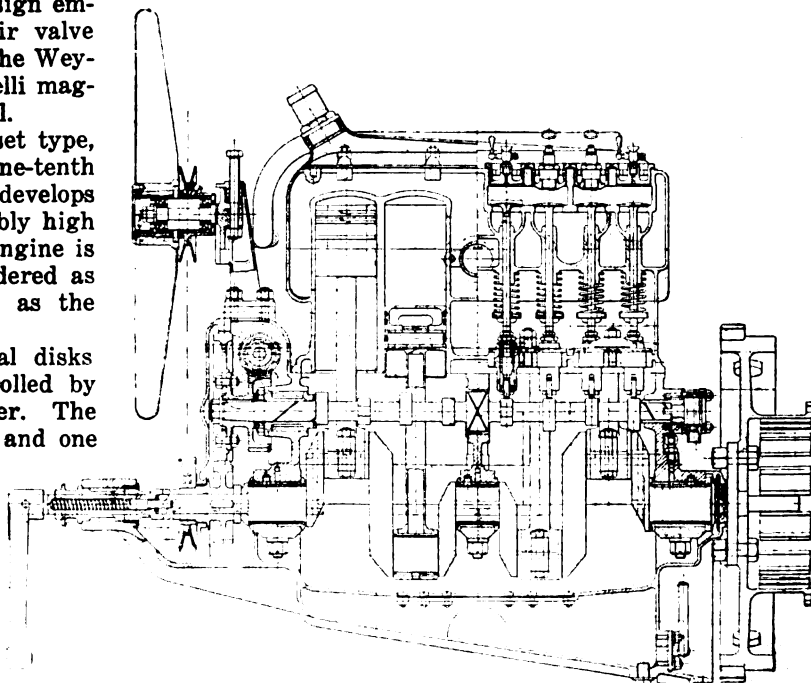
being produced by a sliding vane pump which is fastened to the rear end of the crankcase and driven directly off the camshaft. This pump draws oil from the sump which is separated from the main compartment of the crank chamber by a horizontal, fine-meshed wire screen. It is distributed through an oil tube cast in the upper half of the crankcase from which leads are drilled to all of the main bearings, whence it passes through oil passages in the crank arms and crankpins to the crankpin bearings.

The carbureter is a horizontal type of Itala design embodying the constant level and supplementary air valve principles. Fuel is supplied to the carbureter by the Weymann vacuum feed system. Ignition is by a Marelli magneto with spark control from the steering wheel.

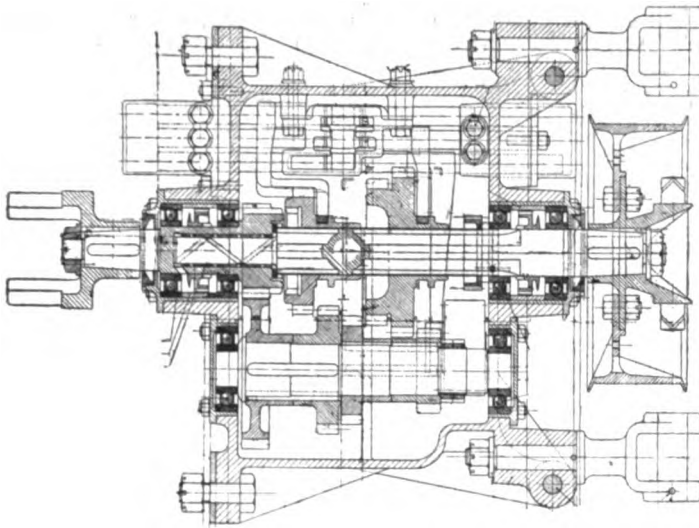
It will be noticed that the engine is of the offset type, the offset being apparently 8 mm. or a little over one-tenth of the bore. It is claimed for the engine that it develops about 50 hp. at 3,000 r.p.m., which is a remarkably high output, especially when it is considered that the engine is of the L-head type which is ordinarily not considered as well adapted to high speeds and large outputs as the overhead valve type.

The clutch is of the dry disk type, the metal disks being faced with Thermoid fabric. It is controlled by means of a pedal which acts on the central spider. The transmission, which affords four forward speeds and one reverse motion, is of the horizontal type. The sliding pinions are mounted on a splined shaft, whereas the gears on the secondary shaft are secured in place by keys and spacers. The high speed is a direct drive and is obtained by means of a positive clutch of the internal and external pinion type, the internal teeth on the second intermediate sliding gear being slid over a projecting portion of the pinion of the constant mesh set. To

the rear end of the third motion shaft is keyed the transmission brake pulley. It will be noted that the shafts, which are mounted on ball bearings, are of very sturdy dimensions, the object in making them comparatively large being to reduce vibration and consequent noisy operation, especially when driving on one of the lower speeds. Attention may be called to the long pilot bearing and to the provision for preventing oil leakage from the gear case. The gearbox is supported by two cross mem-

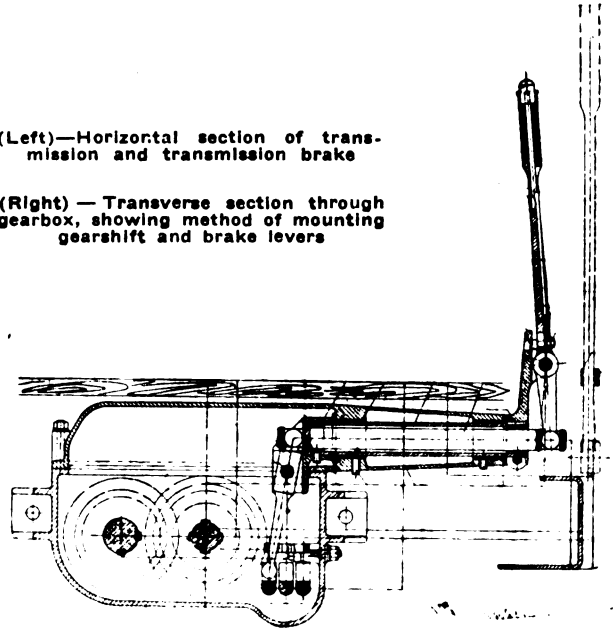


Longitudinal section of engine



(Left)—Horizontal section of transmission and transmission brake

(Right)—Transverse section through gearbox, showing method of mounting gearshift and brake levers



bers of the frame, the connection between the primary shaft and the clutch shaft being made by a universal joint which also has a sliding motion.

Secured to the rear end of the gearcase are two forks to which the forward end of the propeller shaft tube is hinged. The axis of this pivot joint coincides with the center of the universal joint which connects the splined shaft of the transmission to the propeller shaft. This universal is located inside the transmission brake drum and is of a type well known in this country. With the forward end of the propeller shaft housing pivoted to the transmission case, both torque and driving thrust are naturally taken up on this housing. To the shaft extending from the transmission case is keyed one of the helioidal pinions constituting the driving means for the speedometer.

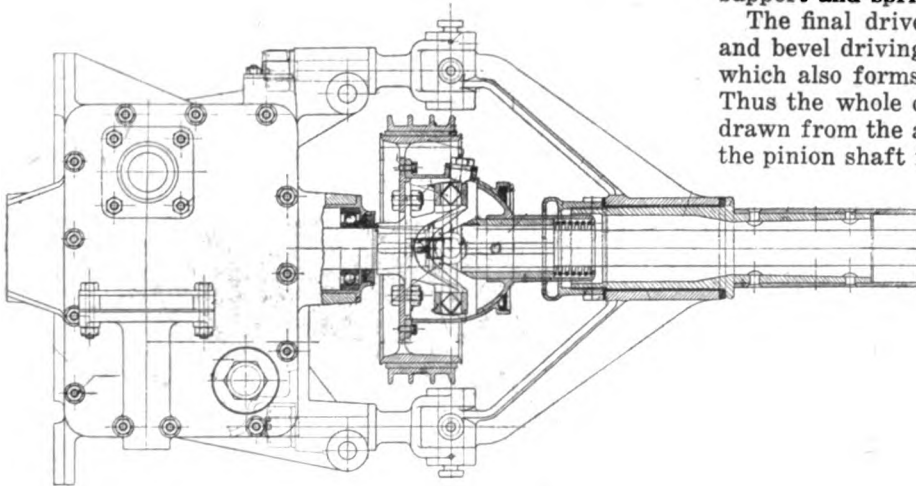
Change speed and brake lever are mounted on a lateral extension of the gearcase cover plate and on the right

hand frame side member respectively. Both levers are so located that they come inside the body. Mounting the change gear lever on an extension of the gearcase cover has the advantage that it is not cramped by any deformation of the frame, as often occurs when the sector is mounted on the frame.

The rear axle housing is made of pressed steel with the propeller shaft housing made integral. This is a construction which is used particularly in Italy and which gives a strong and rigid rear axle construction of light weight. The central portion of the axle housing is flanged, the two halves being bolted together by the flanges. At both ends the flanges are cut away, a tubular axle extension is inserted into the housing and a brake support and spring saddle is forced over it.

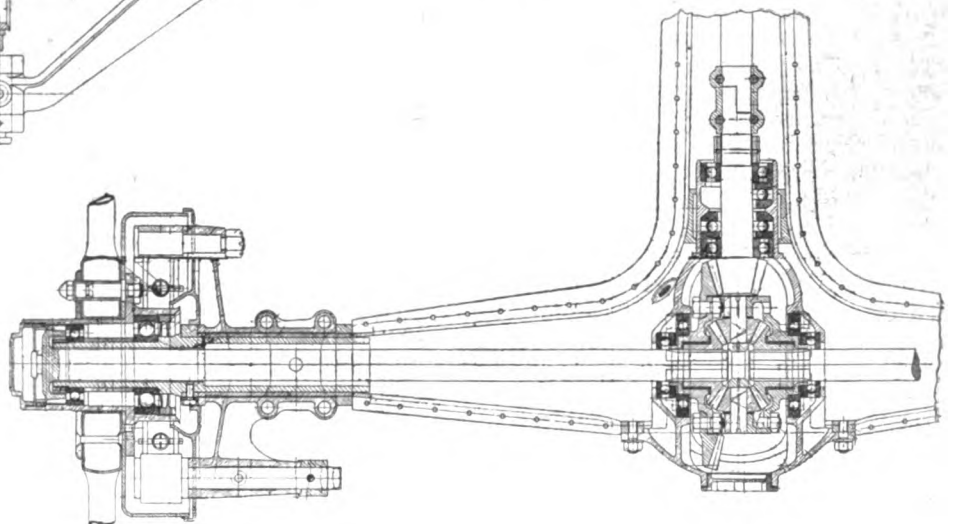
The final drive is by spiral bevel gears, the differential and bevel driving gears being supported in a gear carrier which also forms the rear cover plate of the axle housing. Thus the whole differential and driving gear can be withdrawn from the axle from the rear. To make this possible the pinion shaft is secured to the propeller shaft by means

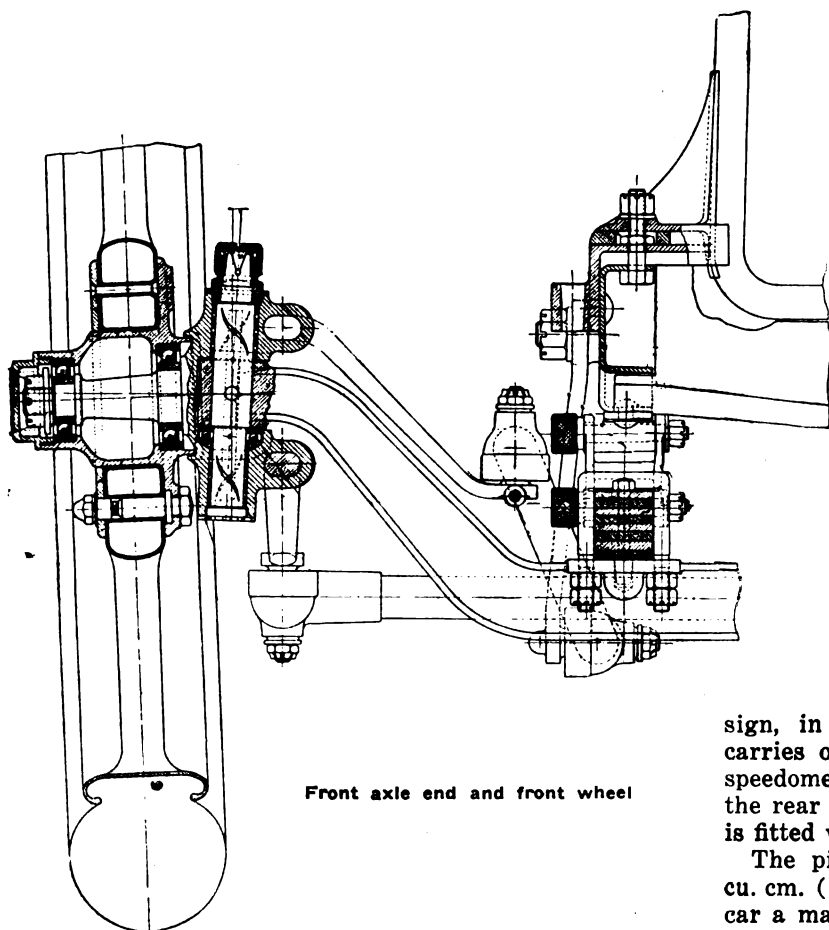
of a special type of clamping coupling. The axle is of the full floating type and its shafts may be withdrawn without disturbing the differential gear in any way. Driving dogs of



(Above)—Method of connecting torque tube to gearbox

(Right)—Horizontal section through rear axle





Front axle end and front wheel

toothed form are forged integral with the rear axle driving shafts and engage with driving teeth formed on the insides of the wheel hubs.

The rear wheel brakes are compensated and are operated by means of the hand lever, while that on the transmission is operated by a pedal. Both are provided with means of adjustment for wear. All springs are of the semi-elliptic type and are provided with rebound reverse leaves on top of the master leaf to prevent oscillation. The rear springs are practically flat under load and are provided with shackles at both ends, as all torque and thrust come on the propeller shaft housing.

Rudge-Whitworth wire wheels are fitted, for which the advantages are claimed that they are lighter and disperse the heat of the tires better than other types. Steering is by worm and worm wheel, the shafts of both being mounted on ball bearings.

The electrical equipment, aside from the ignition apparatus, is of Westinghouse manufacture. This installation is completed by a 6-volt battery, by searchlights and signal lamps, an electric horn and by the combination lighting and starting switch which is assembled on the instrument board together with the amperemeter. This instrument board, which is of simple and attractive design, in addition to the apparatus already mentioned, carries other instruments such as an oil pressure gage, speedometer and clock. The fuel tank, which is located at the rear end of the frame, has a capacity of 22.5 gal. and is fitted with a gasoline gage.

The piston displacement of this engine is only 2881 cu. cm. (176 cu. in.), yet it has sufficient power to give the car a maximum speed on the level of over 60 m.p.h. The normal output is 43 hp. at 2500 r.p.m. The car is made in two lengths of wheelbase, 116 in. and 128 in. The tread is 55½ in. and the tires carried are 820 x 120 mm., which is about the same as 32 x 4½.

## New "Rut-Proof" Pneumatic Truck Tire

**P**NEUMATIC tires used on the adobe roads in the southwestern states, which roads are deeply rutted at certain periods of the year, are subjected to heavy abrasion on the side walls of the tire. In the northern states the same trouble is encountered, the only difference being that the rutted roads freeze instead of becoming sun-baked.

These conditions have prompted the introduction of a pneumatic truck tire of a design intended to meet them. The Goodyear "Rut-Proof" tire, shown in section herewith, is built up ply by ply on an iron core, each ply being applied under tension. The feature of this tire is the crescent-shaped pads on the side walls of the tire, applied before the tread. The pads are made up of a very tough, yet flexible rubber compound and are so placed as to protect the cord fabric carcass against side-wall abrasion from ruts or cuts from sharp stones, etc. The vital part of the tire—namely, the cord carcass—is thus protected, not only by the tread, but on the total exposed area, by a heavy coating of tough rubber.

Road tests have been made with this tire under the worst conditions. An 8-in. tire mounted on the right rear wheel of a truck was rubbed intermittently against a concrete curb for 450 miles and was run altogether over 9000 miles during this test. We are informed that a regular 8-in. pneumatic, given the same test under exactly the same conditions, stood only two miles of curb

rubbing before the gum was entirely worn off the sidewall.



Tire designed to prevent side wall abrasion

# Reversing Facilities for Use with or on Rail Cars

A description of various devices and equipment which have been used on or in connection with the operation of motor-driven rail cars. Such equipment is often important in the successful use of such vehicles.

By Donald A. Hampson

**I**N the Province of Quebec there is a railroad which uses a motor-driven rail car on a passenger run of 45 miles. This car must be turned eight times a day in making its four round trips. A schedule of 360 miles per day does not allow for much time at terminals.

This rather extreme case emphasizes the importance of a faster reverse than is found in ordinary gearsets and of proper terminal facilities as aids to successful operation of gasoline cars on railroads. A number of installations have been condemned because due consideration was not given to these points in the beginning. Proper housing and filling arrangements, together with some form of faster reverse, will save a great deal of time at the end of a run, resulting in decreased labor costs, less congestion in yards, slower depreciation, more popular schedules and generally more efficient service.

With so few exceptions that they may be disregarded, railroad motor cars are one-direction cars. This means that they have to be reversed (turned) twice per round trip. Not that these same cars cannot be operated in a reverse direction at a high speed with the controls at one end, but standard railroad practice does not encourage this and State laws generally forbid it in regular service. Provision for a maximum of paying space, a considerable increase in cost and mechanical complications combined have precluded the use of double-end construction.

So it is that reversing facilities, which include the transmission of power within the car and the track structures for turning the car, may make or mar the success of such a motive power installation. The two are independent, yet they bear a close relationship.

## Survey of Conditions Necessary

A careful survey of existing facilities, plotted with the proposed motor car service, will show whether the time-honored constructions already in existence for turning locomotives and cars will suffice or whether they must be augmented by some device on or for the car itself. Opposite conditions are often disclosed by such a survey. One general manager computed that he would save but twenty minutes a day on six shuttle trips he was to make—there was a convenient wye at one terminal and a turntable at the other—and, as there was considerable lay-over time, the use of a faster reverse was unnecessary. In another case the wye at one end of the line was so far away that half a mile's running in reverse would be required; physical conditions prohibited any other track layout and so a higher reverse speed was decided on as the logical solution.

Separating the various methods so far in use into road facilities and car units, the former will be treated

first. These are the wye (hereinafter called "Y"), the turntable and the loop; all are familiar to railroad men.

The Y received its name from its similarity to the letter, though it is necessary to join the ends of the Y by a tangent to complete the reversal. As laid out by steam road engineers, the forks of a Y are curves of from 300 to 500 ft. radius and are built so large as to accommodate the long wheelbases and number of flanged wheels of their locomotives without undue stresses and risk of derailment. To turn on such a Y seldom takes less than a quarter of a mile running in reverse.

## Smaller Radius for Turning

The motor car, with its short turning radius, does not need a big Y, and thus, if one is to be installed for the car's use, but a fraction of the land area is required. Fig. 1 shows the room required for a motor car Y that is made from discarded street railway tracks. This is a very satisfactory form of Y and relatively cheap—many of these sections of "special work" are replaced every year, and, though worn out for street cars, the old ones answer every purpose for motor car turning. Rails that are too light for modern main line use may be curved by a rail bender and laid down into a small Y, though the chances are that such a Y would cost more than the discarded street car one when frogs and switches are included. One of these small Y's can be installed along the right of way at almost any point without having to acquire much land, or it may be placed at the end of the line or of a siding where other rolling stock will not be required to pass over it; for its particular purpose very little grading and ballast is needed.

Fig. 2 shows a motor car being turned on the locomotive turntable at the Middletown end of the M. & U. R. R. The building at the right houses two of these cars, as well as the road's locomotives, and the passenger station is but a short distance away. This is a good illustration of a case where a faster reverse in the car would help but little.

One man can turn one of these locomotive turntables, though it is a strenuous task. The turntable shown is 72 ft. overall and weighs 35 tons—the car weighs less than 4 tons and has a wheelbase of 17 ft., at almost the exact center of which a balance is obtained.

Engineers would point to the waste in using so large an equipment for such light work, but in many cases this is justified as the most economical practice. A turntable built especially for motor cars is shown by Fig. 3. These turntables are light weight, have an ample factor of strength and are so easily operated that one man (the car's crew) can reverse the car and be going off in less than three minutes. The circular track is



made in three sections, of a standard light rail, and in this case is of 18-ft. diameter. Costing hardly more than a truck owner pays for a set of rubber tires, such turntables become an economy and can be advantageously installed at various points to which cars are apt to be run.

A neat arrangement of motor car facilities is shown by Fig. 4, which shows those at the Dansville terminal of the D. & Mt. M. R. R. Near the passenger station was a siding for no particular purpose. This was extended to the end of railroad property, almost to the sidewalk, and abutting on the latter a car barn was built. It was supplied with heat from the station, the city water line extended and a gasoline tank installed. Just outside the car barn a turntable similar to that of Fig. 3, but constructed by the railroad's employees, was installed. The car is a White with passenger body. It is kept under the very best of conditions, and the original gear-set reverse is all that is required, for there is less than 600 ft. of backward running required at the terminal.

### Loop Tracks

The loop is essentially a street railway device. Even for the double-ended electric car the loop track is favored instead of changing from one end to the other, and we see its use wherever there is track space for it. At pleasure parks and rural termini and even on city streets the loop is made to serve a greater territory at the same time that the car, continuing ahead, is turning itself. Frequently loops serve as loading stations at parks and points of congestion. All that has been said in regard to the loop applies to motor car operation. In many cases the railroad owns unused property on which worn-out rails may be laid to form the simplest kind of a turning medium, the light weight of the car making it possible to do this with a very few ties, no grading and rails that are otherwise fit only for scrap.

Of car turning units, the first to be considered is

the individual, or carried, turntable. This device has been applied to a number of cars and has proved very satisfactory for the purpose for which it was intended. Cars which are used for inspection and official purposes or in a territory where there are long runs between any turning facilities or being used to carry officials or workmen to the rail's end of a line under construction have found the individual turntable of great value.

### Individual Turntables

So far as information is available, individual turntables have been applied only to shorter, lighter cars, those built upon speed truck chassis. In the opinion of some operating officials it is more desirable to turn the car than to run it backward at a high rate of speed. The individual turntable conforms to this and meets other one-way-running demands.

The individual turntables formerly built were a suspended framework of structurals beneath the center of the car, clearing the rails by several inches. To turn, blocks and jacks were placed in position under this frame and resting on the ties; the car was raised enough to permit the wheel flanges to clear the rails, swung 180 deg. and lowered to the rails again—the operation taking about ten minutes.

A more modern, one-man type is shown by Figs. 5 and 6. This interesting device is built around the Sunderman hydraulic automobile jack and some of its features are patented. Referring to the cross-section, B and B are steel casting spacers riveted to the car frame. To these four are riveted the inverted base P, which is cast from the same pattern as P' below it. To the base P' are riveted two I beams of such size as to rest on the rails when lowered and to safely support the whole weight of the car when raised to clear the rail.

The bore of the base castings is such that a piece of 8-in. steel tubing slides in one end and is tight in the other—the upper one. Base P' is bored clear through

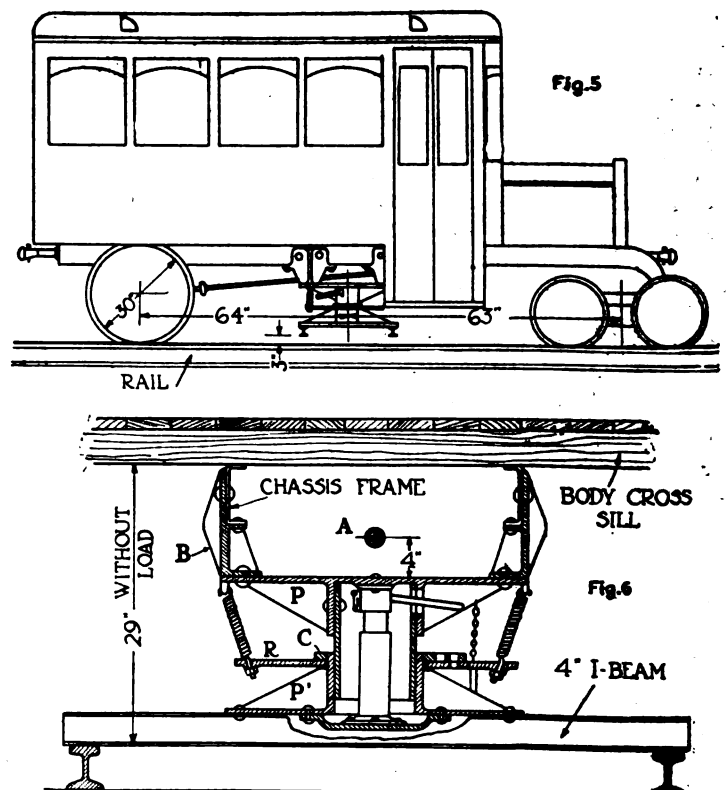
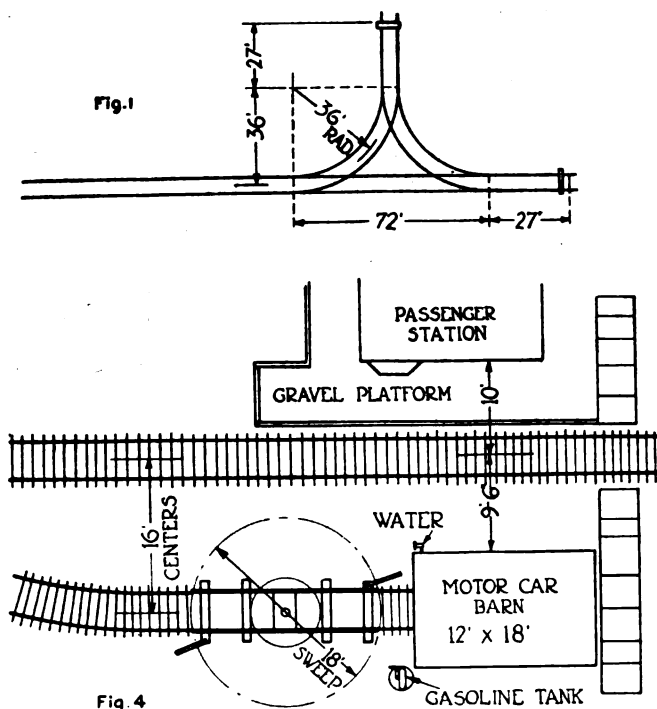


Fig. 1—A "Y" made from discarded street railway tracks. Fig. 4—Turntable and housing facilities used at one railway terminal. Figs. 5 and 6—Two views of a type of portable turntable which is attached to and carried about with the rail car

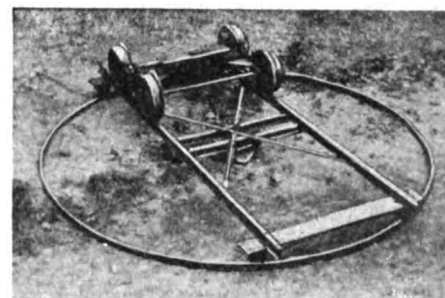
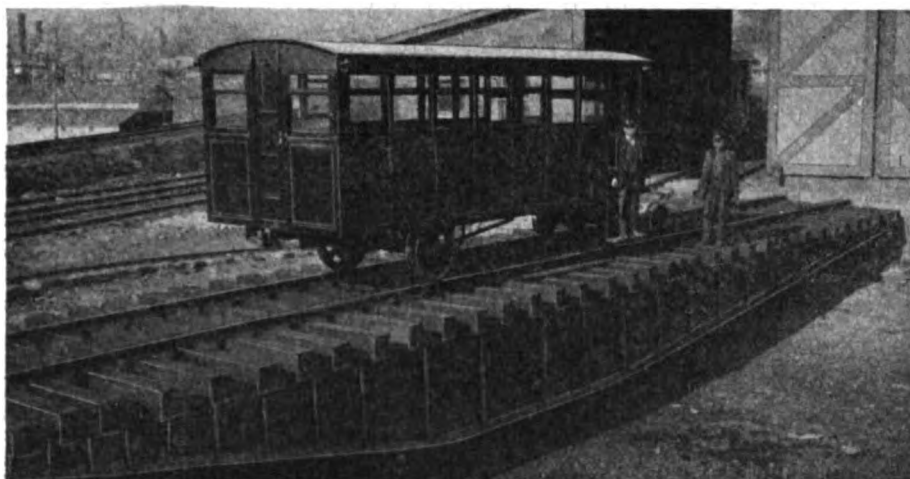


Fig. 2—(Left)—Turntable used either for locomotives or rail cars. Fig. 3—(Above)—A simple turntable designed especially for rail car reversing

and a foot plate riveted on to lower the position of the jack. The Sunderman 7-ton jack is used, not so much for its greater capacity as for its greater lift. Its height closed is  $13\frac{3}{4}$  in., total lift  $6\frac{1}{2}$  in. and the leverage 540 to 1. A very short movement of the operating lever works the pump. The "ram" is secured to the casting P and so revolves with the turning car, a slot in the casting permitting the lever to project through.

In use, the driver sets the car brakes and takes his jack lever out with him. A few strokes and the I beams have been lowered (pumped) to the rails, a few more and the car is clear of the rails. Then he pushes the car around so the wheel flanges are again in line with the rails and again lowers the car. The weight of the car closes the jack. But from that point it is necessary to supply some force to raise the lower half of the turntable back to its position of rail clearance; this is done by the four springs attached to the swivel plate R, which is held to P' by the collar C. The springs also hold the lower half from vibrating and the plate R is further secured in running position by lock pins fitting in tapered holes.

The tension of the springs is about 200 lb. and these constitute the chief element of friction in turning the car, as the weight of the car is taken by the oil in the jack and the turning (upper) member is revolving on an oil bearing which is practically frictionless.

In placing such a turntable under a motor car the center of gravity has to be determined. As shown for the car in Fig. 5, this is nearly in the middle of the wheelbase. So placed, the propeller shaft has ample clearance when the spacers are used. The turntable complete weighs about 400 lb., it presents a trim appearance and is easily operated.

#### Light Passenger Traffic

One of the most promising fields open to gasoline cars is that of light passenger traffic. This may be the electric road which is struggling against jitney competition and under the burdens incident to power production and distribution, the short-line steam road, or the unprofitable branch of a trunk line. The management in all of these cases finds itself with nothing but the local business of a scattered population to produce a revenue which has to be spread over taxes and fixed charges, labor, maintenance, repairs and (usually) a mountain of debt left by a former administration. In the vernacular of the day, "It can't be done." At least, it can't on a road boasting only steam or electric motive power and having a "traffic" of five or ten persons, perhaps twenty on a good trip. Railroads laboring under such conditions must cease operations or continue at

a loss. Gasoline motor coaches might be operated more economically than the class of cars mentioned, but with the cost of these on a par with that of light locomotives there is no chance of the road in financial straits purchasing either. This narrows the selection to the light motor truck, commonly known as a "speed truck," which has a capacity of about  $1\frac{1}{2}$  tons' load, and is reasonable in price because it is a standardized production job. The speed truck may be converted for rail operation very cheaply and fitted with a body of the bus type, the combination serving admirably for the traffic in view.

#### Securing Higher Speed in Reverse

The one objection to this car is its low speed in reverse—in most transmissions about 20 per cent slower than the car's forward "low." As has been stated before, a faster reverse is always desirable, though it is not always necessary. Now, any change to secure a higher reverse speed involves so much money that the plan of installing such cars may be dropped on this account. And for a time at least this car should have a fast reverse if there is any other traffic over the road, for, being the smallest piece of rolling stock, it will be expected to clear for the nearest siding in either direction for other train movements on the road or in yards; besides which the desirability of this car for special trips, often to points having no turning facilities, will soon be apparent.

Fig. 7 shows what is probably the simplest means of securing a high speed in reverse direction for these cars. It is a unit made up to go in the differential housing in place of the assembly already there and, made up in small lots, has cost less than \$100, from which may be subtracted the salvage on returned parts if the work is done before the car has been used. Housings of the banjo type are especially adapted to this change, though it can be made on most rear ends having a cap removable for the insertion of the differential assembly.

The strong appeal of this design lies in its moderate cost, the ease with which it can be applied and the fact that no structural changes whatever are required. Then, the car has the same three speeds in both direction.

As equalizing gears may be dispensed with on the railroad, there is space for the new unit. It has in the center a double-faced jaw clutch which can be shifted to engage either of the two mating steel pieces which carry also the master gear rings. Both gears are constantly in mesh with the pinion, both turn in roller bearings. The clutch is splined to suit the axle shafts and ordinarily engages the left-side mate; the operator controls the car as in automobile practice, but should a fast speed in reverse direction be required, a shift.

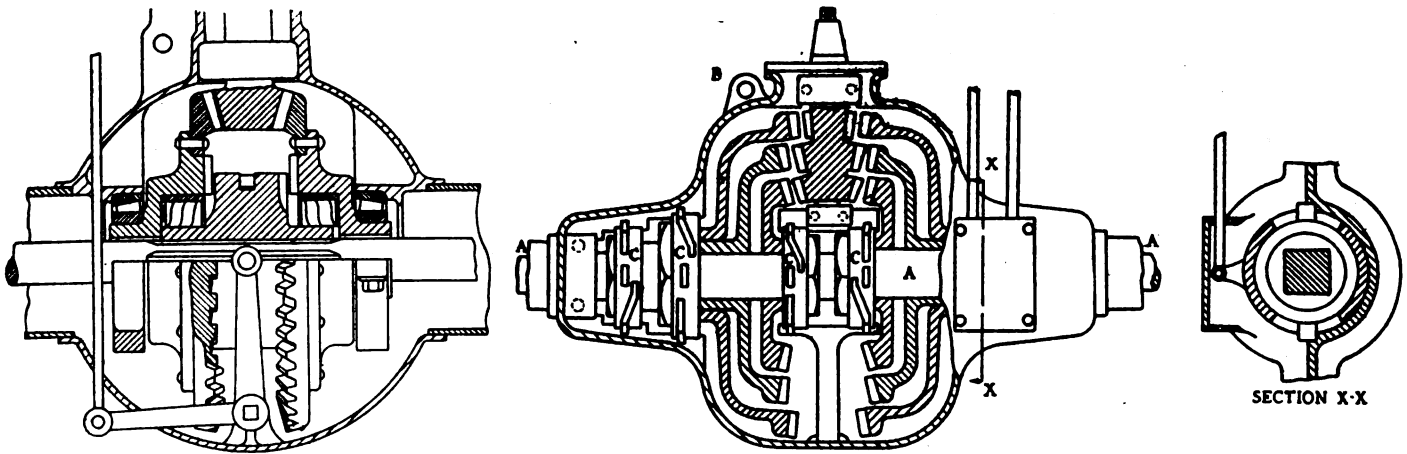


Fig. 7—(Left)—Simple high speed reverse gear. Differential is replaced by a jaw clutch which engages either of two constant mesh ring gears. Fig. 8—(Right)—A direct drive transmission for rail car axles. Any of the ring gears can be engaged, thus affording three speeds in either direction

lever is moved which engages the clutch with the right-side mate and affords three backward speeds in the control.

The only change made in the rear end is the substitution of a cast-iron head in place of the pressed-steel rear cap. The casting furnishes the support for the clutch-shifting members. A spring lock on the inside retains the fork in one of its two positions and also in a neutral if it is desired to use it. The driver's lever has a lock also and is connected with the shift arm by rods.

Another method, and one which has been used on numerous cars, is that of the second gearset, or reverse transmission. This functions only when a faster reverse is desired and is likewise controlled through a separate lever. The three or four speeds of the original gearset are used at all times; in forward running power is transmitted directly through the second gearbox, just as it is in any car when running on the direct drive, but when the separate reverse lever is shifted the power is passed through a lay shaft in the gearset and returns to the main shaft in the opposite direction.

It is optional with the driver of a car equipped with two gearsets to use the one reverse speed in the forward gearbox or the three through the reverse gearbox—if a car movement of only 100 ft. were to be made, the easiest and quickest way would be to slip the shift lever into the reverse corner of the H, while if a longer distance were to be covered the logical procedure would be to use the reverse transmission and step up the speed.

#### Methods of Transmission Construction

Several methods have been followed in the construction of these second transmissions. One has been to utilize the same parts as in the original, as far as possible. There is quite a saving effected this way, as it eliminates most of the special part charges—gearcase and cover, bearings, lay shaft, driver and driven members of the main shaft, clutch and gears can be all standard parts. But the stock reverse would make the car run about one-fourth as fast backward as in the corresponding "speed" forward, consequently the gears selected are chosen to give as near 1 to 1 as tooth clearance will permit. Supports must be provided for the idler reverse gear and welded or riveted to the case and, finally, oil-tight coverings must be applied where two of the newly placed gears cut through the case.

If a number of cars are to be provided with second transmissions it is better to design a simple gearcase to house the reversing mechanism. This is not so expensive if the design utilizes stock transmission parts

as far as possible and departs from them only where simplicity and strength direct. Besides the all-gear transmission, the gear and chain transmission has been used with success. Under this system a pair of gears imparts the reverse direction to the lay shaft, which is spaced further away from the main shaft than in conventional practice, and a silent chain and sprockets deliver the power to the driven main shaft. The chain drive eliminates the idler gear and a good deal of noise.

#### The Direct Drive and Reverse

A direct-drive transmission for rail cars is illustrated by the drawing Fig. 8. Its design will interest those who knew the two-speed rear axle in automobile work a few years ago. On the railroad the chief objection to this type and to rear-end transmissions automatically disappears. It will be noted from the drawing that the continuous live axle A passes through the unit and carries two nests of bevel gears. Each nest provides three speeds in one direction. A triple pinion is employed, and any one of the six gears may be engaged at will with its pinion, and when this is done the rest of the gears merely idle.

The axle A is squared or splined for a portion of its length in the center and upon this square the extended hubs of four gears are caused to slide axially in shifting to these speeds. The low-speed gear in each direction slides on the outside square of an intermediate hub. Cams C move the gears positively and lock them "in" and "out." Reference to the drawing shows that the outer member of these cams rotates (by means of the arm and lever) about one-eighth of a revolution, but it is confined axially by a channel in the housing in which it fits closely. The outer member is double slotted, as shown, and in these slots travel lugs which are a part of the inner member of the cam, which is locked between a shoulder of the gear hub and a nut.

The gearcase is divided in a horizontal plane. From the upper half six shift rods extend forward; these are connected in pairs, so that three rods and as many selectors enter the "quadrant" at the driver's side. At B is a connection for the torque tube. A standard S. A. E. taper pinion end furnishes connection for the drive-shaft universal. This design puts the entire double gearset and right-angle drive in a single case and has the advantage of transmitting the engine's power through but one pair of gears, no matter what direction or speed is selected. It can be applied either on the axle, as shown, or to a jack shaft and in either case can be constructed as rugged as the most skeptical railroad man

may desire, the factors of weight and road clearance not entering as the automobile designer knows them.

Chain driving offers a simple and efficient method of fast reverse running. The gearbox employed for chain drives includes the right-angle gears and jack shaft. Some designs will admit a second master gear (arranged much as the one in Fig. 7) without any alteration—others require a pattern change. Then, the two master gears have a double-jaw clutch put between them, or else they are mounted on a sliding quill, and the same speeds are obtainable in either direction.

The chain drive permits the entire power plant and drive to be attached to a rigid frame and universals of the spline type are sufficient, as there is no angular movement except the slight weave of the frame. The chains take care of such movements as result from spring action, and they permit the use of several types of rugged rear-end construction. For those reasons the chain-drive car is popular with many, and in the railroad field, at least, one purveyor of adapted motor trucks has shown unusual results from their cars in service. Add to this the advantages of an easy, simple and rugged fast reverse.

An entirely different method of reverse running was described and illustrated in AUTOMOTIVE INDUSTRIES of Jan. 1, 1920. Two cars are coupled back to back and

run thus as a train of greater capacity than a single car. The leading car in either direction is the power car and the other the trailer. With reversible seats or longitudinal seats this is quite feasible. Over any steam road, at least, the trailer may be used with a standard motor truck. A number of two-car trains of this kind have been in constant use since 1918 and 1919 and have shown no serious mechanical faults from coupling up in this way. A fast reverse at any point on the railroad is possible with these by just walking through to the other car and starting its engine.

From the foregoing review of the subject it will be seen that it is not a matter of "Can we reverse?"—it is, rather, a matter of "What have you got and what do you want to do?" A universal type of car is possible, but it may not be the most desirable. The factors entering into the consideration are (1) the existing facilities of the railroad for turning cars, (2) the relation of these facilities to stations, other traffic over the road and the terminal car housings to be provided, (3) the type of car it is desired to operate, (4) the nature and location of the traffic the car is expected to serve and solicit, (5) future extensions of motor car service. Careful study of these factors will reveal what supplementary units, if any, are to be incorporated in the new scheme of operation.

## A Popularized Form of Accelerometer

ORDINARILY acceleration is expressed in ft. p. s. p. s., but this means very little to the layman, who does not figure in such terms. Since the force of gravity produces an acceleration of 32.2 ft. p. s. p. s., it may be said to be equal to such an acceleration, and acceleration may be measured in pounds. This principle is made use of in the Drewry testometer, which is an accelerometer graduated in pounds. When mounted on a car it shows the force which is momentarily effective in increasing or decreasing the speed of the car.

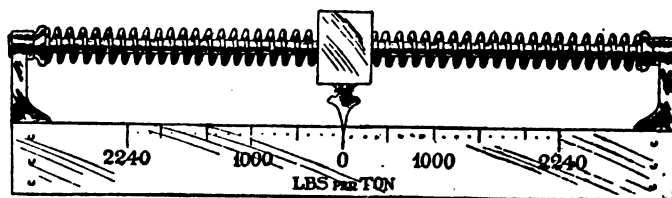
The principle of the new device, which is illustrated by the diagram herewith, may be explained as follows: Take a car weighing, say, one ton and imagine it to be frictionless. If now a force of one ton is applied at the rear, it will cause the car to accelerate at the rate of 32.16 ft. p. s. p. s. If the instrument is located on the car, it, of course, will also be subject to the same acceleration, and, consequently, the weight will be forced back until the pointer is at 2240 lb. Of course, an acceleration of 32.16 ft. p. s. p. s. would be impossible, but any smaller acceleration would be indicated by a proportionately smaller movement.

If the car is traveling at a speed of say 20 m.p.h. and the clutch is then thrown out, it at once begins to decelerate, due to the effects of road resistance, wind resistance and internal friction. The rate at which it decelerates will be proportional to the sum of those forces and the instrument will indicate it in pounds. A very common figure for the sum of the three forces is 60 lb. per ton. The reading of the instrument therefore gives a direct indication of the relative freedom of the car. In a similar manner the effectiveness of the brakes can be tested. One set of brakes is applied at a time and the indications of the instrument are read off.

Following are some of the purposes for which the instrument can be used to advantage: The measurement of the rolling resistance when running free; measurement of the retarding force of either the hand or foot brake; measurement of the maximum pull of the engine; measurement of the maximum pull that the clutch will transmit. To measure the maximum pull of the engine

the car is driven up a hill, which is a little too steep for the high gear, and note is taken of the maximum indication of the instrument, which is the maximum pull the engine will exert.

The actual instrument is made somewhat different from the sketch. The indicating medium consists of a horizontal column of fluid contained in a suitably designed closed circuit. When the instrument is moved forward this column endeavors to stay in its original position and in doing so increases the height of a vertical column of fluid against which the horizontal column is balanced. A point is reached when the fluid must move forward with the instrument, and this point indicates the exact amount of force that is being applied to the instrument in pounds for each ton weight of the



Principle of operation of the testometer

vehicle to which it is attached. There are no mechanical moving parts, and, consequently, there is nothing to get out of adjustment. The friction between the fluid and the walls of the tube provide a brake, consequently there are no oscillations, and readings can be made with ease. Each instrument is calibrated separately on a specially-designed machine which eliminates the slight errors due to local variations in the bore of the glass tube. The bore of these recording tubes is held to within a limit of .005 in. The size of the instrument is approximately 10½ in. by 2 in. by 1½ in.; its weight, 1 lb. 3 oz. The instrument will indicate to 500 lb. per ton. The total length of the scale is approximately 15½ in. and the length from 0 to 100 lb. per ton, 4 in.

The manufacturers of the instrument are the Drewry Instrument Co., Baldock Road, Letchworth, England.

# Revision of Steel Standards Is Proposed by S. A. E.

Thirteen new steels to be added, of which five are carbon and six are nickel chromium steels. For the most part they differ from the nearest of the old specifications by their carbon contents. In some of the old specifications retained the amounts of alloying components will be changed.

ONE of the most lengthy reports to be made to the Standards Committee of the S. A. E. at its coming meeting will be that of the Iron and Steel Division. This report, in fact, goes over the whole standardization work previously done by the Division, revising old specifications to bring them in line with modern practice, and adding a considerable number of new ones. At first glance it is not quite obvious from the report just what is old and what is new in it, except perhaps to those who have almost daily occasion to use these standards in their work; for the benefit of others it may be worth while to briefly review the report.

New specifications have been added particularly in the class of carbon steels. Where formerly there were only six carbon steels in the S. A. E. standards, it is now proposed to standardize eleven. The new carbon steels are in the main intermediate between the present specifications with respect to carbon content and conform to them in all other respects. For instance, while there is now a 10 "point" carbon steel and a 20 "point" carbon steel, there is no 15 "point" carbon steel. There has been some complaint on the part of users, whose requirements with respect to heat treatment are very rigid, that the range in carbon permitted by the present specifications is too wide. For instance, the specifications for the 20 point or 1020 steel call for a carbon content of from 0.15 to 0.25 per cent, and inasmuch as both these extremes would pass under the specifications, they would have to be accepted by the purchaser; but it is held that a heat treatment which would give good results with the 1025 steel is unsuitable for the 1015 steel.

## Individual Carbon Range Unchanged

This objection, however, is not met by the revised specifications, as the range in carbon of individual specifications remains the same as before. Even now the specifications cover the entire range of carbon contents, if exception is made of the spring steel; that is to say, if a steel has just too much carbon to come under the specification for the 1025 steel, for instance, it comes under the specification for the 1035 steel. If the new specifications are adopted, practically all steels will correspond to two different specifications.

Take, for instance, the case of a carbon steel with 28 points of carbon and other components as called for by the specifications. At the present time this is a 1025 steel; but if the new specifications are adopted it will be both a 1025 and a 1030 steel. The question now arises, in what way will the proposed change affect the user? In one respect the argument against too wide a range in carbon content from the standpoint of the effect of heat treatment would apply even more forcibly than before, for the reason that heat treatments are specified

in many cases for two steels together that are next to each other in point of carbon content. For instance, the heat treatments proposed for the 1025 and 1030 steels are exactly the same. Thus the steel which may be subjected to this treatment may have a minimum carbon content of 20 points and a maximum of 35. On the other hand, it may be said that the purchaser himself determines whether he wants the 1025 or the 1030 steel, and once this point has been decided, the range in carbon is limited to 10 points, the same as now.

## Changes Insure Adherence to Specifications

There is another line of argument, however, tending to show that under the new series of specifications the purchaser will get steel that will conform more closely to the mean analysis of any given specification. For instance, with the present specifications, any steel that shows 29 points of carbon is sold as a 1025 steel, although it differs from the mean or desired analysis by four points of carbon. If the new specifications should be adopted, it could be sold as 1030 steel and would then differ from the mean analysis by only one point.

Presumably the proposal to adopt these intermediate specifications is based on experience with the nickel-chromium steels, of which there are now specifications calling for 20, 25, 30, 35 and 40 points of carbon. The newly proposed carbon steel specifications are known as Nos. 1015, 1030, 1040, 1050 and 1046. In regard to the manganese range and the phosphor and sulphur limits these steels correspond to the present steels nearest to them in carbon content. The 1046 is a steel in all respects similar to 1045 except that it has a manganese range of from 0.30 to 0.50 per cent, instead of 0.50 to 0.80 per cent. The most marked result of manganese in the steel is to increase the effect of the heat treatment, and presumably the 1046 steel for the same heat treatment would have a lower tensile strength and elastic limit but would be less brittle than the 1045 steel.

In the nickel steel class it is proposed to change one specification with respect to the manganese content and to add one more specification. In the specification for the 2315 steel the manganese content is to be reduced from 0.50-0.80 to 0.30-0.60 per cent. This is a case-hardening steel, and presumably the reduction in the manganese content is for the purpose of avoiding difficulties with cracking and chipping of the case. The new addition to this class is the 2350 specification, which was formulated to meet the requirements of gear manufacturers for gears of large section. The effect of increased nickel content is especially to raise the yield point, and the slightly greater nickel content of this steel as compared with the 2345 would undoubtedly give a somewhat stronger gear.



To the list of nickel-chromium steels there have been added three new case-hardening steels, the 3115, 3215 and 3312. All of these have lower carbon contents than the case-hardening steels of the nickel-chromium type standardized heretofore. It may be pointed out that there are three classes of nickel chromium steel, with low, medium and high ranges of nickel and chromium respectively. In the low nickel and chromium or 3100 class, the case-hardening steel now standardized is known as the 3120, and the additional specification in this class therefore has 5 points less carbon. In the 3200 class (medium nickel and chromium) there has been added the 3215 to the present case-hardening steel 3220. The 3215 naturally has greater core strength than the 3115, on account of its greater content of the alloying metals. In the 3300 or high nickel and chromium class the new specification is known as the 3312, the carbon content in this case being limited to 0.17 per cent. This is a case-hardening steel which gives a core of maximum strength and toughness.

There has also been added a 3245 steel which is sandwiched in between the present 3240 and 3250. This steel is intended for oil-hardened parts, machined or forged, that require very high physical properties, and the reason for putting it forward is undoubtedly the same as that which prompted the proposal of the new carbon steels. In a steel of this class the heat treatment is said to penetrate very deeply.

In the high nickel and chromium class there have also been added steels 3325 and 3335, medium carbon steels which are sandwiched in between the 3320 and 3330 and between the 3330 and 3340 steels respectively.

There are now four chromium steels which are used mainly in the manufacture of ball bearings, and it is proposed to retain the same number, but the specifications of three of them are to be changed somewhat. At the present time the first three of the chromium steels

are made with two ranges of chromium and silicon each, one class having a low chromium and silicon range and the other a somewhat higher range of both components. In the new specifications nothing is said about two classes of alloys. In the first specification, 5120, the manganese content is made 0.30 to 0.60, which is intermediate between the two former ranges (0.25-0.50 and 0.60-0.80). In the 5140 steel the manganese content is to be 0.50-0.80 per cent, which covers the same range as the manganese content of the former high manganese specification and in addition extends 10 points lower. The chromium content of this steel, which is now 0.60-0.90 per cent, is to be increased to 0.80-1.10 per cent. Steel 5150 takes the place of 5165, which means that the mean carbon content has been lowered 15 points. The manganese content of this steel is specified as 0.50-0.80 per cent, which represents a similar change as in steel 5140, whereas the chromium content is to be increased from 0.60-0.90 to 0.80-1.10 per cent.

A very slight change is contemplated in the chrome-vanadium steels 6140 and 6150, in that the vanadium content desired is now 0.19 instead of 0.18 per cent.

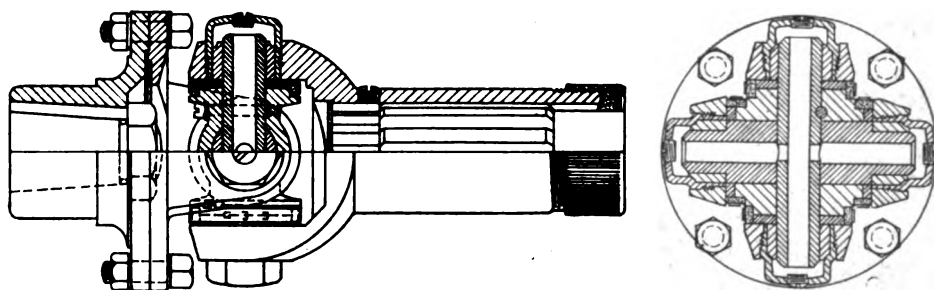
In the silico-manganese steel 9250 the manganese range has been increased from 0.60-0.80 to 0.60-0.90 per cent, and in steel 9260 the manganese content has been increased from 0.50-0.70 to 0.60-0.90 per cent. The silicon range of the 9250 steel has been increased from 1.80-2.10 to 1.80-2.20 and the silicon content of the 9260 steel has been increased from 1.50-1.80 to 1.80-2.20 per cent. These changes make the manganese and silicon contents of steels 9250 and 9260 alike and the only remaining difference is in the carbon content. The note now attached to these specifications, to the effect that acid process steel may contain a maximum of 0.05 per cent of phosphorous, has been eliminated and the phosphorous limit on all steel of these specifications is to be 0.04 per cent, it seems.

## Grease Eliminated in Universal Joint Lubrication

**H**ERETOFORE most universal joints have been lubricated by grease, being inclosed in a sheet metal housing which is filled with the lubricant at intervals. The disadvantages of grease lubrication have come to be recognized more and more, and recently there has been a decided trend to do away with it in chassis construction. A type of universal joint which is lubricated entirely by oil has been brought out by the Hartford Auto Parts Co. It is of the tubular cross-pin type with an internal oil reservoir extending the full length of both pins, affording capacity for a liberal supply of oil.

Centrifugal force throws the oil to the end of the bushing retaining sleeves, from which it is fed by capillary attraction to the bearing surfaces of the bushings and pins. A packing of rectangular section completely encircles the working surfaces at the inner face of the bushings and excludes all foreign matter and dirt. These packings are held in position by clamp bands and are readily removed without disassembling the joint. Hardened thrust collars with large bearing areas reduce the side wear between center blocks and yokes.

Refilling of the joint is accomplished by the removal of a single plug at the top of any of the four bushing



Hartford oil lubricated universal joint

retainers. The bearing pressures are distributed over large areas in order to reduce the unit pressure. The crosspins are a press fit in the center block; the small pin keeps the large pin from moving, and a locking screw passing through the center block fastens the small pin securely in position. The bushings are forced into retainers which are screwed in position and are securely located by staking. A separate chamber is provided for oiling the spline shaft, independent of the joint proper, allowing this member to work continually in a bath of oil. It is claimed to be absolutely impossible for dust or any other foreign matter to reach any of the working surfaces.

It will be seen that the joint is of the companion flange type and in appearance is very similar to older models.

# Influence of Surface Flaws on Strength of Metals

It is shown that surface flaws have a pronounced effect upon metals which are subjected to fatigue through repeated stresses, but that such flaws do not always decrease strength under constant load conditions. Results of some practical tests along this line are described in this article.

By Horace C. Knerr\*

**T**HE dire influence of surface scratches, cracks, indentations and re-entrant angles upon the strength of members subject to repeated stress or "fatigue" has been much discussed in engineering literature of late. Nevertheless, some engineers apparently still fail to realize the immense difference which may exist between the effect of such flaws upon the fatigue strength of a member and its strength under constant load.

A striking illustration of this difference was recently furnished in a simple experiment conducted by the writer. The results of the experiment also provide food for thought in regard to the phenomena of tensile tests in general.

Some thin sheet metal (duralumin), in which there were small indentations or cracks here and there over the otherwise smooth surface, was submitted for approval. These flaws had either come down from the ingot or had been introduced by some mistreatment in forging or rolling. They penetrated only a small fraction of the thickness of the sheet. A portion of one of these flaws is shown in the illustration, Fig. 1, between the "X" marks. The cracks are very minute and are accompanied by a surface discoloration of no appreciable depth.

Tensile specimens cut from the sheet so as to have

\*Metallurgist, Naval Aircraft Factory.

one of these flaws running transversely across the gage length of each showed no noticeable difference in strength from similar specimens without the flaws. In other words, the flaws had no appreciable effect on the strength of the material in direct tension. But as this metal was intended for structural parts, subject to vibrating loads, rejection was recommended. A difference of opinion arose as to whether this material should be used, some maintaining that the tensile tests showed the flaws to be harmless.

Facilities for applying a practical fatigue test were not immediately available; therefore, the following simple test was prepared in an effort to show how very misleading ordinary tensile tests may be in regard to the effect of notches on the strength of a part.

Two tensile specimens were cut from adjacent lengths of a 1-in. round bar of  $3\frac{1}{2}$  per cent nickel steel, or 0.25 per cent carbon content. Brinell hardness readings showed no variation along the specimens, indicating their tensile strength to be uniform.

The specimens were alike except that one had a gage length  $\frac{1}{4}$  in. in diameter, while that of the other was  $\frac{3}{8}$  in.

Using a tool with a 90-deg. point, a V-notch was turned in the  $\frac{3}{8}$ -in. specimen at the middle of the gage length, so that the root diameter of the notch was as

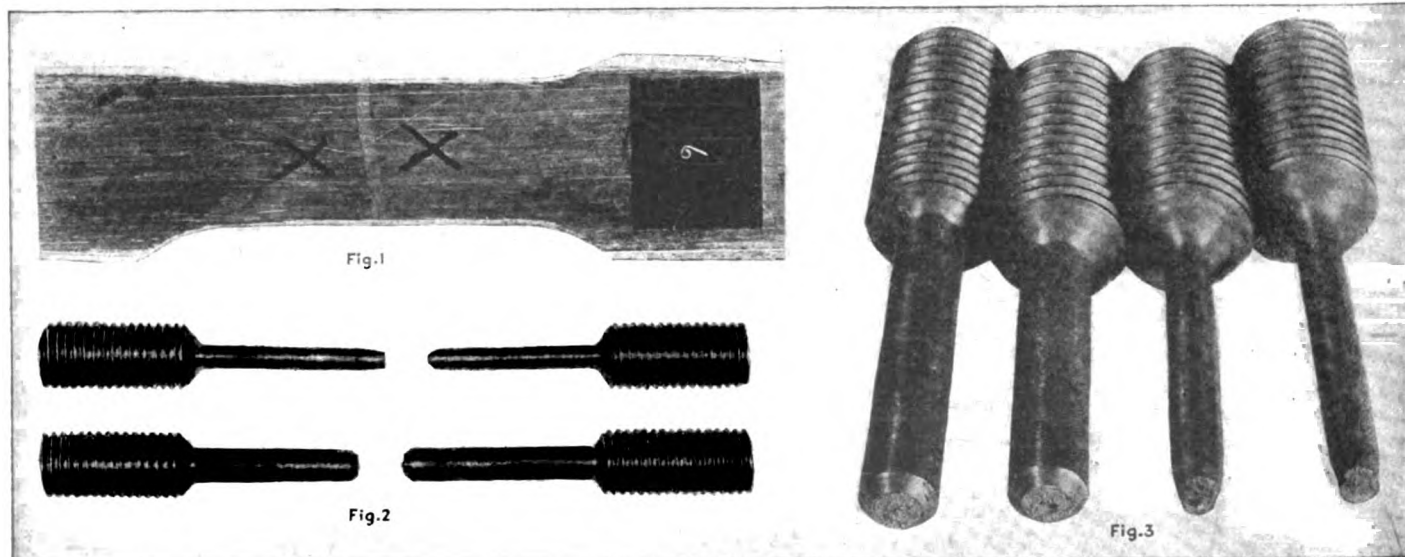


Fig. 1—Fatigue specimen of sheet metal, enlarged about 2 diameters, showing flaws between marks X-X. Fig. 2—Nickel steel tensile specimens after rupture. Fig. 3—Nickel steel specimens, showing fracture (enlarged about 2 diameters), and absence of necking in notched specimen

nearly as possible 0.250 in., giving a section area at the root of the notch equal to the section area of the  $\frac{1}{4}$ -in. specimen (see Fig. 4).

The specimens had threaded ends, and the tensile testing machine was provided with ball and socket jaws, so as to avoid eccentric loading.

There was a radical difference of opinion among those present before the test as to the probable relative tensile strengths of the notched and plain specimens. Some believed that the strengths would be the same, but the majority held the view that the notched specimen would be much weaker because of the concentrated stress at the root of the notch.

The results of the tensile test follow:

#### Nickel Steel Specimens

	Notched	Plain
Brinell hardness .....	269	269
Diameter, inches .....	0.252 (at root)	0.250
Area, sq. in. ....	0.0500	0.491
Breaking load, pounds .....	9,530	5,980
Ult. stress, lb. per sq. in. ....	190,500	119,500
Reduction of area .....	None	41 per cent

Both the unit tensile strength and the actual breaking load in pounds of the notched specimen were greatly in excess of the plain one.

The plain specimen showed a clean cup and cone fracture of velvety texture and with pronounced reduction of area and elongation, all characteristic of this steel. The notched specimen showed a fine crystalline fracture and no appreciable reduction of area or elongation.

The photographs, Figs. 2 and 3, show the shape of these specimens and the fractures.

A similar test was run on a pair of specimens of 0.90 carbon steel (drill rod). In this case the results were as follows:

#### High Carbon Steel Specimens

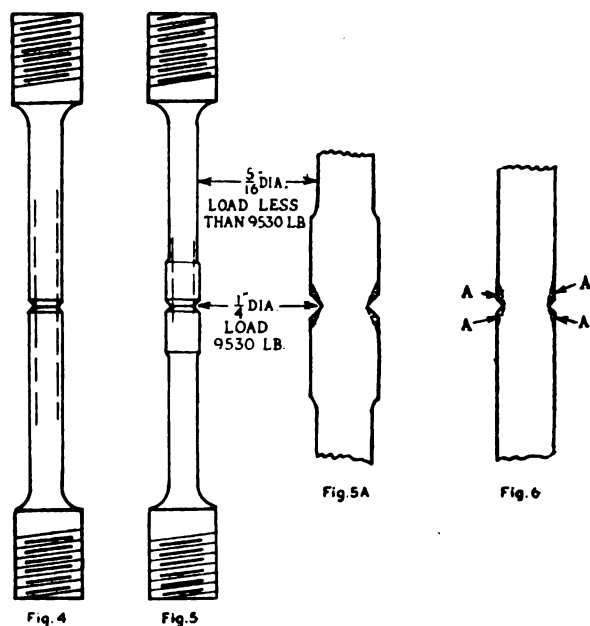
	Notched	Plain
Diameter, inches .....	0.251 (Root)	0.250
Breaking load, pounds .....	8,535	6,865
Ult. stress, lb. per sq. in. ....	172,200	140,000
Reduction of area, .....	None	11.5 per cent

There was very little necking down, and both specimens showed a fine crystalline fracture.

It is evident that a notch may have the effect of greatly raising the apparent unit tensile strength of a piece of metal (figured at the root of the notch). This, of course, is due to the elimination of necking down or reduction of area at the break, and will be more pronounced in ductile metal like nickel steel than in tool steel.

The data for the nickel steel specimen suggests a rather astonishing deduction. The breaking load in pounds, and the ultimate stress (pounds per square inch) of the notched specimen were practically 160 per cent that of the plain specimen. The plain specimen would, therefore, have to be 60 per cent larger in area of cross section to be as strong as the notched specimen—that is, its diameter would have to be 0.316 in. or more than  $\frac{5}{16}$  in. Now, if a portion of the notched specimen on either side of the notch were turned down to  $\frac{5}{16}$  in. diameter, as in Fig. 5, we might expect to see the specimen break in this part rather than at the root of the notch, which was only  $\frac{1}{4}$  in. in diameter. In other words, the notch would have locally strengthened the specimen!

The reader may protest that it is the ridges around the notch which are responsible for the greater strength at the notch, by preventing necking down. True, but how much metal is necessary, and what would be the effect of removing the ridges, as in Fig. 6?



The lines of stress passing through the specimen must converge at the notched section. This leaves a small ring of metal on each side of the notch which carries no tensile stress, as shown at A, A, A, A, in the enlarged sectional view, Fig. 6. These rings of metal may act as supports around the notched section, just as the ridges did. It is, therefore, conceivable that the notched section would still be stronger in tension than a plain portion of larger diameter. There has been no opportunity to indulge in further experiments along this line, however interesting or instructive.

Many interesting lines of thought are suggested by the results of this experiment, and an attempt to discuss them might run into volumes.

It is very clear, however, that there is no connection whatever between the strength of a notched piece in straight tension and its strength under repeated stress. Numerous fatigue tests made by diverse investigators, as well as actual service records, have demonstrated the immense weakening effect of notches in members subject to repeated or alternating stresses. Anyone familiar with fatigue failures will know that the notched specimen would give way much sooner than the plain specimen under a fatigue test. This is just as certain as that the notched specimen would fail at a much lower load in cross-bending, which no engineer will question.

Fatigue tests were eventually run on a number of samples of the defective sheet metal, in comparison with similar samples free from the flaw. The specimens containing the cracks failed in an average of one-fifth the number of reversals of stress withstood by the sound specimens, and the material was rejected.

### The Market in Cyprus

CYPRUS claims to be proud of its 650 miles of motor roads, and particular attention is paid to the maintenance of these. Throughout the island communications are good, and the prosperous natives are importing motor cars at the rate of a 100 a year. As this year's census shows a total population of 310,709 the ratio of imports per head must be regarded as good. There is also a lively demand for tractors, and the agricultural department has instituted a hire service for these machines. Many farmers declare that they are only waiting for the fall in prices to buy agricultural machines. The island's postal service is practically all done by motor transport.

# New Gear Shaper Designed for High Speed Production

Machine built to meet the particular demands of the automobile industry. Designed for increased production, reduced power consumption, accurate work and economy of floor space. Will handle any form of gear entering standard automobile transmissions as well as some special designs.

A NEW design of gear shaper, particularly notable for its high speed of operation, has been produced by the Fellows Gear Shaper Co. The machine is a development of one specially built for the Ford Motor Co. to cut the planetary gears of its transmission. These planetary gear assemblies consist of three gears, which were formerly made singly and riveted together. Cutting the teeth in the gear shaper made it possible to make the three gears in one piece, thus eliminating the riveting and undoubtedly getting a superior product.

The new gear shaper is a production machine in the full sense of the term, yet, by the use of different fixtures, it can be adapted for a considerable variety of work, including the cutting of internal gears. The principles which have been embodied in this gear shaper are interesting as indicative of the latest tendencies in machine tool design. High speed of production has been sought by using high cutting speed rather than heavy feeds. By using a comparatively light feed in combination with a short length of cut—generally the face width of a single gear—heating of the cutting edge of the tool is minimized and the life of the cutter is thereby greatly increased. The light feed, moreover, tends to produce a very accurate tooth surface.

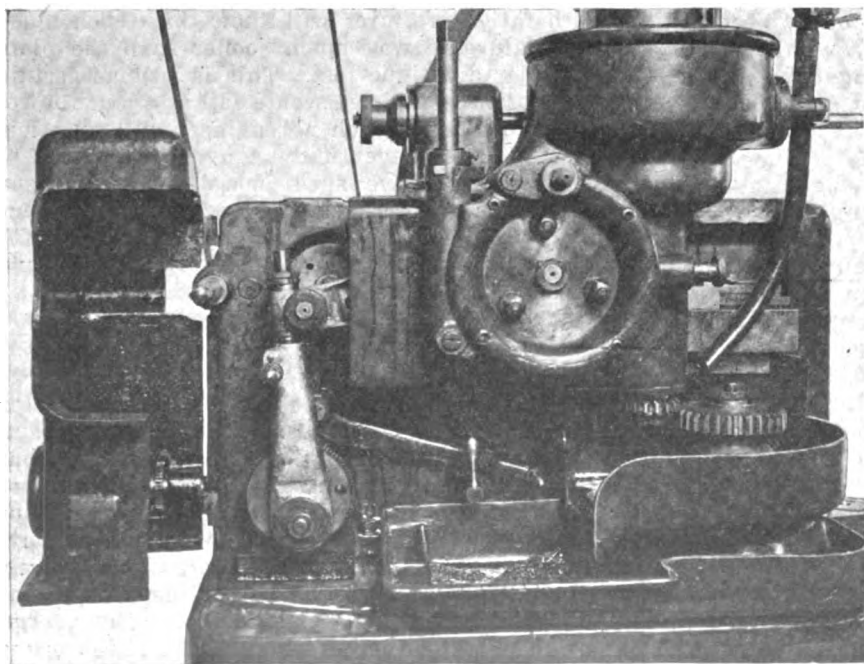
A second aim has been to cut down the power consumption. To this end the machine has been fitted al-

most entirely with ball bearings and the reciprocating parts operating the cutter are made of aluminum alloy forgings, which reduces inertia forces and the pressures and frictional forces resulting therefrom.

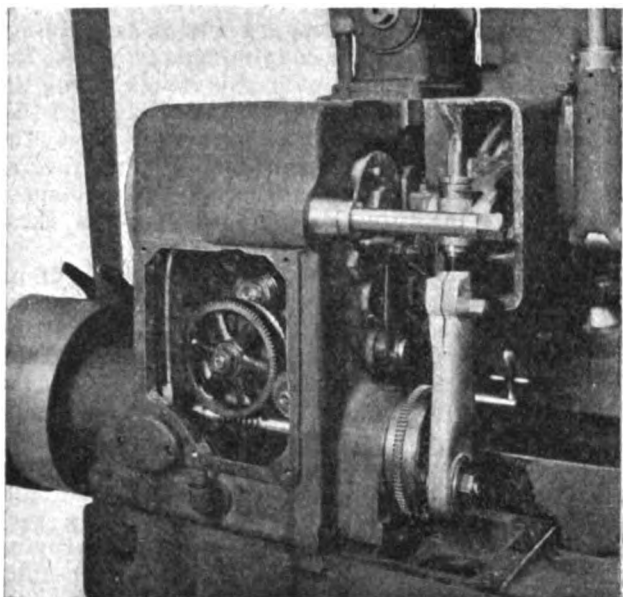
Finally, an eye has been had to reduction of floor space. The machine is arranged with all the controls in front, so the operator does not have to walk around it, and a battery of these gear shapers can have their bases bolted together and be driven directly from the line shafting.

The principle of operation of the new machine is the same as that of the standard Fellows gear shaper, in that a gear-type of cutter is used which works on the generating principle. The cutters used on this machine are standard gear shaper cutters, the teeth of which are generated with great precision after hardening. This principle of gear generation is not new, but the improvements which have been incorporated in the new high-speed gear shaper make it possible to apply the principles in a more effective way. Owing to the high speed at which the cutter is operated, and also the short stroke of the machine, "ganging" of gears, except for very thin gears, is unnecessary. Instead of being a disadvantage, this principle has several advantages. In the first place, it is almost impossible to secure accurate gears when holding a large number on an arbor or fixture at one time. Slight inaccuracies in the machining of the blanks multiply in approximately the same ratio as the number of gears being held at one time, so that, from the standpoint of accuracy, it is better to cut one gear at a time.

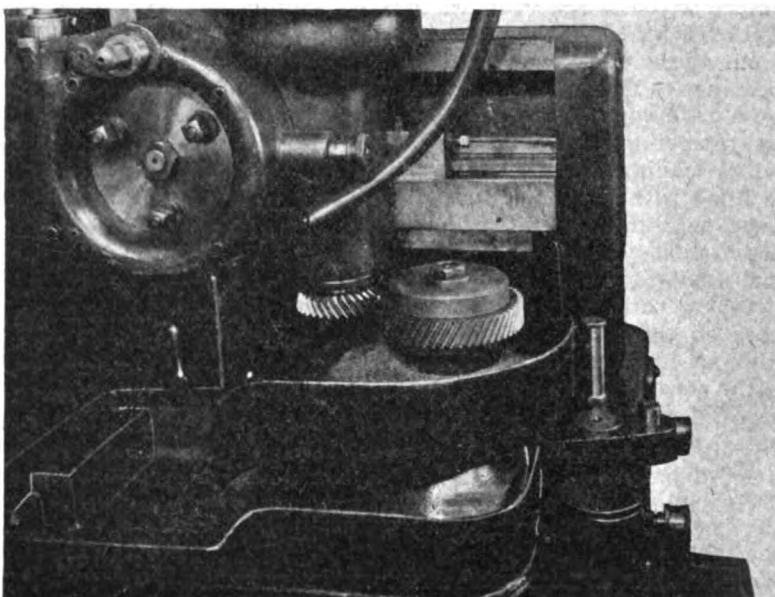
Another advantage is that, owing to the comparatively short stroke of the cutter it can be operated at a high rate of speed, so that the cutter remains in contact with the work for a very short period of time. In fact, the contact is so short that the cutter does not have time to heat up. The cutter is, therefore, kept cool, and its cutting edge is not impaired, so that the same cutter can be used for both roughing and finishing cuts. The work is also kept cool, and variations due to changes in temperature do not enter into the problem at all. A large-supply cutting compound tank is furnished, from which the compound is pumped to the cutter and work, keeping them cool, thus enabling alloy-steel gears to be cut with great rapidity and accuracy. The general practice is to use heavy feeds and slow speeds for



Fellows high speed gear shaper



Close view showing cover plate removed, exposing feed gears, crankshaft, connecting rod, feed cam, etc.



Cutting helical engine timing gears in high speed gear shaper

roughing and higher speeds and finer feeds for finishing. This machine, however, has been designed to operate at exceptionally high speeds, so by taking fine feeds, the life of the cutter can be increased and its cutting edge maintained, making it possible to use the same cutter for roughing and finishing. This is the fundamental reason why this is such a high production machine.

As on the standard-type gear shaper, change gears are provided for taking care of the difference between the number of teeth in the cutter and the number of teeth in the gear being cut. The method of obtaining the rotary feed for the cutter also differs, in that this function is also taken care of by gears.

#### The Cutter-Spindle and Saddle

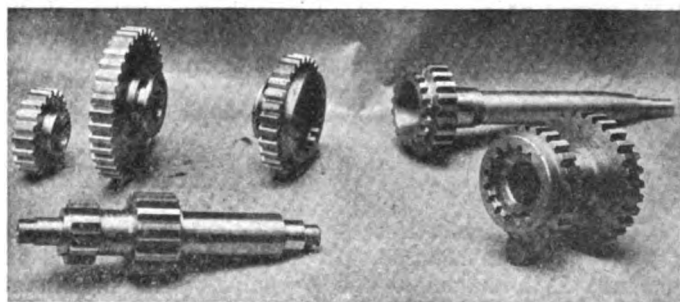
The cutter-spindle used on this machine is of comparatively light weight, and is guided in a straight path by accurately finished guides. It is reciprocated by a connecting-rod and crank-arm of light weight (duralumin). The operating end of the crank-arm is provided with a hardened steel segment gear meshing with rack teeth in the cutter-slide. The crank-arm is bronze bushed at the fulcrum point, and provided with ball-bearings at the point where it is attached to the connecting rod; the latter is operated through a crankshaft carrying an adjustable crank-pin, the position of which governs the length of stroke of the cutter. The lower end of the connecting rod is mounted on a self-aligning ball-bearing on the crank pin, permitting the use of high reciprocating speeds.

The crank-shaft, which operates this reciprocating mechanism, is made from an alloy steel forging and is driven from the rear by a single-pulley drive, so that the machine can be arranged for group drive through a jack-shaft, no countershaft being necessary. Provision has also been made for the installation of individual motor drive. A 1-hp. motor provides sufficient power for operating a single machine. A more economical method of operation, however, when a group of these machines is installed, is to bolt the machine bases together and operate them as a unit. When this is done one 6-hp. motor furnishes ample power for ten machines.

The saddle, which carries the cutter-slide, is adjusted for different diameters of gears through a worm, worm-wheel, pinion and rack, and can be withdrawn to permit

locating and removing the work. It is held on guides on the face of the bed. For the depth feed, the saddle carrying the cutter is advanced towards the work by means of a feed cam, provision being made on this cam for taking, automatically, roughing and finishing cuts. The cutter is gradually fed into depth as the blank and cutter are rotated together, and the cutter overlaps on the finishing cut, so as to eliminate the possibility of variations in the thickness of the teeth.

The time in which the gear will be completed is controlled by the speed at which the cutter-spindle is operated, in conjunction with the feed gears located inside the machine. The rotary feed is expressed as so many strokes of the cutter per revolution, and gears are provided for securing seven different feeds, ranging from coarse to fine, suitable to the material being cut. A feed chart is attached to the plate covering the feed gears. The coarsest feed is 435, which means that the cutter would make 435 strokes to one complete revolution of the cutter; similarly, the finest feed is 1735, indicating that the cutter would make 1735 strokes to one



Willis Ste. Claire transmission countershaft and gears cut in Fellows high speed gear shaper

complete revolution. The feed of the cutter, therefore, is controlled by these feed gears, the selection of which is governed by the material being cut. For cast iron a coarser feed can be used than for alloy steel. Roughing and finishing cuts are taken at the same feed and speed.

Little attention is required by the machine as far as oiling is concerned. All of the high-speed shafts are mounted on ballbearings and are automatically lubri-



cated. From a reservoir in the bed holding  $2\frac{1}{2}$  quarts, light machine oil is pumped to additional reservoirs, and from these wicks carry the oil down to the different bearings. The cutter-spindle shoe and guide are oiled by a reservoir in the saddle housing, which is exposed by removing the helmet. This reservoir in turn has wicks leading from it to the various bearing points and is filled with light machine oil. There are three grease cups on this machine, which are used because it was found that for a slight oscillating movement, grease is more satisfactory than oil.

Owing to the fact that all of the reciprocating members on this machine are of light weight, and that all high-speed shafts are mounted on ballbearings, very little power is required to operate it. In fact, as previously stated, a 1-hp. motor furnishes ample power to cut any type of gear within the capacity of the machine.

The automobile manufacturer unquestionably is largely responsible for the advance that has been made in the past few years in the design of gears and probably the best example of advanced practice is the automobile transmission, the gears of which are made from high grade alloy steels, because they are subjected to greater abuse than probably any other form of gear.

The new high-speed gear shaper will handle any form of gear entering into a standard automobile transmission, as well as some of the special designs. For in-

stance, the countershaft gear, illustrated herewith, is made in two pieces, but no rivets are used in assembling; instead the larger part of the countershaft is held to the smaller part by an internal clutch, this clutch fitting the gear on the countershaft itself. The advantages of this scheme will be readily appreciated by the designer. The other gears are the reverse gear, the low and reverse sliding gear and the direct-drive clutch and second speed gear, as well as the direct-drive pinion. All of these gears were cut on the new high-speed gear shaper.

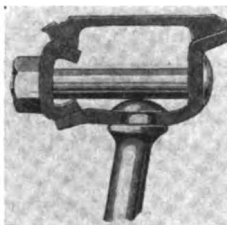
In adapting the new gear shaper to the cutting of internal gears, a slight modification is necessary in the design of the machine, owing to the fact that for cutting an internal gear, the cutter must work on the right-hand side of the center of the work-spindle, instead of on the left-hand side and for this reason a special crank-arm is necessary.

By another slight modification in design the new gear shaper can be adapted to the cutting of helical and herringbone gears, and, of course, produces these very quickly and accurately. In one of the accompanying illustrations the cutting of a camshaft gear for an automobile engine is shown. Practically the only modifications in the machine consist in the use of helical in place of spur guides, the use of helical instead of spur cutters and provision in the machine for changing over for cutting right and left-hand helices.

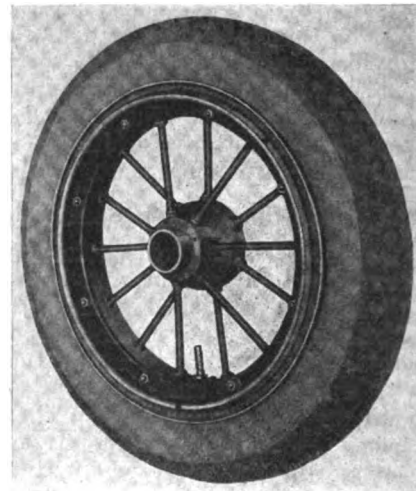
## New Type of Motor Truck Wheel

A NEW type of truck wheel, similar in construction to the metal wheels which have been used so extensively for agricultural machinery, has been brought out by French & Hecht. Round solid spokes are forged into both the hub and the rim and are held rigidly by substantial heads and shoulders. The firm has been making wheels based on this principle for the last thirty-five years, and millions of them are said to be in use in the hardest kinds of service. These wheels, we are informed, are designed so that they will interchange with the wheels on the truck.

Particular attention is called to the rim construction, which embodies a continuous wedge ring with bolts passing completely through the center of the ring, thereby giving a straight pull without the use of clips. As regards weight, the manufacturers say that it weighs no more than other wheels and usually less. While the photograph shows the wheel equipped with a demountable tire, it is the intention to make it in the detachable form also.



French & Hecht solid spoked steel wheel with demountable rim



## Metal Airplane Construction

AT a recent meeting of the Scientific Society for Aviation in Munich, Mr. Dornier spoke on his experience as manager of the Zeppelin works in Lindau and Seemoos. At the instigation, and with the co-operation, of Count Zeppelin he devoted years to the development of the metal airplane on a broad basis. The principles of construction were: 1, exclusive use of steel and light metals; 2, avoidance of the use of seamless tubes joined by welding; 3, as a result of experience in the construction of airships, the use of profiles built up exclusively of sheet and strip metal parts; 4, connections between the individual parts by means of screws or rivets. The seaplanes which were built on the basis of these principles, after many failures, were characterized by the speaker as follows:

Metal construction of sheet and special sections, chiefly steel with light alloys; no tubes, no corrugated sheets, no welded joints. Inherently stable hulls. Stub boats (that is, hulls with lateral, hollow wing stubs for the purpose of increasing the stability in the water). Wings either entirely of metal or metal with fabric. Smooth hulls without girderwork. All masses, especially that of the engines, near the center of gravity. No gear reduction for the engines. Accessibility and possibility of adjustment of engines in the case of multiple engined planes.

Planes according to these principles have been built of from 60 to 100 hp., wing spread from 26 to 143 ft., wing surface up to 3500 sq. ft., width of hull up to 15.4 ft. and useful load capacity up to 7700 lb.

# Large Scale Production Made Possible by Modern Methods

Rapid improvement in the design of machine tools and production methods has enabled Dodge Brothers plant to greatly increase its production capacity without a corresponding increase in the floor space required.

By J. Edward Schipper

**W**E are so accustomed in these days to think in terms of large production that it is easy to lose track of the rapid advance which has been made in the design of production machines and the development of production methods, especially during the past five or six years. During this period the cost of labor has advanced considerably, yet cars are, in general, selling for but little more than they did at the beginning of this period. With increased cost of labor, the price of materials used in automotive manufacture has increased, hence it is probable that the labor cost in fabricating a car is actually less today than it was five or six years ago. This result has been made possible largely because of the rapid advance in production machines and methods. In other words, increasing costs in many directions have been largely offset by better manufacturing methods and machines.

The economies due to these advances in manufacturing methods have, of course, required large capital investments in machine tool and other equipment, so that organizations attempting to operate on a large production basis have been forced to make these investments to continue business without a heavy handicap in meeting competition. On the other hand, the concentration of manufacturing facilities introduced by employing modern methods and machines makes it possible, at least in some cases, to effect marked economies in respect to the floor space required for a given volume of production, and consequently in the capital investment in buildings.

To use production facilities to the best advantage it is obviously necessary to design the article to be produced in such a way as to adapt it readily to quantity production methods, so that it is necessary to have close co-operation between design and manufacturing departments.

## Increase of Production Capacity

From a production standpoint, the Dodge Brothers car offers one of the most interesting studies there is in the automobile field today. This car was one of the first to be designed primarily with a view to its adoption to large quantity production. The capacity of the Dodge Brothers plant is about 625 cars per day. The different departments throughout the factory are laid out on this basis. The production capacity has been steadily growing since July, 1914. The increase in the floor area of the plant, while large, has not been in proportion because of the greater concentration of manufacturing arrangements. To be exact, the area of the factory has grown from 20 acres to 120, or six times during the six years the company has been in production, while the growth of the production capacity has been far greater than this. The reason for this is that all of the time the company has been increasing its production it has been keeping pace with developments in the machine tool industry and constantly bring-

ing every department up-to-date in this respect. The design of the car itself has changed but little during the six years it has been in production and these changes have been only of a detail and not a radical nature. The machine equipment of the factory on the other hand has been undergoing far greater changes.

Some of the biggest developments in the machine tool industry have come during the past five or six years, and the changes made at the Dodge Brothers plant during this period of time illustrate this fact to a remarkable degree. To look at it in another way, had the machine tool industry remained stationary and the productive ability of the Dodge Brothers plant increased at the same rate as has been the case, the plant would now spread over a far greater area in order to turn out the same number of cars per day. This concentration has resulted from a combination of improved machinery and improved methods which have been worked out in the factory itself.

## Handling the Steel

Starting with the steel yard where raw material enters, this is handled by 5-ton electric cranes, which is probably the quickest and handiest method of transporting and controlling the location of this heavy material. Since practically the entire car is made in the one plant, an enormous supply of steel is required for everyday use. Some idea of the amount of material passing through the Dodge Brothers factory may be gained from some statistics of the purchasing department. In the oil burning furnaces of the heat-treating and drop-forging departments, 20,000 gal. of fuel oil are consumed per day; more than 250,000 lb. of forgings are made per day and over 400,000 lb. of grey iron castings, requiring upward of 30,000 lb. of core sand. It has been estimated that the heat-treating and hardening departments alone require 6500 gal. of oil per day. The automatic screw machine department turns out more than 300,000 completely finished pieces per day. An average incoming shipment of raw material to the amount of 100 freight carloads are received daily.

The machines employed in the manufacturing processes would not be suitable for any but large production plants. In the cylinder block department, for example, in place of having machines which take a roughing cut and then pass the work along to a finish cutting machine, the blocks are rough milled and finish milled on the same rotary miller, these being double cutter machines. The cylinder block is so designed that it is adapted to the rotary millers not only in an endwise direction, giving a fixed dimension for the length and consequently interchangeability in this respect, but the top and bottom surfaces of the block can also be milled on the rotary miller. The cylinder blocks are put through the large rotary millers at the rate of 12 per hr.

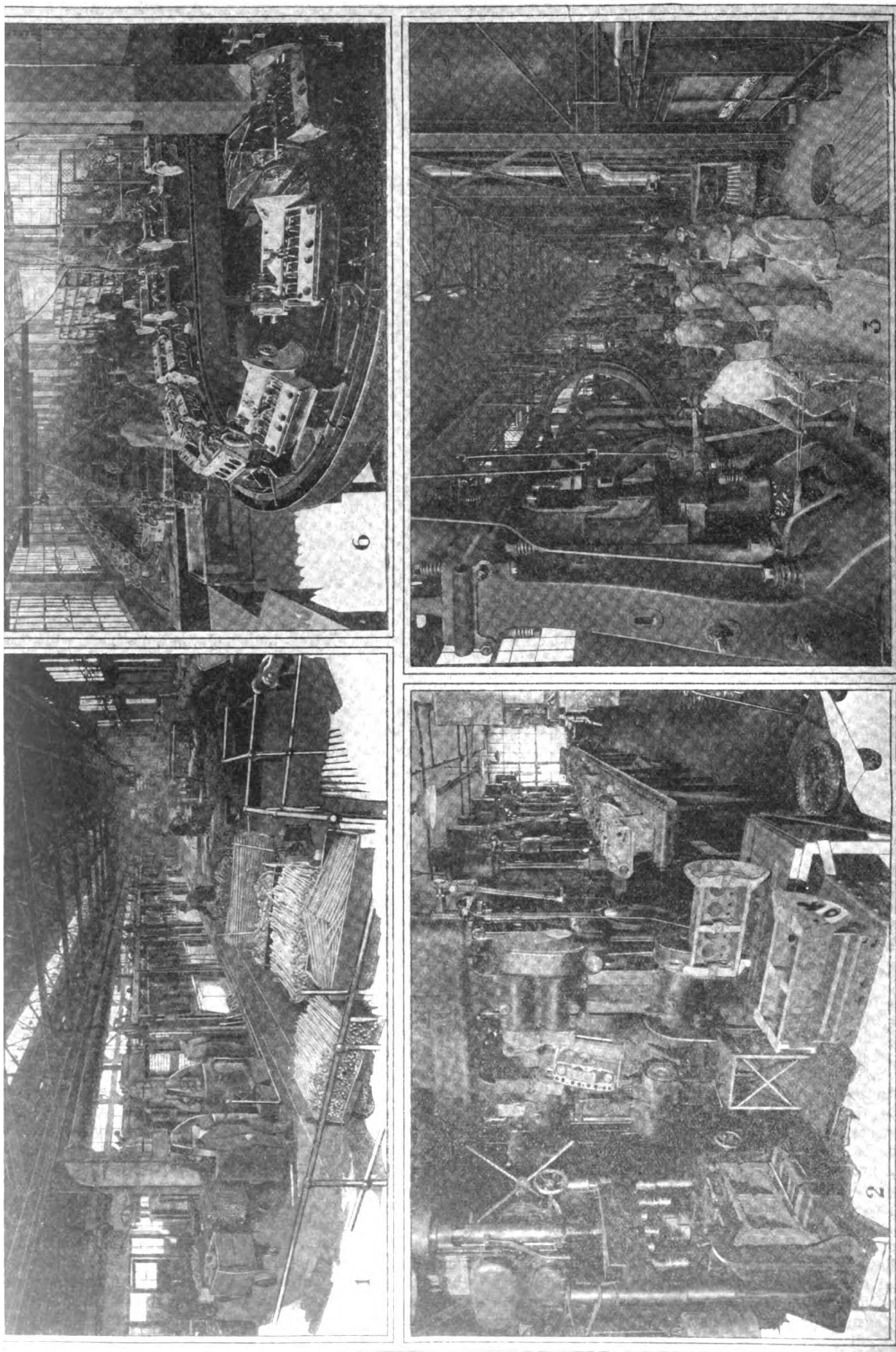


Fig. 1—Annealing furnaces where steel parts used in Dodge Brothers cars are heat treated. Fig. 2—Newton rotary milling machine of the continuous type which rough and finish mills the cylinder blocks. The same type of machine is employed for the transmission cases. Fig. 3—Line of steam hammers used in Dodge Brothers forge department.—Note proximity of hammers to furnaces for convenient handling. Fig. 4—Portion of engine assembly department showing how engines are tilted at angle most convenient for operator

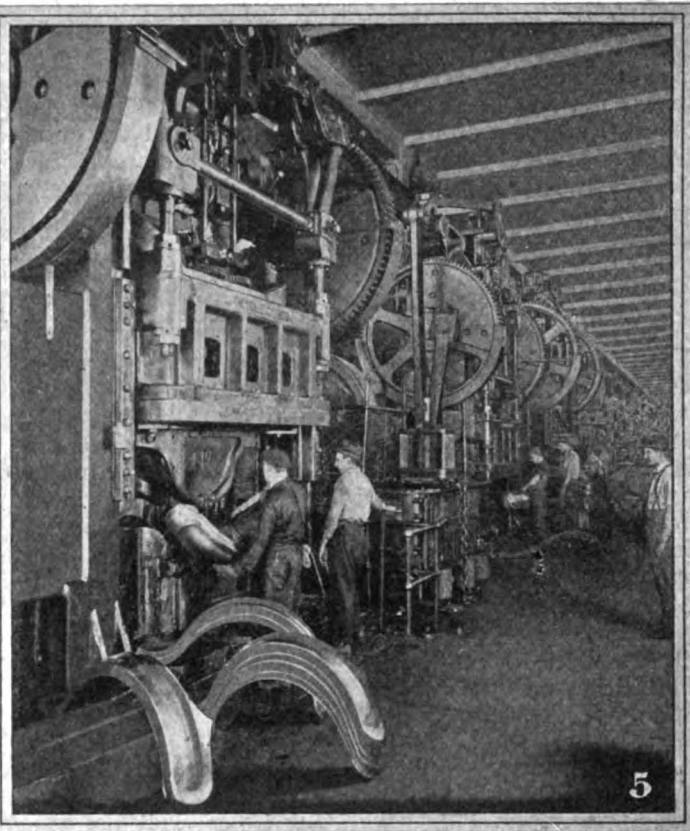
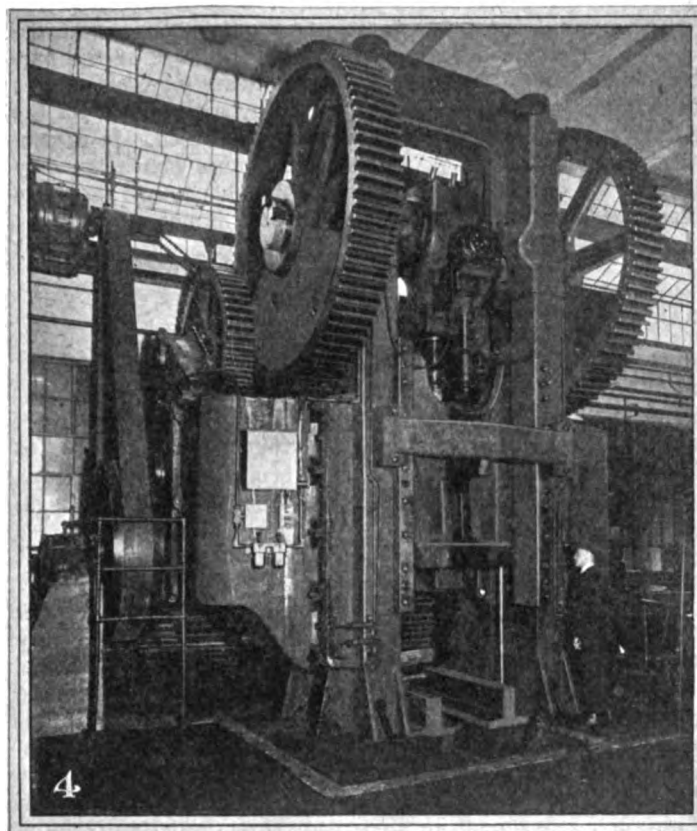


Fig. 4—Type of Toledo press used in the pressed steel department. These are Toledo presses and have capacities up to 1500 tons. Fig. 5—Line of fender presses in Dodge Brothers pressed steel department

This operation is shown in Fig. 2. The miller is capable of holding six blocks at a time and when the blocks leave the miller they have received both the rough and finish cuts. The two sets of cutters are visible in Fig. 2.

Another interesting operation on the cylinder block for this car is the drilling, which is a four-way system almost entirely. The four-way drill is, of course, in common use in large production plants. The unusual feature is that in this plant an entire battery of these drills is employed, cutting down the space required for the drilling operations by at least 50 per cent of what would have been required with the drilling machinery available at the time the plant was first put into operation. Both this operation and the operation which was described previously would have been considered practically impossible at the time Dodge Brothers factory began manufacturing. Rough and finish cutting on the same machine was thought to be possible but impracticable. The latest development in multiple drilling at that time was the railway type of drill in which the parts were passed progressively from one machine to the next. In order to save time, the same jig was employed for several drilling machines. By the present method, only one jig is necessary and it does not have to be moved as the 54 spindle machine completes the four-way operation simultaneously.

The turning of the piston is accomplished on semi-automatic machines arranged in nine batteries with a total capacity of 3600 pistons per day. This is sufficient not only for production, but also for service requirements. Under normal conditions, only eight of these batteries are in operation, five of which take care of the roughing of the outside diameter and the ring grooves and three the finishing. These machines are so arranged that they hold the pistons vertically and are semi-automatic, that is, they are loaded by the operator, started, and then when the operation is complete, cut themselves off.

The forge department is equipped with 57 steam ham-

mers. These take care of the complete line of forgings for the entire car from the heaviest part down to the lighter pieces. The capacity of the forges ranges from 400 to 7500 lb. To take care of the capacity production of 625 cars per day, a consumption of more than 250,000 lb. of steel is required by the forge department. A typical line of the forging machines employed is shown in Fig. 3.

The pressed steel work, of which there is probably a higher percentage on Dodge Brothers cars than on any other car, is also handled in the Dodge Brothers plant. The presses handle not only the chassis and engine parts, such as the oil pan and other pressed steel units, but also take care of body, fenders, etc. The presses run up to a capacity of 1500 tons. They are of the type shown in Fig. 4. The fender department is shown in Fig. 5. As will be noted, these presses are of large capacity to handle the deep draw on the Dodge Brothers fenders.

The body of the Dodge Brothers car being entirely of pressed steel, lends itself to the baked enamel finish which is a characteristic of this car. There is no wood construction in the body to burn in the baking ovens, and the trim sticks are not fitted until after the body has been returned from the enameling and baking process. The body department is also highly concentrated and the work there is carried on in a strictly progressive manner, the bodies being continually on the way until they reach completion at the end of the conveyor which takes them through the last oven.

An interesting feature of the engine assembly system is the conveyor system on which engines are carried in a tilted position at an angle which is most convenient for the operator. A portion of the engine assembly line is shown in Fig. 6. It will be noted that the engines in the foreground are carried on one angle, while in the background they are upside down. Sub-assembly lines have been laid out to be adjacent always to the main assembly line so that when the sub-assembly is completed, it termi-



nates at the point at which it is required for the final assembly. This phase of convenience for the operator is given much study throughout the entire organization. The clean aisles which are maintained, the convenience of stock to the point at which it is required and the elimination of manual handling to the last degree are all factors which are considered of considerable importance in securing the desired production efficiency.

Throughout the plant there are many methods and devices used which are applicable solely because of the particular design of this car. One significant example of this is evident in the ability to put the cylinder block on the rotary miller in the manner already described. It is usually possible to employ a machine of this character only for the top and bottom cuts, but to be able to use the same machine for end milling also is unusual if not unique.

## Metric System Bill a Live Issue

**T**HE bill providing for the introduction of the metric system as a standard in the United States, introduced in the House of Representatives April 11, 1921, has a very definite interest to automotive manufacturers. Were it passed it would affect the automotive industry very strongly. A similar bill has been introduced in the Senate and both measures are now in the conference stage. Hearings on the bill are now being conducted before a sub-committee of the Senate Committee on Manufactures. Advices from Washington indicate that there is a very fair chance that the measure will reach the floor of Congress sometime next spring. The bill is reprinted here as a matter of information to automotive manufacturers.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after ten years from the date of passage and approval of this Act the weights and measures of the meter-liter-gram or metric system shall be the single standard of weights and measures in the United States of America for the uses set out herein.

Sec. 2. That the national prototypes of the fundamental standards of the metric system shall be the copies of the standards known as meter numbered twenty-seven and kilogram numbered twenty, allotted to the United States by the General Conference of Weights and Measures held at Paris in 1889. These are now deposited in the vault of the Bureau of Standards of the Department of Commerce and are those which are now used and employed in deriving the values of all weights and measures used in the United States. These national representations are hereby adopted as the primary standards of weights and measures for the United States of America, and from these all other weights and measures shall be derived and ascertained.

Sec. 3. That from and after ten years from the date of passage and approval of this Act no person shall do or offer or attempt to do any of the following acts, by weights or measures, in or according to any other system than the metric system of weights and measures, namely:

(1) Sell any goods, wares, or merchandise except for export, as provided in Section 8;

(2) Charge or collect for the carriage or transportation of any goods, wares, or merchandise.

Sec. 4. That from and after ten years from the date of passage of this Act no person shall use or attempt to use in any of the transactions detailed in Section 3 any weight or measure or weighing or measuring device designed, constructed, marked, or graduated in any other system than the metric system of weights and measures.

Sec. 5. That not later than ten years from the date of passage and approval of this Act all postage, excises, duties, and customs charged or collected by weights or measures by the Government of the United States shall be charged or collected in or according to the metric system of weights and measures.

Sec. 6. That rules and regulations for the enforcement

of this Act not inconsistent with the provisions hereof shall be made and promulgated by the Secretary of Commerce. The Secretary of Commerce shall also take such steps as he may deem expedient for giving publicity to the dates of transition specified herein and for facilitating the transition to the meter-liter-gram or metric system.

Sec. 7. That all Acts or parts of Acts inconsistent herewith are hereby repealed but only in so far as they are inconsistent herewith; otherwise they shall remain and continue in full force and effect. Whenever in any Act, or rules and regulations, or tariff or schedule made, ratified, approved, or revised by the Government of the United States of America weights or measures of the system now in customary use are employed or referred to, and to comply with the provisions of this Act weights and measures of the metric system should be employed, then such references in such Act, rules and regulations, tariff, or schedule, shall be understood and construed as references to equivalent weights or measures of the metric system ascertained in accordance with the required degree of accuracy.

Sec. 8. That nothing in this Act shall be understood or construed as applying to—

(1) Any contract made before the date at which the provisions of this Act take effect;

(2) The construction or use in the arts, manufacture, or industry of any specification or drawing, tool, machine, or other appliance or implement designed, constructed, or graduated in any desired system;

(3) Goods, wares, or merchandise intended for sale in any foreign country, but if such goods, wares or merchandise are eventually sold for domestic use or consumption then this clause shall not exempt them from the application of any of the provisions of this Act.

Sec. 9. That nothing herein shall be understood or construed as prohibiting the enactment or enforcement of weights and measures laws or ordinances by the various States or cities, and the various States or cities shall have the same powers as though this Act were not in force and effect: Provided, however, That no standard weights or measures shall be established for the uses set out herein which conflict in any way with the standards established herein, and such standards which may already have been established shall be null and void for the uses set out herein.

Sec. 10. That the word "person" as used in this Act shall be construed to import both the plural and singular, as the case demands, and shall include corporations, companies, societies, and associations. When construing and enforcing the provisions of this Act, the act, omission, or failure of any officer, agent, or other person acting for or employed by any corporation, company, society, or association, within the scope of his employment or office, shall in every case be also deemed to be the act, omission, or failure of such corporation, company, society, or association as well as that of the person.



# Trailer Registration Fees High in Many States

Parallel truck fees and restrictions in many instances and the amount of the tax stands as a direct sales resistant. Salesmen must show how economic advantages of the trailer will counterbalance the high fees charged. As with trucks a complete lack of uniformity is a paramount feature.

**T**RAILER registration fees in a majority of the 31 states that impose taxation upon this form of vehicle stand out distinctly as being considerably higher than the amount that has been considered fair and equitable by the Motor Vehicle Conference Committee, composed of representatives of the automotive industry and various highway bodies. There appears to be in many states a direct tendency to discourage the use of trailers which have proven themselves to be an economic factor of transportation.

Many of these fees have been placed at a figure so high as to make the taxation a direct sales resistant, especially when it is considered that the amount of the trailer fee must be added to the amount of the truck fee. As would be expected, most of the states calling for the highest fees for trucks impose the highest taxes upon trailers. Thus, in a State such as Wyoming, where the fee for a 5-ton truck is \$100, the added tax of \$75 for registering a 3-ton trailer is quite apt to cause the prospective purchaser to consider carefully before he buys the latter vehicle.

Under such conditions it behooves the trailer salesman to be able to show his prospective customers that the increased efficiency that will result from the use of a trailer will more than offset the added cost of the high registration fee. A study of the trailer situation

in this respect will show that a great similarity of conditions exists as to trailers and trucks. Recently AUTOMOTIVE INDUSTRIES published an article with tables and charts showing the effect state laws are apt to have upon motor truck sales, and it can easily be seen by comparing the figures for the two vehicles that the situations are almost identical. In fact, in many states the trailer fees are exactly the same as the truck fees, or are determined by the same methods.

Trailer fees vary, of course, with the size and weight of the vehicle, but for purposes of discussion this article will deal with a trailer of 3-ton capacity. Certain physical characteristics must be assumed in order to determine a fee for this trailer, for, as with the trucks, there are many different ways by which the amount of the fee is determined. These physical characteristics are shown with the accompanying chart.

It will be seen on this chart that the highest fee for this type of vehicle is in Florida, where \$95 is charged upon registration. The lowest is in California, where a flat rate of \$2 is charged for all trailers. These present two extremes: the one so high that the single truck owner, at least, is apt to need considerable encouragement before he can be persuaded to buy a trailer of this type, and the other so low that trailers in that state do not furnish their share of the revenue necessary to

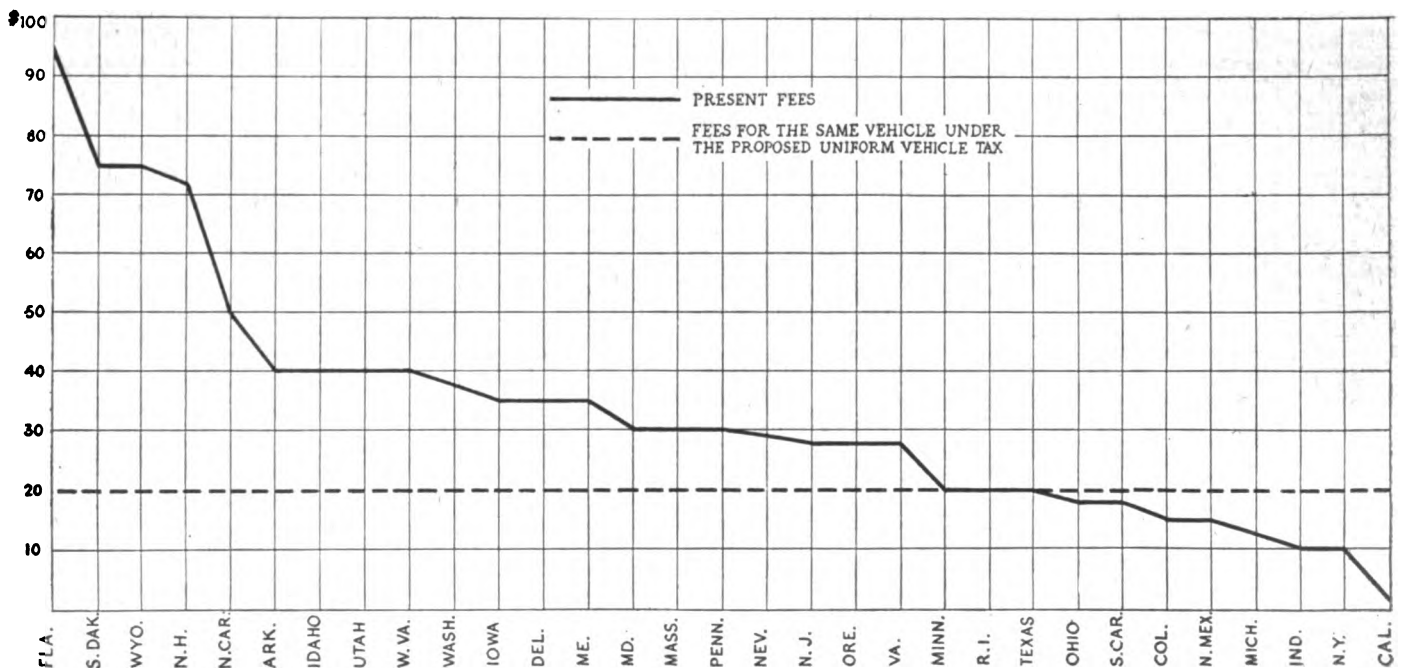


Chart showing the costs of registering a three-ton capacity trailer in the 31 states having trailer laws in effect. This chart is based on the assumption that the trailer has a gross weight of 8,500 lbs.; is equipped with four solid tires of 5 in. width each, and has an original cost of \$1,000

## Changes in Trailer Registration Fees

(This table prepared from data gathered by the Motor Vehicle Conference Committee)

State	Date new law effective	Old Fees	New Fees	State	Date new law effective	Old Fees	New Fees
Alabama	No trailer law			Missouri	No trailer law		
Arizona	No trailer law			Montana	No trailer law		
Arkansas	May 1, 1921		Ton Capacity Pneu. tires 1 or less.....\$10 1 to 2..... 15 2 to 3..... 25 3 to 4..... 40 4 to 5..... 50 No schedule fixed for solid tires.	Nebraska	No trailer law		
California	No new law	Per trailer.....\$2.00	No change	Nevada	No new law	Same as trucks	No change
Colorado	No new law	1 to 2-ton capacity.\$10 For each additional ton..... 5	No change	New Hampshire	Jan. 1, 1922	No fees previously charged	Per 100 Pneu. sol. Met. lb. gr. tires wt. trailer & load \$0.60 \$0.85 \$1.00
Connecticut	No trailer law			New Jersey	Jan. 1, 1922	Same as old truck fees	Same as new truck fees
Delaware	No new law	Per 500 lb. gr. wt., \$2.00 Metal tires, double fees if gr. wt. exceeds 1,500 lbs.	No change	New Mexico	Jan. 1, 1922	No fees previously charged	Rubber Metal Per 100 lb. tires tires rated cap. \$0.25 \$0.50
Florida	Jan. 1, 1922	Same as trucks if over 500 lbs. capacity. Under 500 lbs. capacity, no fees.	Pneu. Solid Per 100 lb. tires tires gr. wt....\$0.75 \$1.12	New York	No new law	Gr. wt. Fee Tons 2 or less \$5.00 2 to 5 10.00 5 to 7 15.00 7 to 10 20.00 10 to 14 30.00 Plus \$5 for each ton over 14.	No change
Georgia	No trailer law			North Carolina	July 1, 1921	Ton Capacity 1 \$10 Plus \$20 for each additional ton.	Per Ton Capacity \$15
Idaho	No new law	Same as trucks	No change	North Dakota	No trailer law		
Illinois	No trailer law			Ohio	No new law	Per 100 lb. gr. wt., \$0.20	No change
Indiana	Jan. 1, 1922	Ton cap. of truck drawing trailer Fee 1 to 1 \$3 1 to 2 5 to 7 1/2 \$20 2 to 3 5 7 1/2 & over 25 3 to 5 15	Ton capacity Fee Less than 1..... \$3 1 to 2..... 6 2 to 5..... 10 5 to 7 1/2..... 20	Oklahoma	No trailer law		
Iowa	Jan. 1, 1922	Cap. Fee Iron 2 or Pneu. or more tires steel solid 1 to 1 \$10 \$15 \$10 1 to 2 15 30 15 2 to 3 25 .. 35 3 to 4 40 .. 50 4 to 5 50 .. 60 5 to 6 60 .. 70	Ton Capacity Pneu. 2 or 1 to 1 \$10 1 to 2 15 \$5 2 to 3 .. 15 3 to 4 25 35 4 to 5 40 50 5 to 6 50 60 6 to 7 60 70 No change for metal tires. Trailers with capacity of less than 1/2 ton not subject to fee.	Oregon	Jan. 1, 1922	1/2 old truck rates	1/2 new truck rates
Kansas	No trailer law			Pennsylvania	Jan. 1, 1922	Same as old truck fees	Same as new truck fees. With metal tires, double regular fees. No fee required for trailers weighing less than 500 lbs.
Kentucky	No trailer law			Rhode Island	Jan. 1, 1922	No fees previously charged	Pneu Solid Metal Per 100 lb. tires gr. wt. \$0.15 \$0.25 \$0.35
Louisiana	No trailer law			South Carolina	No new law	Per trailer, \$5 plus \$2 per 1,000 lb. carrying capacity	No change
Maine	Jan. 1, 1921	No fees previously charged	Pneu. Solid Iron Per 100 lb. gr. wt. \$0.15 \$0.40 \$0.75	South Dakota	Jan. 1, 1922	No fees previously charged	Same as trucks
Maryland	No new law	1-ton capacity \$10 plus \$20 for each additional ton. Metal tires, double above.	No change	Tennessee	No trailer law		
Massachusetts	No new law	Pneu. tires, 1/2 truck rates. Solid tires, same as trucks. Metal tires, double trucks.	No change	Texas	Jan. 1, 1922	No fees previously charged	Pneu Solid Metal Per 100 tires gr. wt. \$0.15 \$0.25 \$0.35
Michigan	No new law	Per 100 lbs. of trailer's weight \$0.50	No change	Utah	April 1, 1921	No fees previously charged	Ton Cap. Pneu. Solid Metal 1 \$10 \$15 \$15 2 15 25 50 3 25 40 .. 4 40 60 .. 5 50 75 ..
Minnesota	April 5, 1921	No fees previously charged	2% of value. Minimum fee for 1 ton or less, \$10, plus \$2 per ton or fraction thereof over 1 ton.	Virginia	No new law	1 Ton Capacity, \$15, plus \$3 per each additional 1,000 lbs.	No change
Mississippi	No trailer law			Vermont	No trailer law		
				Washington	No new law	Same as trucks	No change
				West Virginia	No new law	Ton Cap. Solid Pneu. tires 1 or less \$10 \$5 Each additional ton 15 7.50	No change
				Wisconsin	No trailer law		
				Wyoming	Jan. 1, 1922	No fees previously charged	Same as trucks. No fee required for trailers of less than 500 lbs. capacity

insure proper highway maintenance. It should also be remembered in this connection that there are 18 states that charge no fees whatever for trailers. Some of these latter states are ones in which truck fees are unusually high. The fees discussed here are ones demanded for trailers equipped with solid tires. Eleven of the 30

states considerably reduce the fees where pneumatic tires are used. These states, together with the amount charged for the typical 3-ton trailer equipped with pneumatic tires are as follows: Florida, \$63.75; New Hampshire, \$51; Indiana, \$25; Utah, \$25; Pennsylvania, \$24; Oregon, \$21; West Virginia, \$20; Massachusetts, \$15;

Maine, \$12.75; Rhode Island, \$12.75; Texas, \$12.75.

These, compared with the fees required for solid tires, are considerably lower in most cases, but in the other 20 states no distinction is made.

So far as trailer weight and size restrictions are concerned, they are practically identical with the truck restrictions. In several states there is a limit to the length of a truck and trailer combination allowed, but these restrictions were shown in the truck tables.

A glance at the accompanying chart will serve to show the absolute lack of uniformity that exists in trailer fees. Little else could be expected, however, if a study of truck fees has been made. There is about the same variance in method and result that was so evident in connection with trucks. What is true of the 3-ton trailer discussed in this article would also be true of other sizes of vehicles. Most states, as was stated at the outset, are demanding registration fees considerably higher than the amount decided upon by the Motor Vehicle Conference Committee when it submitted the Proposed Uniform Vehicle Law to state legislators. Under that law the fees would be computed upon the following basis:

	Per 100 lb. gross weight of vehicle and load
Equipped with	
Pneumatic tires.....	15 cents
Solid tires.....	25 cents
Iron, steel or other hard tires.....	35 cents

There are at the present time two states using this basis in its entirety. These two states are Rhode Island and Texas. The fee for the typical 3-ton trailer under such a law would be \$20 if equipped with solid tires. There are 20 states charging more than this amount, three have placed the fee at \$20 and eight charge below the fee considered fair. If equipped with pneumatic tires the fee for such a vehicle under the Proposed Uniform Vehicle Law would be \$12.50.

From a sales standpoint it is believed that these excessive fees will do more to hinder trailer sales than the excessive truck fees will do to hinder truck sales. The prospective purchaser of a truck usually has made up his mind that a truck is necessary to the conduct of his business, and about the only doubt left in his mind is as to the make he should buy. The trailer prospect, however, may feel that a trailer would be something of an asset, but not a necessity. If he knows that he must pay an annual fee of something like \$40 or \$50, or more, to operate this trailer, he is quite apt to decide that his business can well do without such added equipment. This would apply particularly to the man with but one or two trucks.

Sales managers, therefore, would do well to make a close study of these trailer fees with a view to learning how best to overcome this sales resistant. They should then study the economic possibilities of the trailer and learn how increased efficiency from its use will counterbalance the registration fee.

## New Model Lavine Steering Gear

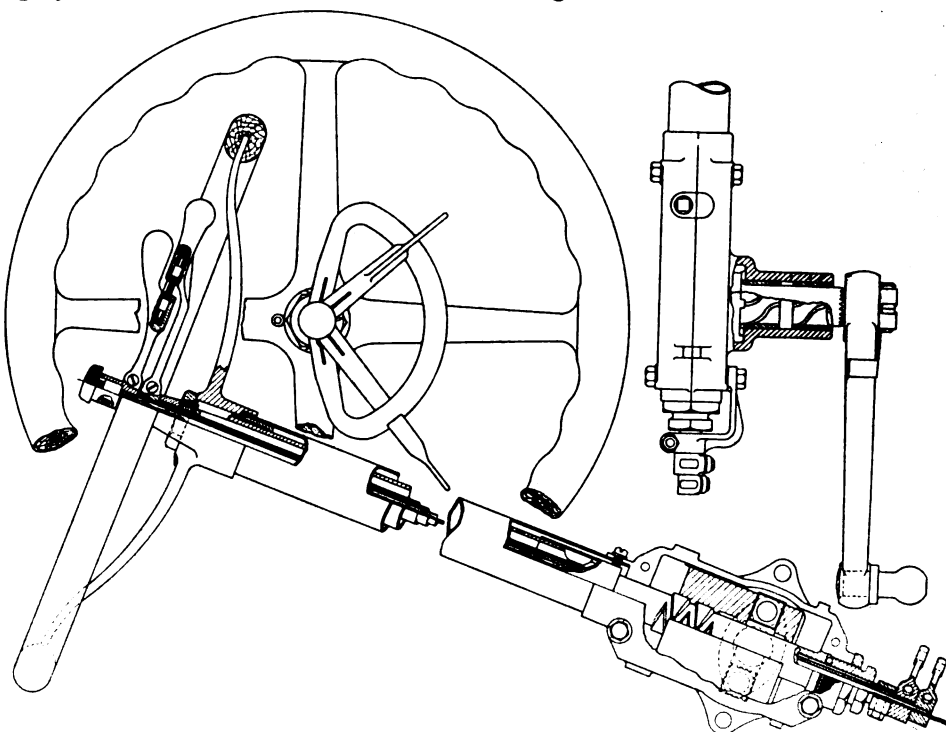
**L**AVINE steering gear, which is of the split nut type, having every working part hardened and ground, is now being produced. The housing and its cover of this new model are made of malleable iron castings, which are straightened under a 30-ton drop hammer. The worm and sliding heads are made of alloy steel, carbonized, hardened and ground. The tolerances on these parts are 0.001 in. plus and minus. The trunnion blocks are made of chrome-vanadium steel, heat-treated. The trunnion shaft forging is thoroughly annealed to relieve forging strains, machined and then heat-treated for toughness and high tensile strength which is said to run about 140,000 lb. per sq. in. Finally, this shaft is ground to tolerances of plus and minus 0.001 in. The end of this shaft is machined with thirty-six 90-deg. splines or serrations, to insure a dependable set for the ball arm. The ball arm is made of carbon steel, heat-treated. The particular heat-treatment it gets is designed to render the steel of the arm very tough so as to enable it to withstand the shocks to which it is subjected in service. A taper pin is used in connection with the ball.

The trunnion shaft is mounted in bronze bushings made of an 86 copper, 12 tin, 2 zinc composition which is said to be very hard. All tubing used on this gear is passed through a tubing resizing machine, insuring tubing true to size. Bronze bushings are inserted at both ends, these bushings being machined and

reamed, a precaution taken to prevent rattle in the gear.

The worm is secured to the worm tube by a shrink fit and is then further secured by two Woodruff keys which are spot-welded to hold them in place, after which a collar is shrunk over them. This collar is again spot welded in eight different places. The controls are made by the die-casting method.

Attention may be called to the provision for effective lubrication of the worm wheel shaft whose bushing is made in halves with a grease reservoir between.



# South African Tractor Market Demands Study

## Part I

American tractor leads in popularity, but manufacturers should analyze the territories there with a view to furnishing machines adapted for the kind of work each district requires. Factors determining types needed.

By George B. Bell\*

THE growing importance of agriculture in South Africa was clearly reflected in the 1920 imports of agricultural implements, among which probably no classification showed a greater increase than the imports of tractors. This fact is brought out in a report received from Trade Commissioner P. J. Stevenson, which discusses in considerable detail the many factors which affect, favorably or adversely, the sale of American tractors. According to this report, in 1920 the Union of South Africa imported 736 tractors valued at £199,626, compared with 294 imported in 1919 and valued at £53,312. The following table gives the quantities, values and country of origin of these imports:

	1919		1920	
	Quan.	Value	Quan.	Value
United Kingdom .....	4	£1,096	148	£56,874
Canada .....	21	4,239	14	2,800
Belgium .....	..	....	1	200
Italy .....	..	....	3	1,676
United States .....	269	47,977	570	138,076
	294	£53,312	736	£199,626

This statement shows that the American tractor leads all others in popularity in the Union, comprising, in 1919, 91 per cent of the total number imported, and, in 1920, 77 per cent. Figures showing the imports of tractors for 1921 are available for the first eight months, during which period 62 tractors valued at £40,637 were imported, as compared with 485 tractors valued at £107,107 imported in the corresponding period of 1920.

The deflation movement, which has had an especially paralyzing effect on the producers of raw materials, has caused, temporarily, what practically amounts to a cessation of the sale of tractors to the farming community. Although the South African farmer enjoyed five years of exceptional prosperity during the war period, the agricultural community to-day is in the worst position of any section of the country. This is due, of course, largely to the uneven economic balance which prevails, but also to the fact that during the days of prosperity the credit of farmers was high and they were enabled to borrow heavily for the purchase of additional land, better grades of stock, as well as general improvements. Consequently, at the present time, when farmers are forced to buy high-priced manufactured products with the reduced incomes resulting from low-priced raw materials, the market for expensive equipment is considerably curtailed.

In considering the market for tractors, it must be borne in mind that there are only 81,018 occupied farms and agricultural holdings, according to the latest agricultural census of 1920. The number of farms and the acreage, as reported in the census of April 30, 1920, were as follows:

	Occupied		Unoccupied	
	Number	Acreage	Number	Acreage
Cape Province..	32,515	117,301,293	1,315	9,981,129
Natal .....	8,807	9,046,642	488	877,642
Transvaal .....	23,502	37,652,296	2,747	11,219,404
Orange Free State .....	16,190	29,191,196	935	914,134
	81,014	193,191,427	5,485	22,992,309

As is apparent from this table, the Cape Province is the largest farming district in the Union. The South-western districts of the Cape Province and also the Eastern districts are well cultivated. In Natal there is intense cultivation in the coastal section and in the extreme West, as well as in Zululand, while in the Orange Free State the main agricultural districts are located in the Northeastern section. In the Transvaal agriculture is fairly uniformly distributed, excepting the extreme Northern and Western districts, where, because of the inadequate transportation and rainfall, respectively, there is a sparse population. The chief crops grown in the Union from May, 1919, to April, 1920, are shown in the following table, by provinces:

	Cape	Natal	Transvaal	Orange Free	Total
	Acres	Acres	Acres	Acres	Acres
Wheat .....	588,361	3,068	91,629	133,655	816,713
Rye .....	112,254	439	3,509	24,615	140,817
Barley .....	72,892	854	6,938	4,252	84,936
Oats .....	446,438	7,706	83,889	108,705	646,738
Maize .....	239,797	400,227	1,773,552	1,576,841	3,990,417
Kaffir corn ..	25,153	34,117	188,130	90,145	337,545
Potatoes ...	19,488	7,978	30,534	41,341	99,341
Tobacco ....	6,347	1,724	16,681	977	25,729
Cottonseed ..	87	4,423	6,910	10	11,430
Chicory ....	688	40	67	...	795
Ground nuts (Peanuts) .	171	1,749	11,002	257	13,179
Tea .....	...	3,728	...	...	3,728

Conditions under which tractors are used vary considerably throughout the Union. On the High Veldt of the Transvaal and on the Low Veldt of the Orange Free State, tractors are used at fairly high altitudes. According to an article in *Commerce Reports* of Aug. 18, 1921, which was reprinted from the *London Times Trade Supplement*, the loss of power in internal combustion engines at an altitude of 4000 ft. amounts to 10 per cent. Ameri-

\*Chief Agricultural Implements Division of the Bureau of Foreign and Domestic Commerce. Condensed from an article appearing in *Commerce Reports*.

can experts who have been consulted on this point place the loss at about 20 per cent at 5000 ft. elevation. At an elevation of 3500 to 4000 ft., such as is to be found in some parts of the Orange Free State and Zululand, the loss would be somewhat less, averaging from 12 to 14 per cent, and slightly higher at the 6000-ft. elevation often found in the Transvaal. Along the coastal districts of Natal and in the Cape Province this loss does not occur, but power is slightly increased by reason of the greater humidity of the atmosphere.

The type of tractor required is determined to a large degree by the character of soils and other general working conditions, and these questions must be considered along with the altitude at which the tractor is to be used. In Zululand, where sugar is the main crop, plowing is rendered difficult both by the presence of the roots of the sugar cane from previous crops and by the lack of rainfall. Throughout Natal and the Cape Province the soil is usually fairly light, containing considerable sand, which makes for easier working, as does the great rainfall which this section generally receives. This soil can be compared to that found in the central or eastern part of North Carolina. In the Transvaal there is found in considerable quantities, red clay, black turfs and a mixture of sand, as well as loamy alluvial soils along the streams. The soil in the Orange Free State is usually a red, sandy clay, corresponding to the "gumbo" soils in the United States. Due to the rapidity of evaporation and the long dry spells, the ground becomes intensely dry and hard, both in the Transvaal and the Orange Free State. As a result of these conditions light tractors that have been successful in Natal and the Cape Province, where working conditions are most favorable, have been utter failures when tried in the Transvaal or the Orange Free State.

The unscientific sale of tractors to be used under conditions for which they are utterly unsuitable has done considerable harm to the development of the tractor trade. The successful handling of this particular problem is of vital importance to any manufacturer. The sale of tractors, even under normal conditions of prosperity, is not an easy proposition, and every care should be taken to insure sales based upon technical advice as to the suitability of various models to the various conditions prevailing in South Africa. In this connection attention should be called to the fact that descriptive matter prepared for distribution throughout the Union should take into account local working conditions. For example, the tractor which can easily handle six or eight plows in certain parts of the United States could perhaps handle only two or three in the Transvaal.

One of the most successful manufacturers in the United States builds for South Africa the same models that are used in the home market, without a single change. Engines should be specially built for this country, laying down certain specifications for revolutions, the reduced speed supposedly leading to a longer life and more satisfactory working of the engine. Another point referred to was the excessive dust cloud rising in the plowing operations. Unquestionably, the working parts of a tractor must be dust-proof for use in South Africa, just as in America, although it is particularly necessary on the Low and High Veldts. Generally speaking, however, the American tractors which have

been supplied have been satisfactory as far as their mechanism and design are concerned without any alteration or change.

The average farmer in South Africa is fairly well acquainted with the use of machinery, and can be expected to have little difficulty in running a tractor. It is not true that the South African farmer requires a machine that is capable of being overdriven or overworked, or that the cheapest kind of labor will be put in charge of a tractor as soon as it has demonstrated its worth. Native labor is seldom used for the operation of tractors, and mistreatment of the machinery is of rare occurrence. The farmer who is progressive enough to spend hundreds of pounds on a tractor as an investment is not likely to fall into any such error and can be expected to use care and follow instructions from the manufacturer as to the handling of the equipment.

It appears that the trend of conditions in South Africa will be to make it easier for the tractor to compete with the oxen and other draft animals. Improvement of exchange and lower factory prices, which will be followed by a lower selling price in the Union, will serve to broaden the market. As a result of different kinds of educational work, both direct and indirect, the farmer is becoming increasingly more progressive, and will conduct his farming operations on a more intensive scale than in the past, and in order to do this most efficiently he will realize that he must utilize the most modern and up-to-date methods available.

American tractors, generally, are bought in preference to those made in any other country. Several machines from foreign makers have been used in the various districts, but the opinion of the farmers there seems to be that American machines are best. There is still room for improvement, however, and a careful study of the demands of the market there should give to American manufacturers a knowledge that will prove immensely valuable in stimulating and developing sales.

## Commercial Aviation Abroad

DEVELOPMENT of commercial aviation has progressed more rapidly in France than it has in England. Last June French air companies carried 1553 passengers. Those in Great Britain carried only 400.

According to various estimates France in 1920 carried 5864 passengers as against 729 in 1919. An increase in the amount of merchandise carried was also recorded. The figures for 1919 were 14,080 kilos, while in 1920 the total was 124,195 kilos. More than 1,000,000 miles were traveled by commercial planes in 1920.

The longest traffic route at present is the one from Toulouse to Casablanca, Morocco, which takes about a day and a half with a stop over night. Other foreign services include: Paris-London, four times daily, two and one-half hours; Paris-Brussels, two hours; Paris-Amsterdam, four three-quarter hours; Paris-Strasbourg-Prague, seven hours; Paris-Warsaw, daily except Sunday, twelve and one-half hours; Bayonne-Bilbao-Santander, daily, two and one-half hours.

Services within France include: Bordeaux-Toulouse-Montpellier, three and one-half hours; Montpellier-Nîmes-Avignon-Nice, twice weekly.





# The FORUM



## What Another Owner Thinks

Editor, AUTOMOTIVE INDUSTRIES:

Taking courage from Mr. Harold Blanchard's letter as quoted in your magazine of Dec. 1; I desire to add a few observations taken from the users' point of view.

A recent contribution to your magazine states that the car owner is "boss of the industry." Is this strictly according to fact? When the electric starter was placed on the market in 1911 the vague need for a reliable self-starter doubtless arose in the mind of the owner, but the type, application and development was in the hands of the automotive engineers. I believe the same state of affairs existed in the development of the eight and twelve-cylinder engines, the hot-spot manifold and thermostats.

It would appear then that the engineers have a great opportunity to place in the hands of the owners more economical cars. Recent discussions regarding fuel economy indicate that lower normal engine speeds under light duty are desirable. Otherwise stated this means higher gear ratios. The cry is raised that four speeds are not wanted and the owners do not want to shift gears. My observation has been that it is not the shifting gears that is objected to, but the noise of the geared speeds. Several years ago I equipped a light six Thomas with a Cadillac-Timken two-speed rear axle, using a hand lever to operate the shift. The fuel economy improved 20 per cent, and I will never forget the look of astonishment that came over the face of a driver of a much bigger car when I suddenly, quietly glided away uphill without the noise of any gears. Again, a 6-60 Alco geared 2½ to 1 on fourth speed is regularly averaging 10 to 11 miles to a gallon with an unheated intake pipe. This car has a displacement of 579.5 cu. in. I have yet to find an eight of 314 cu. in. or a twelve of 424 cu. in. that can make the same average.

Given two direct drives of, say 3 to 1 and 4 to 1, and a two-speed transmission, it would appear that economy comparable to foreign practice could be obtained.

Why do engineers insist upon putting brake levers in front of the rear axle, where they collect all the dirt and rarely get any attention? A grease cup or Alemite connection under the floor boards is wasted, yet the latest and best cars persist in the practice. Is there any reason why brake rods and levers cannot be inside the axle housing, with the pull rods running up the torque or enclosed drive shaft tube? The external band brakes of current practice have been criticized quite extensively of late, and it is to be hoped that four-wheel internal brakes or transmission brakes with one set of internal brakes will become the rule.

With reference to one of the cheap cars, why, oh why, after such improvements as pressed steel running board brackets, new fan bearings, do they still leave the timer and wires in the slough of despond? The business in timers and wires for this car seems to be thriving and is the commonest replacement made. This condition has existed for a mere ten years.

Headlights have recently been subject to legislative

restriction. Doubtless signaling devices will soon come in for their restrictions. The number of narrow escapes a driver will have in a day in any city from sedans and coupes breaking out of the curb line with all windows closed and no signal is familiar to most of us. Cannot the S. A. E. formulate a standard signaling device for closed cars and have it put on properly at the factory making it just as much a part of the car as the brakes or horn? People who use closed cars want to keep warm and dry, and therefore will not use the window available for signaling. The owners still maintain enough energy to push a horn button, another button to operate a "Right, Left and Stop" signal would not greatly over-exert them.

With a last reference to the two-speed rear axle. A design similar to the Stone-Probst, Austin or the old Berliot or Alco chain drive double bevel construction seems to be capable of refinement so that the unsprung weight would not greatly exceed present construction. This could be further insured if the band brakes were removed and aluminum or pressed steel internal shoes with suitable lining were used on the internal brakes. Anyone who has driven a double direct drive car knows the feeling of reserve power and smoothness that this construction gives.

ELLERY CHANNING WOOD.

## Motorcycles on the Farm

Editor, AUTOMOTIVE INDUSTRIES:

We have read with a great deal of interest the article of Marketing the Motorcycle, by Norman G. Shidle.

As we are thorough believers in market analysis, we can, we believe, appreciate the importance of Mr. Shidle's message. While we have not tried to check up the figures he quotes, nor are we prepared to say whether we agree in all of his deductions or not, we do believe that he has overlooked an important phase of the motorcycle market—the farm market. It is to that we wish to call your especial attention.

There are several reasons why motorcycles can be sold to farm boys. The enormous increase in automobiles on farms has, to a considerable extent, educated the boys to more speed than they can attain when driving horses.

The use of motorcycles by rural mail carriers has demonstrated their adaptability to country roads. It has demonstrated also the practicability of carrying fair sized loads. This factor has undoubtedly had a stimulating influence on motorcycle sales.

Because the motorcycle is a utility machine, economical of operation, with plenty of speed and power, it is possible for the farmer to send into town for repair parts when a breakdown occurs in the rush season.

As you undoubtedly know, a great number of farm boys attend high school in nearby villages. In this connection, it is interesting to note that the average farm is 4.8 miles from the nearest market. In this instance we interpret market to mean also the nearest point in which a school is located.

You will be interested in knowing that in our investigations we have found that there are an average of 1.6 men

above the age of sixteen on the average farm in our territory.

In the following table we have set up the number of farm families in each state in our territory—which we call our Heart Territory—and alongside that the number of men and boys in each state above the age of sixteen.

Number of Farm Boys and Men Sixteen Years of Age and Over

Heart States	Number of Farm Families	Number of Farm Boys and Men Over 16
Illinois	237,181	379,490
Indiana	205,126	328,202
Iowa	213,439	341,502
Kansas	165,286	264,458
Michigan	196,447	314,315
Minnesota	178,478	285,565
Missouri	263,004	420,806
Nebraska	124,417	199,067
North Dakota	77,690	124,804
Ohio	256,695	410,712
Oklahoma	191,988	307,181
South Dakota	74,637	119,419
Wisconsin	189,295	302,872
Heart States Total	2,373,683	3,797,893

In the cities, it is quite true that the motorcycle is regarded more as a delivery than as a pleasure vehicle. On the farm, altho it is a utility vehicle, it is nevertheless regarded as a pleasure machine. There is comparatively little data to show that farm boys and men are buying motorcycles in large numbers. We are convinced that the pleasure appeal should take precedent over the utility appeal when advertising to farm boys.

We do not feel that the utility appeal should be entirely disregarded in appealing to farm boys, however. The majority of boys over sixteen on the average farm are living with their parents and working with their father on the farm. The utility appeal will give the son a pretty strong argument for the purchase of a motorcycle.

If you have ever lived on a farm, you undoubtedly know that during haying and harvest and the busy seasons of the year, a broken part on a piece of machinery may hold up the entire crew. This is especially true of a harvest or threshing machine. A broken part on the binder or a broken casting or another part in the separator will hold up the farmer and his hired men, and his neighbors who are trading work.

The motorcycle can be used to secure such hurry-up repairs. It can also be used to deliver poultry, eggs, cream and all sorts of small farm produce, as well as to obtain emergency supplies from the nearest market.

There are, as you of course know, a large number of motorcycles in use, many of which are probably owned in farmers' families.

C. A. BAUMGART,  
Bureau of Farm Market Analysis, *Successful Farming*.

## Finish of Closed Car Interiors

Editor, AUTOMOTIVE INDUSTRIES:

The writer went over the article on closed car bodies published in your Nov. 24 issue, very carefully, and was very much interested in it.

There is no question whatsoever but what there is a growing demand for the cars equipped with a low-priced closed body. No line is complete without it. We feel sure that the very near future will bring forth many low-priced closed bodies, and from what we have seen we would say that no attempt has been made to stint the little refinements and accessories that go to make the closed body desirable. Probably one of the most important points that will require attention in this type of body is weight, as the power plant and chassis designed correctly for the open car is sometimes inadequate for the closed car.

We believe that the future will bring out the type of body that will eliminate upholstering with the exception of seat cushions and backs. By this I mean the interior

of a closed car should appear very much as the finish of a pullman car smoker, where we find imitation mahogany throughout with the exception of the seats and the seat-backs.

This would eliminate the present necessity of waving a vacuum cleaner around one's head in order to clean the interior, the cleaning being done by the application of a damp cloth. This would aid in the elimination of some considerable expense, we believe.

ALEX TAUB, Engineer,  
General Motors Corporation.

## Thin Top Leaves for Springs

Editor, AUTOMOTIVE INDUSTRIES:

The article, "A Remedy for Spring Breakage," by Frederick Franz in the issue of Nov. 10, interested the writer as he is the inventor of a leaf spring in which the master leaf is thinner than the other plates. Springs of this description have been in use by several automobile builders since 1915. We may mention a few here: Dorris, National, Crane, Mercer, Simplex and Marmon; the last-named maker's cars have been regularly so equipped since 1914-1915.

When your correspondent states that a "Chicago spring maker almost refused to supply me with springs for an electric truck—having the top leaf thinner than the remaining leaves" on account of the "unusual procedure" it may have been that the said spring maker was well aware of the existence of U. S. Patents No. 1,199,013 and 1,199,038 issued Sept. 19, 1916, and No. 1,241,744 of Oct. 2, 1917. These patented springs, known as the "Sheldon-Landau" springs, are manufactured exclusively by the Sheldon Axle & Spring Co. of Wilkes-Barre, Pa.

It may be of interest to the automobile industry in general to know that during the past six years in which these springs were sold—there are at least 70,000 in service—not one case of main plate breakage has been reported. It should be said, in due justice to truth, that springs can be made in which the main plate is thicker than the other plates, or as thick as the other plates, which may be used for the Hotchkiss drive which will not break the main plate, but such springs will be short lived. Per contra, such springs may be made to have as high an endurance as the Sheldon-Landau type, but they will be exceedingly heavy.

The real cause of main plate breakage in any leaf spring is not due to the Hotchkiss drive alone, for the same thing happens to springs that do no "driving." The cause is quite deep seated and this is hardly the place for a discussion of the problem; the patents named will give one a practical exposition. To any one seriously interested it may be said that, a serial paper entitled "A New Theory of Plate Springs" by the undersigned and P. H. Parr, published in the Journal of the Franklin Institute, during 1918-1919, gives a complete scientific exposé of the problem your correspondent has but lightly touched upon.

DAVID LANDAU,  
Sheldon Axle and Spring Co.

THERE is a law in Mexico which greatly limits the sale of runabouts and coupes, according to the Ford Motor Co. This law states that an automobile cannot remain standing on the street without some person being in the driver's seat. Many car owners carry a little Mexican boy about with them. This boy rides in a bucket seat on the rear fender. When the owner leaves the car, the boy gets up into the front seat and acts as a watcher. The law was brought about by the great number of automobile thefts during recent months.

# Qualifications of Employees Must Be Developed

Many individuals have potential capacities and capabilities which have never been brought to light because the opportunity was never offered. Much attention has been paid to the selection of men, but too little to their development. Qualities of an individual vary with his experience.

By Harry Tipper

NOT long ago I was invited to attend a meeting of managers of large concerns who met at stated times in executive sessions to discuss intimately the problems of management. This particular session was devoted to the selection of men. The discussion was very vigorous and generally indulged in by the group. The main discussion turned upon testing and examination which would indicate the qualities possessed by the man and their applicability to the particular positions under consideration. A good deal of experience was given as to the working of these tests and methods of standard examination and there was evidently a general feeling that some tests or standards were necessary and apparently most of the managers were employing methods of this kind.

Through all the discussion, however, there was a suggestion of futility. The whole matter seemed to rest upon so slim a foundation that the superstructure of discussion and operation was too heavy for the foundation that had been assumed. Not a single speaker realized that the foundation upon which his tests and examinations were built was assumed without sufficient supporting evidence and should have been subject to the same critical consideration that was being given to the methods.

The man who introduced the discussion, evidently an able man, had led with a list of qualities under about one hundred headings and four hundred subject divisions. The reason for this list was not indicated and the writer was left completely in the dark as to its origin and definition. Furthermore, the qualities were accepted as though human beings either possessed these qualities or did not. Any stranger listening to the discussion would have been justified in supposing that initiative, personality, accuracy, and other mental qualities were definite, measurable and fixed—almost like so much property or so many tangible possessions of which it may be said that one either has them or does not have them. There was no indication of any idea that qualities grow and wane, that the same fundamental quality varies not only by degrees but in the direction of its skill and that the development of the qualities as well as their direction is largely due to the surroundings, the character of the activity and its specialization.

This was the more astonishing because we have all seen youths of procrastinating decision become men of force and capable of continually deciding upon the adoption of operations. Similarly, the boy who was poor in mathematics in his college training may become expert in the use of the mathematics required for his business.

All the qualities vary even in the same individual at different stages of his experience. As the responsibility is put upon him, the experience of handling that responsibility brings into play new qualities and develops new characteristics.

It is true that when a man has reached his middle life, under ordinary circumstances, his habits of action are sufficiently stabilized to indicate his probable worth from the standpoint of his qualities. It is also true that the average value grows as the individuals themselves grow and we will get better machinists, better salesmen, better executives as we improve the opportunities for the individuals to develop and raise the general average.

In this whole discussion, however, no attempt was made to consider the variation of qualities in the same individual and consequently to realize that the qualities exhibited are the effects of the man's action; they do not govern the man's capacities, but arise out of the expression of the man's capacities in his reaction to his responsibilities and surroundings.

No attempt was made to consider the development of men and yet the entire efficiency of business depends upon the development of more capable, skillful, accurate, adaptable workers with greater understanding, better judgment and more effective powers of decision.

This group of men represented forward looking, studious managers who are intensely interested in solving the problems and for this reason their attitude upon this point is illuminating as it suggests the general attitude in business. One of the ablest of the old leaders in business said that a true executive should be able to take any healthy individual, mentally and physically normal and with an ordinary education, and produce a good worker therefrom.

A larger measure of preparatory education is necessary for larger responsibilities, perhaps, but the old leaders of business who built American business from small, insignificant and crude beginnings could show very little education amongst them, and their associates and younger subordinate officers were in the same category. About all these men had was normal physical and mental health and an eager desire for activity. All the other qualities they acquired from the necessities of their experiences.

How are we to improve the present structure of business and its efficiency unless the modern leaders are capable of doing the same thing—that is, developing the potential capacity of the individual and producing a larger efficiency because of that development? These managers have not yet secured a full vision of the responsibility of their position when their discussion as to the selections of men are confined to the discovery of men with capabilities already developed, with little appreciation as to how the development of these capabilities takes place and with little consideration of the development of men by the efficiency of their own leadership and work.

An investigation made in connection with the offices of several lines of industry for the benefit of one of the universities indicated a great reluctance on the part of the employers in these lines to hire boys from the universities without experience. Almost all these concerns wanted their men ready made for them and one of their complaints about university education was that the men were not ready made for their organization when they got through.

It would be interesting to discuss how we are to keep industry going if the concerns are unwilling to accept into their organization untrained material and develop it. It would be interesting to determine the increase in the difficulty of securing employment on the part of those leaving school and college because of their lack of experience, but that determination would lead somewhat too far afield to be of moment in an article of this kind.

It is discouraging, however, from the standpoint of an industry to find so much discussion of the selection of men and only a small comparative consideration to the development of men. Even where the development of men has been given some consideration, the responsibility for that development has been unfortunately shelved by the transfer to a school or a training department, so that the operating officials would not be required to study leadership of this type.

It must not be forgotten that for 90 per cent of the people the great educational factor is the employment. It is the work which develops the capacity, emphasizes the knowledge and augments the power to accept responsibility. Only a comparatively small number of the individuals leaving school have any marked desires or any marked talents in a particular direction. Most of them are still forceful only in *potentia*, and their potential capacities will be developed into visible qualities of action as they are used in industry. Not only is this the case but the attempt to provide methods of examination and methods which will measure the capabilities of the man is not entirely without danger in the present state of our knowledge.

Even the terms used are so indefinite that observations made in respect of these terms must vary in accordance with the understanding of the individual observer. A speaker not very long ago in talking about the qualities which were desirable for a certain line of occupation referred to a voluminous thesaurus at his elbow and said that this was the most valuable book from which to arrive at a proper understanding of these qualities, but no thesaurus nor dictionary is expected to define terms. By the substitution of other words in commoner use, and by

explanation of derivations or past meanings they describe the limitations to be considered in the use of the word in any connection. There is a vast difference between description and definition. Definition consists in the discovery of the principle underlying the tangible results or effects and the statement of its character and application. No definitions have yet been made of human qualities which would enable two or three observers to arrive at the same conclusion therefrom. The sales manager says he must have somebody with initiative, yet he does not take a research man, although of all men the research man must initiate more than any one else. Practically all his work is initiating or starting something so that he can discover its relation to other matters and more of the facts concerning it. The initiative in the understanding of the sales manager is a different quality than the one displayed by the research manager and it is useless to adopt a term which can express such different ideas as a standard by which to measure.

It is true that we require for the work of machinist a man with the developed skill to handle machinery or else we must be prepared to devote a certain amount of time and effort to the development of that skill in the youth. The other qualities we demand, the qualities we class indefinitely by the terms loyalty, persistence, etc., we have no right to demand unless we have taken means to develop these qualities in the educational system through which these men must pass.

If we are to gain the respect, to develop the loyalty, to secure the persistent effort and the interest of these workers, our leadership in industry must be of such a character that these qualities are developed by the very nature of the work and its surroundings. There is no escape from this, and the selection of men by the more or less standardized proceedings usual in so many factories to-day cannot weed out more than the small minority of incompetents who for one reason or another are visibly deficient in their expressed capacity.

These methods cannot build a greater general average of efficiency or secure a deeper quality, although the future of industry depends upon doing both. A character is not a fixed and determined matter. Elements of character action grow and change. No man of fifty is the same individual in characteristics that he was at twenty.

It is the business of industry to take advantage of this fact by developing not only skill but quality, so that the whole efficiency of industry will be kept moving forward at the required pace.

## New Aluminum Alloy Developed

A NEW aluminum alloy lighter than pure aluminum and said to have mechanical properties which make it superior to the ordinary aluminum-zinc-copper alloys has been developed in Germany and is being commercialized under the name silumin. It is an alloy of aluminum with 14 per cent silicon, its specific gravity (2.5 to 2.65) being about 10 per cent less than that of the most common aluminum alloys and also slightly less than that of the pure metal. The tensile strength of 28,400 lb. per square inch is from 25 to 30 per cent greater than that of the alloys mentioned, and the elongation of 5 to 10 per cent is, on the average, more than twice as great. At high temperatures silumin is also superior to the ordinary alloys in this respect. With increasing temperature the tensile strength decreases at

first slowly and then gradually more rapidly. The hardness at room temperature is 85,000 lb. per square inch (under a load of 500 kg. and a 10-mm. ball); at 350 deg., 28,000 to 35,000 lb. per square inch. Wet steam has hardly any effect on silumin, the same as on pure aluminum. Dilute hydrochloric acid (25 per cent), as well as concentrated acid, attack it less than pure aluminum. The new alloy is said to be a better conductor of heat than any other similar alloy, its conductivity being to that of pure aluminum as 4.7 is to 4. The coefficient of heat expansion is 0.88 in that of pure aluminum.

The alloy is produced by combining aluminum and silicon, but it can also be produced electrolytically. After it has been poured it is subjected to a heat treatment.—From Zeitschrift des Vereines Deutscher Ingenieure.



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## The Dealer Contract

**D**EFINITE suggestions for changes in the dealer contract have emanated from a special committee of the National Automobile Dealers' Association and the N. A. C. C. The specific suggestions appear to be sound and should aid in the development of more satisfactory relationships between dealers and manufacturers.

The really important aspect of the conference which resulted in these suggestions, however, is the spirit of co-operation evinced on the part of both manufacturers and dealers. The disposition has been shown to get around a table and talk over mutual difficulties frankly and to attempt to compromise the points at issue in a manner satisfactory to all concerned. This is the significant feature of these suggestions concerning the dealer contract.

The progress actually achieved as a result of these conferences and the recommendations coming therefrom will be in direct proportion to the desire of individual manufacturers to carry out the suggestions and to put into their dealer relationships the spirit

of honesty and co-operation which must have been the genesis of the conferences. Friction in relations between dealer and manufacturer is a potent factor in increasing marketing costs. The business period which the industry is entering demands efficient merchandising.

## Reduce Closed Car Costs

**A**N analysis of present closed body prices is significant in light of the movement toward lowering the price differential between open and closed models. The following figures show the percentage difference between open car and sedan prices in cars of four price classes. In making this compilation those cars were considered which fitted into a given price class in both open and closed models.

Cars under \$1,000.	
1920 prices .....	83%
1921 prices .....	64%
Cars \$1,000-\$2,000.	
1920 prices .....	55%
1921 prices .....	62%
Cars \$2,000-\$3,000.	
1920 prices .....	42%
1921 prices .....	49%
Cars over \$3,000.	
1920 prices .....	29%
1921 prices .....	31%

These figures show that in all except the lowest price class, the differential between open and closed body prices has increased. Thus the trend in prices appears to be in direct opposition to the trend in buyers' demand. Even in the low-price class, where the trend is in the right direction, the absolute percentage difference is still greater than in any other case.

There is a growing demand for lower priced closed cars. The public is sold on the all-year-round vehicle, but many prospective buyers cannot or will not pay 50 per cent more than for an open car. The problem facing the body designer and the body production engineer is to produce a closed body which can be sold at a price reasonably near that of the open job.

## Government of Civil Aviation

**T**HE Governments of the various large industrial countries seem to be agreed that it is for the national good to foster the development of aircraft. If not as much has been done along this line during the past three years as would have been desirable, it is probably due to the fact that most of these Governments have had very difficult and pressing problems to face and there has been in all countries a strong demand for financial retrenchment.

Practically the only country in which aircraft development has enjoyed consistent Government support is France. The service between Paris and London is maintained with the aid of a Government subsidy, and similar services with Government aid are now planned to connect Paris with Warsaw, Constantinople, Stockholm and Algiers. In England not much of a definite character seems to have been accomplished so far, though some very ambitious schemes



were put forth at different times. It is only necessary to refer to the Cape-to-Cairo air route, which was said to have been practically completed about a year ago, and to the England-Australia flights which were to be the beginning of a regular British Empire air service. Both projects failed of realization because of their over-ambitiousness. Now the British Air Ministry seems determined to make a new start in fostering civil aviation, on a more rational basis, for it has been learned that an experimental machine designed for carrying heavy loads is being built for the account of the Ministry at the plant of the Bristol Aircraft Co. The machine in question will have a carrying capacity of 3 tons, and it is the intention of the Ministry to make use of it in an experimental way to determine the actual costs of aerial transport. There are enthusiasts who maintain that these costs can be brought down as low as those of automobile transport.

## What Will the Show Bring Forth?

**T**HE New York show has a special significance this year since it is sure to be the scene of many interesting developments. In a certain sense it will probably be a signal for a new start. Present selling conditions are not favorable because there is a well-substantiated rumor throughout the industry which prophesies another flurry of price cuts at the New York exhibit.

As a result dealers are working hard to clean out stocks of old models, but are being hindered because the public as well, to a certain extent, has caught the price-reduction rumor waves. The immediate situation is one of uncertainty, a condition which will probably remain until Jan. 7. It is sincerely to be hoped that if another readjustment of prices takes place, a definite effort will be made to set the new prices upon a sound economic basis, that reductions will not simply be another slice lopped off by-guess-and-by-gosh.

An exceptionally large number of new models will be another feature of this year's show. Most of the newcomers will be in the group which sells for less than \$2,000, many of them nearer the \$1,000 class. There will be a number of entirely new models put out by firms already established, and there will be, in addition, a number of new cars made by new companies. The trend shown by new cars, however, is directly in line with the marketing economics of the present situation, which indicate that nearly 95 per cent of the cars made in the future will sell for less than \$2,000.

There is a general feeling that prices of parts and supplies have gone about as low as they will for some time to come, and it is devoutly hoped in all quarters of the industry that whatever price reductions or "readjustments" which remain to be made in the selling prices of completed vehicles will be announced at the shows so that the industry can be stabilized and dealers can go ahead with the confidence that there will be no more cuts, at least for months to come.

Prospective purchasers generally are waiting for cuts expected after Jan. 1.

## Unthinking Criticism of Standardization

**M**OST engineers are strong advocates of standardization, but occasionally we hear a violent protest against such and such an attempt at standardization based upon a feeling that something is to be done to destroy initiative, or the power to create something new. One engineer recently said in effect that we might as well build a standard car and be done with it. This is a good example of unthinking criticism. No general scheme of standardization aims at such a thing or anything remotely resembling it. If it did it could never succeed.

Truly meritorious developments in engineering cannot long be held back by reason of the existence of standards, and the engineer's ability to create will always find opportunity for expression, but such creative work should always be done with due regard to its effect upon the community of interests and not solely with a view to benefiting a single individual or a small group of individuals. The introduction of a special size or type of part into an automobile, for example, may conceivably prove a direct benefit to the manufacturer and even the purchaser, so far as first cost is concerned, and still not benefit either, in the long run, because it introduces service difficulties and expense and adds just so much more to the burden of carrying another special part.

On the other hand, standards which have become obsolete as a result of improved methods, especially in the automotive industry, are not difficult to change. In other words, the industry is quick to adopt new developments which are of evident benefit to all concerned, and no other type of development can hope to be successful in the long run.

Among the concerns which have made the most conspicuous success in the automotive industry are those which have adhered rigidly to the production of what, so far as they are concerned, is a highly standardized product, and this success is in no small part due to the fact that both manufacturer and purchaser have profited by standardization.

## May Your Ship Come In

**W**E pass on to you this sincere Christmas message, which has been sent by one manufacturer to his dealers, since it conveys so aptly the wish AUTOMOTIVE INDUSTRIES has for its subscribers this Yuletide:

"Somewhere on the waters a ship is sailing. It is the vessel you dream of as your ship. Sometimes it seems far out at sea, tossing about in its battle with the waves. At other times you can almost see it coming safely and majestically into the harbor, with full sails and flying flags.

"'When my ship comes in' is an expression that we all have used some time or other, little thinking that this very ship might be sailing in a straight course into port, with anchor ready to drop. And our wish to you is that your ship will come in by the twenty-fifth of this month, bearing Christmas tidings of joy and happiness for you."

# Report Commends Motor Vehicles

## Improve Standard of Living on Farms

### Joint Commission of Congress Deduces Recommendations from Recent Inquiry

Washington, Dec. 19.—Indisputable testimony as to the essentiality of motor vehicles is given in the first section of a report of the Joint Commission on Agricultural Inquiry of the Sixty-Seventh Congress which was filed this week.

The commission strongly recommends that better roads to local markets and improved joint facilities at terminals for connecting rail, water and motor transport systems be developed with a view to reducing the cost of marketing and distribution.

The influence of the automobile on farm life is described by the commission as follows:

"The automobile with good roads will help make larger rural community centers possible, and hence as choice recreational and social opportunities as smaller cities and most larger cities will offer. A better standard of living in the country should be a cost factor to be reckoned with in future farm prices."

The commission then goes on to say:

"Another element of importance in the cost of production is the increase in outlay necessary for machinery and equipment. In agriculture, as in industry, machinery has more and more taken the place of hand labor.

### Crops Must Meet Costs

"The outlay for the necessary farm equipment and machinery should ultimately be paid for out of the products of the farm, either in increased output, lower unit costs or in higher money prices. There is nothing in the history of the development of agriculture in the last 30 years which indicates that either the interest on higher farm values or the increase in cost of machinery and equipment is likely to be paid for out of the increased production. To the extent that they can not be paid for out of increased production they must be paid for out of higher money prices or in lower unit costs if the standard of living on the farm is to be maintained.

"About 31 farms (30.7) out of every 100 now report automobiles. Automobiles were reported for more than half the farms in Nebraska, Iowa, Southern Dakota, Kansas, Minnesota, North Dakota, California and Illinois.

"The extent to which investments in tractors, trucks, automobiles, and other farm machinery are justifiable in reducing the cost of production by increasing quantity output or increasing efficiency of production is a problem which must be solved with reference to the conditions existing upon each farm. No general conclusion upon this

## SAMSON TO PROCEED WITH HOME BUILDING

JANESVILLE, WIS., Dec. 19.—An order from headquarters of General Motors to the Samson Tractor Co. of Janesville, Wis., to proceed with the completion of 54 dwellings erected two years ago but not finished, is regarded as indicative of enlarged operations in the near future based on improvement in the tractor and implement business.

question can be arrived at without more data than it is possible for this commission to obtain in the limited time available to it.

"Considering the entire question from the standpoint of agricultural as a whole, due consideration must be given to the necessity and desirability of increasing satisfaction and conveniences of farm life within the limits of the economic rewards which the industry should afford those engaged in it.

"The expansion in the use of machinery has brought expansion in the size of farms. We have competed with the world in agricultural production by increasing output per unit of labor as distinct from output per acre. The number of farms increased but 1.4 per cent in the last decade. The average acreage per farm increased from 138.1 in 1910 to 148.2 in 1920, or 2.9 per cent."

Quite significantly the commission says:

"On the whole, it seems probable that increased production of farm products in this country must be at the expense of increased costs. There is nothing in the study of the development of agriculture for the past 30 years which justifies a conclusion that greatly increased fixed charges resulting from higher land values, greater indebtedness, larger outlay for equipment and machinery, fertilizer, labor, and greater satisfaction and conveniences in country life, can be paid for out of either increased production per man or per acre. Payment of these increased costs must come out of larger money returns, and these are dependent for the most part upon better organization and more efficient marketing of farm crops."

## Shuler Creditors Accept Compromise on Claims

LOUISVILLE, Dec. 19.—A majority of the creditors of the Shuler Axle Mfg. Co. have agreed to accept a compromise of 80 per cent on claims at a hearing before Judge George A. Brent, referee in bankruptcy. Preferred claims against the company, such as wages of employees and taxes, will be paid in full.

The accepted compromise of creditors will be certified to the Federal Court of this district for final action after which the company's assets are to be turned back to the corporation. Reorganization steps will be taken, it is stated.

## Overland Planning Full Force in 1922

### Bock Bearing Anticipates Increased Business—Auto-Lite Corp. Optimistic

TOLEDO, Dec. 19.—The first indications of the intention of the Willys-Overland Co. to take on a full force in its plant here in 1922 was given this week when it was announced that the forces in the tool and die room would be trebled and advertisements for sheet metal die-makers and experienced automobile tool-makers were sent out. The plant will close from Dec. 22 to Jan. 3 for inventory.

It is planned to have 12,000 men at work at the Overland plant by March. The January schedule is 7500 cars and for February it is 11,000.

The Chevrolet Motors Co. plant here closed Saturday until Jan. 1, releasing about 400 men for the holiday season. Vice-President E. D. Moore said the shutdown was only temporary and for the purpose of taking inventory. Some new machinery is being prepared for the rush of orders expected early in the new year.

The Bock Bearing Co. is anticipating about 10 per cent increase in its business for January and a gradual increase of about that much each month until next fall, when the business will be back to its normal. In January operations will be about 30 per cent of normal. President R. E. Clingan states that many automobile manufacturers will place orders after the New York and Chicago shows.

The Electric Auto-Lite Corp. reports its business as showing an increase and being considerably better than at any time during the year. The prospects for 1922 are the brightest in its history.

## Metz Co. Reorganizes and Changes Its Name

WALTHAM, MASS., Dec. 19.—Official announcement has been made that the Metz Co. has been reorganized as the Waltham Motor Manufacturers, Inc. The new corporation is offering \$500,000 in 8 per cent cumulative preferred stock at \$10 par plus 100 per cent bonus in no par common.

The capital authorized and outstanding after the financing plan will consist of \$2,500,000 in preferred and 1,000,000 shares of common. The name of the Metz car has been changed to the Waltham and the company proposes to manufacture a new type of automobile body in addition to the car.

# Plants Close for Inventory Taking

## Will Resume Jan. 3 on Old Schedules

### Car Manufacturers Confident of Steady Expansion as Year Progresses

NEW YORK, Dec. 20—Most of the manufacturing companies in the automotive field will take advantage of the holiday period to take their annual inventory. All of them are preparing, however, to resume operations Jan. 3, on schedules fully as large as those now in force, and are confident that it will be necessary to expand their output steadily as the new year progresses. It is almost universally true that the inventory position is much more satisfactory than it was a year ago. Most companies have taken their losses and many of them have balanced the supplies on hand.

The belief is general among parts manufacturers and those who supply car and truck manufacturers with materials that substantial orders will be given very soon. Rock bottom prices are being given on materials ordered at this time and it is improbable they will go much lower for a long time to come. Some of the parts manufacturers are quoting prices which will allow them only a very small margin of profit, in order to operate their plants more nearly at capacity.

The subject of costs is one which is being given exceedingly careful attention in all branches of the industry. Competition is keen, and manufacturers realize that purchasers must be given greater value for their money. Every effort is being made to effect economies in factory production costs and to keep down overhead expenses. One of the means to this end which is being taken up seriously by the larger manufacturers is the elimination of distributors and direct relations with dealers through factory branches.

Another important trend is toward the development of light cars of high quality. Some of the newcomers in the field propose to meet this demand with six-cylinder cars of good body work and excellent material throughout. Some of the older manufacturers who have specialized in heavier cars will expand their lines to include lighter models. This would give an excellent argument to the manufacturer who proposes to insist on having

### CITIES THAT OFFER BEST SALES FIELD

BOSTON, Dec. 19—Under the heading of "Sales Opportunities," the United Business Service lists the following as the best cities in which to make sales in January:

Baltimore, Birmingham, Charlotte, N. C., Cheyenne, Wyo., Dayton, Detroit, Fall River, Grand Rapids, Knoxville, Tenn., Lawrence, Mass., Los Angeles, Lowell, Mass., Manchester, N. H., Mobile, Nashville, Tenn., New Bedford, Oshkosh, Reading, Pa., Richmond, Sacramento, South Bend, Ind., Tacoma, Toledo and Washington, D. C.

his dealers handle his own lines exclusively. If he can provide a dealer with both a light and a heavy car he will contend there is no reason why he should take on another make. A large number of these new models will be displayed at the New York and Chicago shows.

As the year comes to an end it has become certain that production will exceed the most optimistic forecasts at the beginning of the year, and the most careful estimate still stands at approximately 1,700,000 for American producers of passenger cars and trucks. This record has been exceeded by the industry in only three years and it is only about half a million less than in 1920.

The outlook for production and sales in 1922 continues problematical. Most manufacturers believe business will be better, but many of them hold to the belief that sales, especially of passenger cars, will not be much larger in 1922 than they have been in the past year. The outlook for truck sales, however, is more promising, and the market will expand gradually as general business conditions return to normal.

### BAKER SCHEDULE INCREASED

EVANSVILLE, WIS., Dec. 19—The Baker Mfg. Co., a large producer of farm gas engines, has increased its working schedules from three days a week to six days a week, 8 hours a day. A horizontal decrease in wages amounting to 25 per cent has been accepted by all employees under this plan. The betterment in orders and improved outlook are responsible for the enlargement of output, which is the first in about ten months' time.

## Duplex Exhibits New Rail Vehicle

Weights 10,000 Lbs. with Forward  
Speed of 45 Miles  
an Hour

DETROIT, Dec. 17—Duplex Truck Co., Lansing, exhibited at its stockholders' meeting this week a new gasoline-driven motor car designed for use by railroads for short hauls and branch line work. The rail car is in a way supplementary to the special bus model developed by the company which has been adopted in many communities during the year for street and road transportation.

President Harry M. Lee in introducing the new vehicle said its low operating cost would enable railroads to amplify their service on branch lines, and, probably, be instrumental in causing new lines and extensions to be built.

The car weighs about 10,000 lbs. and has a forward speed of 45 miles an hour and reverse speed of 25. The front end of the car is supported by a four-wheel truck with brakes on all four wheels and also on the rear wheels. The power drive is worm and ring gear. One-man operation is provided and there is seating capacity for 32 passengers. Separate batteries are used for starting and lighting.

Special design bodies will provide for cars acting as both passenger and freight carriers. Separate trailers for freight and baggage can also be used where volume is large enough to warrant, the speed of the car being little diminished by use of the trailer. It is also pointed out that the car could be used for emergency service on street railway lines where infrequent service makes electric power uneconomical.

## Gasoline Stocks Reduced 59,000,000 Gallons

WASHINGTON, Dec. 19—Refinery statistics compiled by the Bureau of Mines for October show that stocks of gasoline were reduced 59,000,000 gallons during the month. However, the stocks of gasoline on hand Oct. 31 consisted of 155,000,000 gallons in excess of those on the same date of last year.

Domestic consumption of gasoline increased by 17,000,000 gallons, as compared with September, and exports increased 12,000,000 gallons. Shipments to insular possessions decreased 3,000,000 gallons. The daily average production of gasoline for October increased 327,000 gallons, as compared with the production for the previous month, making the daily average output 14,224,372 gallons.

## May Change Method of Engine Stamping

### S. A. E. Committee Recommends Alteration of Numbering to Curb Thefts

NEW YORK, Dec. 19—Recognizing that the first step the automobile thief takes in changing the identity of stolen automobiles is to alter the engine number so that the automobile engine cannot be identified, the engine division of the Society of Automotive Engineers, at the suggestion of automobile insurance companies, has recommended revisions in the method of numbering engines which was approved for general use in 1916. The revisions proposed are believed to be the simplest, most effective and practical system for numbering engines which has been devised for protecting automobiles against theft.

#### Position Moved

These recommendations provide that the engine serial or identification number shall be placed near the top of the right-hand side of the crankcase proper in a position in which it can be read easily. It shall be between two vertical ribs of beads  $\frac{1}{4}$  in. wide,  $\frac{1}{2}$  in. high, 3 in. long and 3 in. apart. The surface of the casting between the ribs shall be left rough as cast and unpainted on the finished engine. The numbers shall be evenly stamped in the casting  $\frac{1}{32}$  in. deep and shall be  $\frac{1}{4}$  in. high and of script form.

The first digit shall be stamped close to the left hand rib and the last digit shall be followed by a large star or other character to prevent adding digits. A star or other character also shall be stamped immediately above and below each number to prevent adding another number. The number shall be stamped twice on each casting to permit correcting any errors made in stamping either number. No other number or character shall be placed within the space provided.

By this method in case an error is made in stamping either number, an additional number would be stamped directly under or above the number, the number stamped in error being cancelled by stamping a horizontal line through it. In this way two correct unmutated numbers would appear on each engine.

#### Provision Made for Errors

In case errors were made in stamping both the original numbers, the casting would be scrapped as the system requires at least one of the two original numbers shall be unmutated in any way.

The recommendation will be acted upon at the standards committee meeting on Jan. 10.

It is understood that a 7½ per cent reduction in theft insurance premiums will obtain if a method of numbering engines is adopted by the society as standard which would conform with the Underwriters Laboratories' requirements.

## MOLASSES IS USED TO TEST GASOLINE

MILWAUKEE, Dec. 19—Little dabs of cheap molasses on plain pine sticks in the hands of oil inspectors in Wisconsin have saved users of gasoline thousands of dollars this year. This simple test to discover water in gasoline was first used in Minnesota, but has been adopted as an official means of testing by the State oil inspector's department of Wisconsin.

The theory is that water is heavier than gasoline and always sinks to the bottom. A stick dipped in cheap molasses glides through gasoline without showing any effect on the molasses. But when water is encountered, the molasses comes off the stick. When the stick is withdrawn, the exact amount of water in the tank is clearly revealed by the discolored fluid.

The recommendations resulted after a careful review of present practice, soliciting suggestions and comments from insurance companies, automobile and engine manufacturers and metallurgists in reference to methods of numbering engines. The majority of the replies indicate preference for plain figures about  $\frac{1}{4}$  in. high deeply stamped into a pad or plain surface cast on the engine.

Among the several suggestions received as a means for preventing engine numbers from being changed were casting a pad of special alloy steel in the engine crankcase on which the engine numbers might be stamped, casting numbers of an opaque material in a cylinder block in such a way that X-ray photographs would show the numbers, using raised numbers and casting on a small thin brass plate with edges crimped down  $\frac{1}{8}$  in. and knurled so as to anchor the edges securely in the crankcase, the number being stamped in the brass plate in the usual way.

## N. A. C. C. Names Jordan in Safety Promotion Work

NEW YORK, Dec. 19—Edward S. Jordan, president of the Jordan Motor Car Co., has been appointed special representative in traffic and safety by the highway committee of the National Automobile Chamber of Commerce. He has been actively engaged in the promotion of safety work with relation to the highways.

"Education saves lives of children," Jordan says. "We can accomplish most by working through the schools. We must speak for severe penalties on speeding and careless driving, but we can bring about the best results in training the children in safe behavior on the streets and providing playgrounds for their leisure hours."

## Goodyear Making Navy Balloonettes

### Will Be Used as Gas Containers for American Constructed Dirigible

AKRON, O., Dec. 19—Eighteen large balloonettes to be used as gas containers in the ZR-1, which will be the first rigid dirigible airship to be constructed in America, are being made for the navy department of the United States Government by the Goodyear Tire & Rubber Co.

The balloonettes will range in size from 200,000 cubic foot capacity down to 18,000 cubic feet. The government order calls for their delivery by July 1 to the navy hangar at Lakehurst, N. J. The hull of the ZR-1 is being made at Philadelphia.

In the manufacture of the huge gas containers, "Gold-beaters' skin" is being given its first extensive use in this country for the manufacture of balloon fabric. The material is the blind gut taken from the intestines of the steer. It was originally given the name of "Gold-beaters' skin" by reason of the fact that goldsmiths used the skins in making gold leaf by placing sheets of gold between the layers of skin and hammering into the filmy gold leaf.

#### Use Steer Intestines

Parts of the intestines of nearly one million steers will be used in the manufacture of the balloonettes. The use of the skins was first employed in Europe, never prior to this time having been extensively used in the United States. Goodyear is placing orders for the skins with all big packers in the country. They are being received in Akron packed in salt.

The membranes are soaked, cleansed and scraped and when dried each skin measures about 20 inches in length and eight inches in width. The skins are cemented together by a secret process and then are cemented over rubberized fabric and coated with shellac, forming a tough and slightly elastic lining for the gas containers.

The largest of the ZR-1 balloonettes being made by Goodyear is equivalent in gas capacity to that of the largest dirigible hull ever manufactured in this country. In other words, one of the ZR-1's eighteen balloonettes will be as large as most of the navy and army dirigibles of 200 foot length now in commission.

Goodyear is putting on a force of 300 girls and women to prepare the skins for the gas containers.

#### ASK BANKRUPTCY FOR AERO

NEW YORK, Dec. 19—An involuntary petition in bankruptcy has been filed against the Aero Motor Corp. by three creditors with claims aggregating \$23,000. They are Gio Ansaldo & Co., \$19,296; Wright Aeronautical Corp., \$3,300; P. Brady & Son Co., \$895. It is stated that the corporation has admitted its inability to pay its debts.

## Curtiss Airplane Claims Sustained

### Court of Appeals Finds He Was First to Build Hydro Machine

NEW YORK, Dec. 19.—The final chapter in one of the longest legal controversies ever waged in this country over the development of flying machines was written in the United States Circuit Court of Appeals for the second district when a decision was handed down upholding the claim of Glenn H. Curtiss that he was the first to build a flying machine which arose from and alighted on the water.

The suit was brought to establish the right of Curtiss to a broad patent on the hydro-airplane, and the circuit court decision reverses a ruling of the United States district court for the eastern district of New York in the case of the Curtiss Aeroplane & Motor Corp. and Glenn H. Curtiss against Albert S. Janin of the Janin Co., Inc. The decision was signed by Judges Hough, Manton and Mayer.

#### Controversy Started in 1911

The prolonged legal controversy grew out of an application for a patent filed on Aug. 22, 1911, by Curtiss, who, on Jan. 26 preceding, had demonstrated his flying boat in the harbor of San Diego, Cal. His successful flight with an air machine equipped with a boat hull structure and wings buoyed with small pontoons was made on the same day that Janin filed his application for what he described as a land, water and air machine.

The opinion of the court, written by Judge Hough, holds that when Curtiss made the San Diego flight he then succeeded in reducing to practice the theory of his invention, which entitled him to the broad patent thereon inasmuch as Janin's invention, at the time of this flight, and even later when the application of Curtiss was filed, had not advanced beyond the theoretical stage where it was described on paper, and that the mere description did not constitute a reduction to practice, since it was never proved and was unlikely to be proved, that Janin's plans would enable another person to build a hydro-airplane that would work with success.

#### Janin's Invention Considered

In this case, reads the opinion, we feel sure that defendant's constructive reduction to practice received no assistance from any previous conception on his part; and this is true even if full credence be given to defendant's evidence as to his early drawings, models and experiments and no weight be attached to plaintiff's testimony tending to show Janin as one unworthy of belief.

The reason for this holding is that whatever Janin conceived prior to Jan. 26, 1911, whatever experiments or models he made, it is admitted that the ripe fruit of all that he had done was contained in the specification he then filed. If, therefore, that specification does not enable the man skilled in the art to construct without further exercise of the in-

## OLDEST AMERICAN CAR IN COMMISSION SOUGHT

NEW YORK, Dec. 19.—Search has begun by S. A. Miles, manager of the New York and Chicago automobile shows, for the oldest automobile of standard American make still running. He wants to exhibit it at the Grand Central Palace and the Coliseum to give a chance for comparison with the cars that are manufactured now. The purpose is to show the value the purchaser of to-day is getting as contrasted with the pioneer days when motor vehicles were driven by single cylinder gas engines, known as "one-lungers."

Candidates in the contest who have knowledge of relics of olden days will be required to send details of the make of car; year of manufacture; the manufacturer's number, if possible; an estimate of the number of miles the car has run; what changes have been made and as nearly as possible the date and distance of its last run, with a photograph of the car. The show management will pay for the transportation of the owner of the car and the car itself from any part of the United States to New York and Chicago and return.

ventive faculty an operative hydro-airplane there has been no reduction to practice, constructive or otherwise.

Janin disclosed no boat body; by his own evidence he never conceived a boat body other than one like that of a swift small vessel (e.g., a torpedo boat). He speaks even in his 1913 specifications only of a 'hull-like body,' and his drawings only reveal the freeboard of something long and narrow of historic boat shapes.

The San Diego flight made by the Curtiss hydro-airplane was made possible by his development of the boat body with wing pontoons at his plant at Hammondsport, N. Y., where he was working on the water machine as early as 1910, when he flew from Albany down the Hudson to Governors Island, alighting on land with an aircraft equipped with the floating appurtenances to alight in the river. The flight down the Hudson was witnessed by thousands along Riverside Drive and from the office buildings affording a view of the waterfront.

#### OBERBERGER PLANS STOPPED

MILWAUKEE, Dec. 19.—Plans of the creditors' committee of the John Oberberger Forge Co., bankrupt, to reorganize as the United States Forge Co., have been definitely stopped by order of Referee John F. Harper, who refused a further extension of 10 days to accomplish the reorganization and directed the immediate sale of the property. J. Frank Gerdis, trustee, says that unsecured creditors will net about 10 per cent. The next meeting of creditors will be on Jan. 4.

## Canton Forge Plant Sold for \$293,500

### Purchasers, According to Stipulations of Sale, Will Continue Operations

CLEVELAND, Dec. 19.—Terms on which the Canton Forge plant, which is a subsidiary of the \$20,000,000 Standard Parts Co. of this city, were sold, became known when Federal Judge D. C. Westenhaver approved the private sale.

The purchasers are Fred A. Poore and Phillip Poore, president and vice-president, respectively, of the P. & M. Co. of Chicago. The price was \$293,500. They are to pay \$50,000 cash. The balance is to be covered by promissory notes to be paid Jan. 1, 1923. It is stipulated that the purchasers are to organize a new company to operate the plant.

At the time that he approved the sale of the forge plant, Judge Westenhaver directed that the remaining unused machinery and fixtures in the American Ball Bearing plant, another subsidiary of Standard Parts, be sold at public auction. The ball bearing plant is in this city. The date of the auction was set for some time between Jan. 15 and Jan. 30. The sales are to be for cash.

Receiver Frank A. Scott, under whose administration great progress had been made in paying off creditors and in increasing efficiency, announced the present policy is for concentration in the larger plants.

The Standard Parts is attracting considerable interest in financial circles in this city. In recent months its indebtedness has been reduced to less than \$8,000,000 from a \$10,000,000 mark on the wrong side of the company's ledger. The sale of the Canton forge and the ball bearing plants will bring into the company treasury an additional \$360,000. This is nearly enough to pay a 5 per cent dividend to the creditors.

## Propose Erecting Car Plant in Mexico City

MONTEREY, MEXICO, Dec. 19.—Considerable interest is being shown in the proposition of O. A. Larrazalo of El Paso, former governor of New Mexico, and associates, for the construction of a plant in the City of Mexico for the manufacture of automobiles. At a recent session of the Chamber of Deputies the matter was discussed at some length and the proposition was given the indorsement of that body.

The plans call for the organization of a company to be composed of American and Mexican capital. President Obregon has given an audience to the promoters and told them that the Government would give it all the aid it could. Among the other men interested in the proposed industry are J. S. Curtiss of El Paso and Adolfo P. Buquor and Alejandro of the City of Mexico. The name of the automobile that is to be manufactured will be Anahuac.



## N. A. C. C. Suggests Used Car Methods

### Questionnaires Go to Manufacturers Inviting Criticism of Report on Situation

NEW YORK, Dec. 19—A statement giving the results of the survey of the used car problem ordered by the directors of the National Automobile Chamber of Commerce discloses that the two plans most widely advocated by dealers are:

1—Independent and impartial appraisal bureaus to be established in larger cities with an agreement by dealers to accept cars in trade only at a price set by the bureau, and each dealer to sell the used cars he takes in trade.

2—Advertising by the manufacturer of the sales price of old models in good condition based on reports from the country generally. It is contended it should not be necessary to give sales values on cars less than one and a half nor more than four years old. Under this plan any dealer exceeding the allowance would do it with the knowledge that he was taking a loss. It is felt this plan would increase the respect for the used car because the manufacturer would be giving accurate information on values.

#### Exchanges Mentioned

Other suggestions made to remedy the problem include:

Used car market reports with dealers allowing the quoted market prices for cars taken in trade.

Establishment by dealers in each locality of an information bureau to make public the sales price of the various makes of used cars sold during the previous two weeks. This would be similar to the Chicago used car market report.

Used car exchanges to be maintained by dealers as a used car department, sales force and appraiser, to buy used cars from dealers, recondition and sell them.

#### Shows as a Remedy

National used car markets to provide the longest possible line of used cars for prospective purchases and supply owners with a ready market for their used cars. These used car markets could be incorporated with a wide distribution of the stock. The markets, under this plan, would issue to the owner, upon the receipt of a used car, a negotiable receipt or certificate which could be used either as collateral upon which to borrow money for the purchase of a new car or to give in part payment for such a car.

A factory rebuilding system under which cars not too distant from the factory would be returned for rebuilding.

Used car shows.

Establishment of local co-operative repair shops where cars of various makes can be reconditioned at cost.

Many plans have been tried and many more have been suggested," says the state-

ment of the N. A. C. C., but the strong outstanding feature seems to be the failure of retail automobile merchants to learn true values and to buy used cars at a price that will insure a profit when sold. No good merchant should be expected to do otherwise.

The directors are endeavoring to make this survey without bias, touching on the good and bad points of the operations of both manufacturers and dealers.

Requiring dealers some times to take their full allotment, overproduction of certain cars, rushing production to use up old inventories and giving inside trading allowances are among the things attributed to the manufacturer in developing the present situation.

Interviews with dealers prove that handling used cars could be made a profitable business provided they would, through their salesmen, educate their customers to the true value of second hand cars. Substantial dealers insist that there will be little difficulty if all dealers taking in used cars would learn not to just accept them in trade, but to buy them for resale at a profit. Make a virtue out of a necessity and buy second hand cars with enthusiasm and with the knowledge that when bought right they can be sold at a profit.

The new car market is certain to be slow until the over-supply of used cars is liquidated. With money in such stocks the dealer is financially unable to stock new cars in any quantity. It thus becomes a problem of the car maker, who is interested in helping the dealer solve the problem.

In discussing what car makers can do to ease the situation, the statement says:

Make better and fewer cars. Sell parts for reconditioning used cars at low price. Take dealers' used-car stock into account when figuring territory's potentiality. Warn dealers when they have too many used cars. Discontinue 'inside billings.' Ship only on bona fide orders instead of on monthly contract allotments. Buy in for salvage own cars over certain age.

Manufacturers are asked to send in their criticisms of the survey as early as possible together with suggestions for the improvement of the used car situation. To facilitate replies a questionnaire has been sent to each of them.

## Milwaukee Clears Decks for Steady Production

MILWAUKEE, Dec. 19—The situation of the automotive industries in this center of the parts and equipment manufacturing business is growing better steadily. More activity is noted during the first half of December than in the corresponding period a year ago. A good many concerns advanced inventory taking to the last ten days in November in order to clear the decks for uninterrupted production during December and there will be less idleness during the week from Christmas to New Year's Day than usual.

A local drop forge company now completing a reorganization reports an offer of an order which will require 60 days to fill. Foundries are making further increases in working schedules. Gray iron shops specializing in automotive castings report increases in bookings, and in shipping directions on standing orders.

## Firestone Surplus Totals \$15,813,258

### Loss of \$16,000,000 Taken During Year—Sales Aggregated \$66,372,938

AKRON, Dec. 19—After taking a loss of \$16,000,000 in inventories and tangible assets during the past fiscal year, the Firestone Tire & Rubber Co. is able to show a surplus of \$15,813,258 with \$5,888,564 in cash on hand, according to the annual balance sheet of the company issued in connection with the annual Firestone meeting. Directors declared the regular quarterly dividend on 6 per cent preferred stock, payable Jan. 15, and the quarterly dividend on 7 per cent preferred stock, payable Feb. 15. No action was taken in restoring dividends to Firestone common stock.

Firestone sales for the fiscal year ending Oct. 31, were \$66,372,938, or approximately 42 per cent of sales of the previous year which aggregated \$114,980,000. Unit sales for the past year, however, were only 15 per cent below those of a year ago, the decline in sales revenue volume being due to the series of tire price cuts enforced during the past twelve months. While dealers' business increased 2 per cent in the last year, the selling expense was decreased 38 per cent in dollars expended.

#### Bankers Express Confidence

Our inventories now are clear and are invoiced at the market or below, and now that we have no loss to take in our commitments, we must not relax our energy and determination to manufacture tires at a profit, said President H. S. Firestone at the annual meeting. Bankers who have extended accommodations to our company in the past year have expressed confidence in Firestone and have offered the same liberal banking arrangements that had prevailed in the year just closing.

Firestone reported the company had negotiated loans for \$37,252,000 during 1921, and at the close of the year had reduced this loan to \$21,600,000. In 1920 he reported the company borrowed \$43,942,000 but reduced the sum to \$31,356,000 by the close of the same year.

The Firestone balance sheet shows accounts receivable of \$12,181,114, cash on hand of \$5,888,564; inventories listed at \$12,534,369. Investments include \$3,989,055 in capital stock in foreign subsidiary companies and in stocks and bonds. Treasury stock certificates total \$129,848, while other accounts due from officers and employees of the company on their purchases of common stock, total \$5,905,424. Real estate is listed at \$30,594,721. Deferred charges are \$711,269.

The company's liabilities include \$21,680,000 in notes and acceptances payable. Accounts payable are \$2,368,276. Accrued accounts, interest and taxes are \$351,927; reserves for plant depreciation, liquidation of inventory accounts and general contingencies \$11,430,602; capital stock showing preferred 7 per cent cumulative and common, figuring authorized and issued on all classes less the unissued, of \$23,561,670.

## Engineering Staff Named for Peerless

**Anibal in Charge of Direction—  
Holden Named Chief  
Assistant**

CLEVELAND, Dec. 19—The engineering staff of the Peerless Motor Car Co., which will operate under the direction of B. H. Anibal as chief engineer has been completed. The personnel follows:

F. M. Holden, assistant chief engineer, with supervision of research and experimental work, was formerly research engineer of the Cadillac Motor Car Co.

Herman Schwarze, electrical engineer, in charge of electrical design and equipment, acted in the same capacity for the Cadillac organization. Schwarze is given the credit for having made practicable the electric starting, lighting and ignition principle, as embodied in the 1912 Cadillac.

F. W. Slack, chassis engineer, has been with the Peerless engineering department for 12 years. He has had much to do with the development of the eight-cylinder Peerless engine, being in charge of the designing.

W. R. Milner, body engineer, recently resigned from a similar position with the Cadillac company. Previous to his Cadillac association, he had filled the post of body engineer and designer for the Marmon company.

L. C. Tenney, chief draftsman, has been identified with automobile engineering and construction work since the early days of the industry. His longest term of service was with the Cadillac company.

Richard Emig, foreman of the experimental department, in charge of car building and machine shops, had practical experience in tool-making, machine operation, final finishing, experimental driving and machine shop supervision with the Cadillac Motor Car Co.

## Engine Size Is Reduced in Detroit Steam Car

DETROIT, Dec. 16—Further details of the steam car to be made by the Detroit Steam Motor Corp. indicate that an attempt will be made to bring the car down to a popular size.

The engine will be the Uniflow type similar to that used in previous successful steam cars, except that it is smaller. It is 10 hp.,  $3\frac{1}{4} \times 4\frac{1}{4}$  double acting single expansion, operating directly on the rear axle with Stevenson link valve gears. The boiler is a fire-proof type adapted for 500 lb. working pressure with 628 flues. Automatic control is used for the steam pressure, water level and fire, and the car is designed to operate on gasoline, kerosene or distillate.

Claims are made for 2000 miles to the gallon of lubricating oil and 15 miles to the gallon of kerosene. From 600 to

800 miles is claimed for each filling of water.

By the reduction of the engine size to about 50 per cent of the type formerly used and the reduction of the wheelbase to 110 in., it is expected that the weight will be kept below 2000 lb. The car will be mounted on  $31 \times 4$  in. tires and will be in the \$1,000 class.

An automatic pilot ignites the main burner when the volume of steam in the boiler drops below 450 lb. pressure. When the pressure reaches 550 lb. the main burner is automatically shut off. There will be four body styles provided, a roadster, five-passenger touring, coupé and sedan. Later there will be a light delivery wagon on the same chassis.

## Service Truck Obtains Big Order from Poland

WABASH, IND., Dec. 19—The Service Motor Truck Co. of this city has completed negotiations with the Government of Poland for what is said to be one of the largest individual truck orders ever made in peace times, by which the Polish Government buys hundreds of Service trucks, with parts and tires. The first shipment of four trucks is now on the way to Poland, according to the announcement by the company.

It is said that the Polish government is issuing bonds to be underwritten by a Polish-American banker's syndicate headed by John F. Smulski of Chicago. Consequent to this huge order it is expected that the company's plant will soon be working at maximum production. James M. Marshall and Harry McGuire of this city are now applying for passports preparatory to leaving for Poland, Bavaria, Russia, Czecho-Slovakia and other European countries where they will demonstrate trucks.

## Sharon Pressed Steel Co. Reorganization Completed

SHARON, PA., Dec. 19—Reorganization and refinancing of the Sharon Pressed Steel Co. has been completed and a financial statement as of Nov. 21 shows a satisfactory condition. Since the management was taken over last February by Henry W. Torney and Arthur E. Swan, the plant has been operating continuously and has shown a steady increase in output.

It now is running at about 50 per cent of capacity. The refinancing has been in the hands of Josiah Kirby of the Cleveland Discount Co., who is a director and large stockholder in the Sharon company.

## FULLER COMPANY ON FULL TIME

MADISON, WIS., Dec. 19—After running at greatly reduced capacity for many months, the Fuller & Johnson Mfg. Co., farm gas engines and machinery, has placed its force on a full time basis. A number of large orders for delivery in the first quarter of 1922 is responsible. The force at present numbers about 200 and is to be increased gradually.

## Organized Effort Aids Chicago Trade

**Christmas Helps Sales—Truck  
Manufacturers See Increase  
After January 1**

CHICAGO, Dec. 19—Daily rains for the past 30 days in Chicago territory have rendered Illinois roads almost impassable. This fact more than any other has had a retarding effect on the sale of automobiles in the Chicago market outside the city itself.

Sales in Chicago during the first two weeks of December are spotty in the extreme and seem to have responded in proportion to the effort put forth by the dealers. Organizations that have tuned up to meet present conditions of more difficult sales report satisfactory business.

Many of the city sales have been purely Christmas or gift sales. These have added materially to the volume and it is said by dealers, judging from prospects now in sight, that sales will keep up at a fair rate until a few days before Christmas.

## November Business Exceeded

With most dealers in Chicago sales show up better than for any two weeks in November and in many cases December to date has produced more sales than the whole of last month. No one class of cars is particularly in the lead in the Chicago market.

One of the bright spots in the local situation is the remarkable activity in motor trucks. Light capacity vehicles are in demand and these sales have been not unusual for some time. Heavy capacity trucks have been slow to move and this is true practically of the whole line. About the first of December demand began for these trucks and December so far has registered more sales than any one whole month during the last eighteen.

Manufacturing of trucks in Chicago is on a very low schedule with hopes for an increase after the turn of the year. Some of the makers expect to enter a capacity schedule after Jan. 1.

## Business Men to Continue Nashville Body Factory

NASHVILLE, Dec. 19—The plant of the bankrupt National Body Mfg. Co. has been purchased by a group of Nashville business men who will continue the manufacture of touring bodies for Ford cars. The plant already is in operation and the new management is optimistic over the prospects for spring business.

The company expects to be nationally represented by county dealers through State distributors. The old name will be retained. The purchasers are all active in other lines of business and operations will be carried on under the direction of J. S. Albert as general manager.

## Expect Price Cuts at New York Show

Reductions, Due to New Models,  
Certain, Particularly in Six-  
Cylinder Field

NEW YORK, Dec. 20—While motor car manufacturers naturally are exceedingly reticent on the subject, it can be accepted as certain that there will be several "readjustments" of prices and values, especially values, after Jan. 1. Most of them probably will be announced simultaneously at the opening of the New York show.

Some reductions or "readjustments" are certain, especially in the six-cylinder field. They will be brought about largely by the introduction of new models. This will include old as well as new lines.

The new six-cylinder Rickenbacker will sell for less than \$1,500 and it will have good body work and excellent material throughout. There also will be the Jewett light six which will bear the same relation to the Paige Motor Car Co. that the Essex does to the Hudson. Another new model will be a Chandler which, it is understood, will be in the light six field.

### Lexington Has Light Six

The Lexington Motor Co. will display at New York for the first time a light six which, it is understood, will sell for about \$1,300. The new Durant six, which is the rebuilt Sheridan, will be in production in January. It will sell for \$1,650. Other new light cars in prospect include the Frontenac and the Hanson six. It is known that the Studebaker models at the show will incorporate many changes and refinements.

Most of the actual price cuts probably will come in the heavier and more expensive lines. It is not denied that General Motors will announce a sharp reduction on its eight-cylinder line. No models of the new General Motors air-cooled line will be displayed at the shows, and it is probable there will be greater delay than was expected in getting them into production.

This is only a fraction of the lines which will have important announcements to make after the turn of the year.

Price considerations have become of prime importance in the automotive industry and costs are being scanned as never before. There will be fierce competition in all its branches in the next year. Those companies which are just coming into the field, although they have yet to establish a reputation, have one advantage in the fact that they can equip their factories at pre-war costs and can buy inventories at low price levels.

### Ford Denies Report

DETROIT, Dec. 20—The sales office of the Ford Motor Co. denies reports of an impending price cut and asserts that dealers who have inquired about it have

## TRUCK COMPETITION BEGUN BY RAILROAD

DETROIT, Dec. 20—The Michigan Central Railroad has inaugurated a system of fast daily local freight trains, running on express schedules, from Lansing to many points in Michigan, to compete with various automobile truck lines centering there. It is predicted that if these experiments successfully cope with truck competition, the service will be extended.

been informed that the reports are not true. No formal public denial has been made by the company, however.

There has been a feeling within the industry that Ford might be in a position to reduce his costs inasmuch as his plans for the production of glass and cotton will take form in the near future. It is believed that by the beginning of 1922, Ford will control all the materials used in his cars except tires, and that for this reason his production costs will be lower than ever before.

It has been persistently reported that Ford proposes to extend the plan under which he helps dealers to facilitate time sales. This probably will be particularly true in relation to dealers in small communities.

## Morrow Leaves Willys Subsidiary as President

NEW YORK, Dec. 20—The resignation of A. P. Morrow as president of the Willys-Morrow Co. is announced by John N. Willys. Morrow retires from the management of the Elmira plant after long deliberation because certain outside interests will require much of his time. He is not severing his relations with the company, however, as he will remain in an advisory capacity. Regret at his resignation is expressed by Willys and his associates.

Morrow had been at the head of the company since its organization more than 15 years ago. His work during the war was notable. Within a comparatively short time a plant was built and airplane motors were turned out in large quantities.

Walter P. Chrysler has been elected president of the company but he will serve in that capacity only temporarily. A permanent successor to Morrow has not been selected but it is understood one of the men proposed for the position is C. E. Killinger, treasurer of the Wilson Foundry & Machine Co., which is a Willys subsidiary.

### SMALL PROPERTY TO BE SOLD

INDIANAPOLIS, Dec. 20—All the property of the William Small Co., manufacturer of the Monroe car, will be offered for sale on Dec. 28 by Receiver Fesler.

## Low Inventories Create New Market

Parts Makers Will Benefit Even  
if Car Output is Un-  
changed

NEW YORK, Dec. 21—While a majority of parts manufacturers do not expect production of motor vehicles in 1922 to run far ahead of the 1921 output, they are confident their business will be considerably better, even with the same production schedules in force, for the reason that most vehicle manufacturers have worked down their inventories to the point where they are having to go into the market for supplies. Purchases from now on will be practically current with production so far as most unit parts are concerned. This working down of inventories is one of the most satisfactory factors in the situation so far as the parts makers are concerned.

### Truck Prospects Best

Those who supply truck manufacturers are even more optimistic than those whose chief business is with passenger car makers, for they are convinced the market for trucks will steadily expand as the year progresses and general business gets back on a more normal basis. One significant and gratifying report from the parts makers is that tractor manufacturers are slowly coming back into the field for supplies.

While production of motor vehicles has dropped off considerably this month, many parts manufacturers report that their December business will be better than for November. This is construed to mean that vehicle makers are preparing for January production. December has brought a large number of releases and a considerable volume of new business.

Although collections may be regarded as fairly satisfactory they are not quite as good as for the past two or three months.

A considerable number of jobbers have placed orders this month for January and February shipments.

## Body Company Formed to Specialize on Fords

DETROIT, Dec. 19—The Automotive Body Corp. has been organized by former officials of well known body companies for the manufacture of custom bodies and special four-door sedan bodies for Ford cars which are interchangeable with other Ford bodies.

The company will also do body engineering and build cabs and bodies for commercial cars. Repairing, painting and trimming will be handled in a special department. Davis Baker, formerly with the C. R. Wilson Body Co., is president; Paul Block, formerly of the Racine Mfg. Co., vice-president, and C. M. Mulholland, secretary and treasurer.

## Kentucky Wagon May Join Merger

**Stockholders Will Be Presented  
with Two Plans for Re-  
organization**

LOUISVILLE, KY., Dec. 20—Stockholders of the Kentucky Wagon Mfg. Co. at their annual meeting Jan. 12, will be called upon to consider complete reorganization plans, contemplating either a merger with several other concerns manufacturing automobile parts or placing a mortgage for \$750,000 on the plant and releasing it and its entire equipment to the Kentucky Mfg. Co. to be capitalized at \$1,000,000.

In notices to all stockholders urging them to be present at the meeting or to be represented there, it is stated that the reorganization is due to market conditions in cotton-producing sections of the South, which comprise the chief market of the company.

Both plans of reorganization are outlined in detail in the call for the meeting. The first proposes that a mortgage of \$750,000 be placed on the property not included in the personal property inventory and the organization of a new company to be known as the Kentucky Mfg. Co., to which the plant of the Kentucky Wagon Mfg. Co. will be leased for from five to ten years at \$200,000 per year. This amount, it is said, will pay the fixed charges of operation and provide a sinking fund to pay off the mortgage.

The lessor will apply the proceeds of the mortgage to the payment of debts and assume and pay off the balance of indebtedness itself. The lessor, the Kentucky Mfg. Co., will be capitalized at \$1,000,000 with the privilege to the stockholders of the wagon company to subscribe to the stock on the basis of one share of the new company for three shares of the wagon company.

The second proposal is for a merger with other companies in the Associated Motor Industries.

Should the consolidation of companies be effected the official call states that stockholders of the wagon company would receive stock in the Associated Motor Industries to the extent of 140 per cent of the net tangible assets of the wagon company. All the property of the wagon company would be sold to the merger organization which would assume all its indebtedness.

## Surplus War Material to Be Sold at 11 Camps

WASHINGTON, Dec. 20—Schedules for auction sales of the War Department Surplus Property Division show that motor vehicles and other supplies will be sold at 11 camps during January. Material which cost approximately \$12,000,000 will be placed on sale. A quantity of air service material will be disposed of at the sale at Omaha, Jan. 11.

The schedule calls for auctions at Bal-

timore, Jan. 5; Camp Grant, Ill., Jan. 7; Schenectady, N. Y., Jan. 9; Boston, Jan. 12; Camp Dodge, Iowa, Jan. 13; Fort Mason, Cal., Jan. 17; New Cumberland, Pa., Jan. 17; St. Louis, Jan. 19; Pittsburgh, Jan. 24, and Camp Lee, Va., Jan. 31. This automotive equipment is unserviceable and rejected by Federal departments.

## "Gier-Lewis" Developed by Motor Wheel Corp.

DETROIT, Dec. 21—Announcement of a new steel wheel, brought out by the Gier-Tuarc Division of the Motor Wheel Corp. of Lansing, was made coincident with the first annual sales meeting of the division and resulted in orders totaling approximately \$100,000 for delivery before April 1. It will be known as the Gier-Lewis.

The new wheel is a radial corrugated disc steel wheel for use on lighter types of cars, the corrugated metal resembling in appearance spokes of a wood wheel. The Gier-Tuarc wheel is for use on heavier vehicles.

C. C. Carlton, secretary of the company, said that the most remarkable feature of the convention was the confidence that the dealers expressed in the immediate future of the business. This confidence is exemplified in the orders placed by Reo Motor Car Co. for the first lot of Reo taxicabs.

## Temporary Receiver to Act During Oil Refining Suits

COLUMBUS, IND., Dec. 19—Judge John W. Donaker has opened the hearing on two suits for receivership brought against the Indiana Refining Co. by 107 stockholders of the company who charge mismanagement, misapplication and unlawful use of funds.

Before the hearing was begun a supplementary complaint was filed asking for a receivership to serve during the hearing of the suits. The petition was granted and the Peoples Savings & Trust Co. of Columbus was appointed to act as temporary receiver.

## COTTA SOLD FOR \$175,000

CHICAGO, Dec. 20—Closing the receivership in the Cotta Transmission Co., Rockford, Ill., T. E. Swords, representing the Rockford Trust & Savings Bank and other Rockford interests, bid in the property at the receiver's sale for \$175,000. The assets of the company were given at \$325,000 while the liabilities were approximately \$1,000,000. The company will be reorganized and the business continued.

## TO PASS ON OWEN CLAIMS

WILMINGTON, DEL., Dec. 19—Former Chancellor Charles M. Curtis of Wilmington has been appointed by Judge Morris in the United States District Court special master in the matter of Uri T. Hungerford vs. the Owen Magnetic Motor Car Co., in bankruptcy. Claims aggregate \$750,000.

## Custodian Succeeds Receiver for Gary

**President of Bank May Be Ap-  
pointed Trustee of Truck  
Company**

CHICAGO, Dec. 21—Judge Carpenter, sitting in the Federal Court at Indianapolis, appointed Charles Suprise, clerk of the Federal Court at Hammond, Ind., custodian of the property of the Gary Motor Truck Co., succeeding G. M. Semmes, who was appointed receiver by the Superior Court of Gary. Richard R. Schaff, president of the First National Bank of Gary, it is understood, will be appointed trustee within a few days.

At a recent meeting of the creditors of the company, a creditors' committee was appointed to look after the interests of the creditors and to work out a plan whereby the company's property may be kept out of forced sale. Seventy per cent of the creditors, representing 90 per cent of the indebtedness of the company, have agreed to accept the judgment of this committee which is composed of C. W. Dickinson, Timken-Detroit Axle Co.; Sloan of the Buda Co.; K. F. Conrad of Parrish & Bingham, and C. W. Fuller of Fuller & Sons Mfg. Co.

Frank Dawson, president of the Gary Motor Truck Co., asserts that he has enough money to refinance the company, thus keeping it out of a receiver's sale. His plan will mean that all the old stockholders will lose all their stock, but that the creditors will be paid in full. In case of a sale it is said that the creditors will not realize more than 30 per cent.

If the reorganization as planned by Dawson goes through, the new company will operate its own branches throughout the country and will build a business wagon in the speed class.

## General Motors Produced 139,400 Cars in 9 Months

NEW YORK, Dec. 21—Production by the passenger car divisions of the General Motors Corp. for the nine months ended Sept. 30 was 139,400 as compared with 290,250 for the same period in 1920. The production details follow:

	(Third Quarter)		(9 mos. to Sept. 30)	
	1921	1920	1921	1920
Buick .....	31,000	25,700	60,000	87,500
Cadillac .....	2,000	6,200	6,800	14,900
Chevrolet .....	20,000	37,100	45,000	119,800
Oakland .....	2,800	12,300	9,100	34,700
Oldsmobile ...	4,500	8,450	15,900	24,750
Scrpps-Booth.	1,200	2,700	2,600	8,600
Totals .....	61,500	92,450	139,400	290,250

## Packard Car Output, 6469

DETROIT, Dec. 21—Production of passenger cars by the Packard Motor Car Co. for the year ended Aug. 31 was 6469 and the output of trucks was 1386. In the year ended Aug. 31, 1920, the company manufactured 7667 cars and 7445 trucks.

## Kansas Expects Much from New Rail Rates

### Lower Cost of Shipping Crops Will Stimulate Buying Among Farmers

TOPEKA, Dec. 19—Reduction of 16 per cent in freight rates on grain and hay recently ordered by the Interstate Commerce Commission is expected by Kansas automotive dealers to have an excellent effect on business during the winter and to stimulate buying next spring.

Freight rates have been one of the sore spots with farmers, who have held that they were unreasonable and confiscatory in many instances, and this material reduction, in addition to giving them more money for their products by lessening the cost of getting them to market, will also have a favorable psychological reaction, dealers believe, and will bring farmers into the market who otherwise would have stayed out.

It is felt by many observers that many farmers have not bought more liberally, not so much because they lacked the money as because they felt they had been made the victims of the readjustment period and resented it to the extent of withholding their patronage as long as possible as a means of showing their displeasure.

## Durant Motors of New York Supplies California Branch

NEW YORK, Dec. 20—The Durant Motor Car Co. of New York has contracted to supply the Durant Motor Car Co. of California with 15 trainloads of Durant fours. Each train will carry not less than 150 cars and they will be dispatched every 10 days. The second trainload started for the coast to-day. In registration of new cars in the Metropolitan district for November, the Durant ranked fifth.

## Hoover Made Chairman in South American Work

WASHINGTON, Dec. 20—Considerable significance is attached to the appointment of Secretary Hoover as chairman of the United States section of the Inter-American High Commission, especially in relation to development of automotive markets in South American countries. Selection of this commission is taken to mean that the Government will make strenuous efforts to offset growing European influence in these neighboring republics.

This movement is of particular importance to the automotive industry at this time because of the intensive efforts of American motor manufacturers to cultivate these markets in spite of strong competition. The acceptance of the vice-chairmanship by Wesley L. Jones, chairman of Senate Committee on Commerce,

indicates that the legislative branches of the Government will support the program of the administration.

In an official statement, Secretary Hoover pointed out that the commission has under consideration in its various national sections a uniform commercial law among American republics, laws governing industrial and literary property, simplification of fiscal administrative relations in the matter of customs, etc.

## Harley Co. Plant Sold to Railroad Interests

SPRINGFIELD, MASS., Dec. 22—Negotiations have been practically completed by Pennsylvania railroad interests to purchase the plant of the Harley Co. in this city. It will be used to manufacture railway accessories and parts, including journals, couplings, fittings, etc. It cannot be learned here that it involves any plan to motorize the lines of the company. The sale probably will be completed Dec. 28.

The purchase of the Harley plant is believed to be the outgrowth of a recent announcement by the railroad that it will give up its own repair shops. It is proposed to begin operation of the plant within 30 days after the sale and enlarge the working force gradually to about 2000. The plant, which now covers four acres, will be gradually expanded next summer.

The Hendee Mfg. Co., which makes the Indian motorcycle, owns \$400,000 of the \$600,000 common and all of the \$600,000 preferred stock of the Harley Co.

## INVESTORS MAKE CHARGES

MILWAUKEE, Dec. 19—Two warrants have been issued by the district attorney of Milwaukee County charging larceny as bailee and embezzlement against Orson A. Towle, vice-president of the Holmes Air-Cooled Motor Car Co. of Canton, Ohio, who for a time maintained an office in Milwaukee for the sale of capital shares. Between fifty and twenty complaints have been made by local investors, who say they purchased and paid for shares in July and August, 1920, but have not received stock certificates.

## PARRETT DIVIDES WORK

CHICAGO HEIGHTS, ILL., Dec. 20—Recent reorganization changes have been completed in connection with the manufacture and sale of Parrett agricultural tractors which provide for two separate organizations, one covering manufacturing and the other sales, with Dent Parrett, president and general manager of each. The manufacturing organization is the Hicks-Parrett Tractor Co., the sales organization is the Parrett Tractor Co., both located here.

## FORD FOREIGN PLANS GROW

LONDON, Dec. 14 (*By Mail*)—It is reported here that the Ford Motor Co. soon will open an assembly plant at Antwerp, Belgium.

## Buda Incorporates Automotive Parts

### Subsidiary Has Established 29 Service Stations to Handle Company's Products

CHICAGO, Dec. 21—The officers of the Buda Co. have incorporated as a subsidiary the Automotive Parts Corp. of America, which has already established 29 service stations to handle Buda products, and the number of main stations ultimately will be increased to about 50.

The main stations will be supplemented by a series of sub-stations which will carry only the fast moving parts and will depend upon the main stations for the larger and more expensive parts.

By means of these stations the Buda company expects eventually to cover the whole country so that any part for a Buda engine can be obtained within a few hours. All stations will maintain a uniform list price.

Most of the Buda service stations now are carrying Torbenson axles and Fuller transmissions. These parts are handled under the same sales policy as that outlined by the Buda company.

Negotiations now are under way for servicing several other major units through this service station system.

It is proposed to adjust repair part prices from time to time so that they will be sold to the consuming public at only a fair margin of manufacturing profit.

## Dallas Trade Increases 20 Per Cent in December

DALLAS, Dec. 20—Retail sales of automobiles for the first two weeks of December show an increase of 20 per cent over a corresponding period in November. Dealers do not attribute the increase to holiday buying but more to lower prices.

There was also an increase of 15 per cent in the accessory and tire business. Truck dealers report a gain of from 5 to 15 per cent. Tractor business increased 10 per cent and trailer dealers report a corresponding gain.

## NEW ENGINE TO BE MADE

DETROIT, Dec. 21—The Superior Combustion Engine Corp. has been formed here to manufacture a two-cylinder, two-cycle engine which will burn either gasoline or kerosene. It is designed for use in either motor cars or boats. Production will be started, in a leased plant, on 500 15-hp. marine engines.

## GOVE PROPERTY SOLD

DETROIT, Dec. 21—The land and factory of the Gove Motor Car Co. was sold at trustees' sale to William Benham of Brighton, Mich., for \$2,500.



## Price Plan Violates Sherman Trust Law

### Supreme Court Hands Down Decision Affecting Conduct of Associations

WASHINGTON, Dec. 19.—Interpreted as uprooting the fundamental principles of trade associations which exchange price information, a majority opinion of the United States Supreme Court was delivered to-day by Justice Clarke on the so-called open price competition plan of the American Hardwood Manufacturers' Association.

By a divided opinion of six to three, the highest tribunal affirmed the decision of the lower courts, holding that competitors who exchange information as to past transactions, touching prices or production, are doing what is prohibited by the Sherman anti-trust law. So sweeping is the decision, in the estimation of attorneys who have closely followed the case, that it will force the dissolution of trade associations in some branches of industry and may develop a widespread change in methods of doing business.

#### Controls Prices

The case for the first time presented the legal question as to the practices of those organizations in industry which are known as "open price associations." The court upheld the contention of the Government that such a plan was invented and adopted by the industrial world to circumvent the provisions of the Sherman anti-trust act as to co-operation and exchange of information in trade. The Government insisted that the operation of the plan is far more efficacious in controlling prices than an actual agreement fixing prices between the same persons.

Justice Clarke held that the plan "constituted a joint conspiracy to restrict lumber production in the country and keep prices up." He declared that the arrangement was nothing more than calling an old scheme by a new name. According to the opinion expressed for the court there was no evidence presented showing the existence of a "gentlemen's agreement," but the result was "a harmonious individual action among large groups of natural competitors."

#### Restricts Production

Justice Clarke said that while the plan on paper, to all appearances, provided for data on past performances, or transactions which it was claimed could not be used in fixing prices, the detailed discussion and predictions in the trade, coupled with the expert analysis by statistical experts, indicated to the court that the plan was a combination which primarily had a tendency to restrict production and, consequently, it was a con-

## FIFTH AVENUE TO GET FIVE CENT BUS LINE

NEW YORK, Dec. 19.—Mayor Hylan has announced that the administration has completed its plans to establish a new bus line on Fifth Avenue and Riverside Drive, which will charge a five cent fare and operate in opposition to the Fifth Avenue Coach Co., which charges a ten cent fare.

certed effort to increase prices.

It was the contention of Justice Clarke that detailed argument of the purposes of the plan was not necessary because the effect of the combination could be easily ascertained in the market columns of daily newspapers and Government publications. Considerable stress was placed upon the employment of an expert statistician by the hardwood organization as an assistant to the secretary, which the court described as "an authoritative voice of the organization."

#### Circumstances Affect Application

It is a source of speculation as to whether the Government will proceed against other trade associations in other industries unless they either voluntarily dissolve or restrict their activities. This point arises from the statement of the attorney general in the supplemental brief filed in hardwood case in October, in which it was said:

Manifestly, the results of the co-operation of this open price scheme are different when applied to different industries, and under different economic conditions. This court will become fully informed as to its various effects unless the disposition of this case be such as to render future actions of this character useless.

By considering the motives which control human conduct, we can reach a reasonably correct conclusion as to what some of the results have been, and will be, if the activities of these associations are not restrained, under the varying conditions in-

(Continued on page 1250)

## Suggestions Embodied in New Dealer Contracts

NEW YORK, Dec. 20.—Several automobile manufacturing companies already have notified the National Automobile Chamber of Commerce that they are incorporating in their dealer contracts several of the suggestions made as a result of conferences between special committees representing the N. A. C. C. and the National Automobile Dealers' Association.

Some companies have gone even further in modification of their contracts than suggested by the N. A. C. C. directors. The manufacturers feel that if the N. A. C. C. suggestions are adopted dealers will have a perpetual contract rather than one limited to a certain period. It is pointed out, however, that the N. A. C. C. has no authority to direct the general adoption of its suggestions and that this is a subject which must be understood by each individual dealer.

## Austrian-Daimler Appears in Orient

### Makes Bid for Japanese Trade— Shows Influence of Air- plane Design

NEW YORK, Dec. 21.—Austrian automobiles are again appearing in the Oriental markets, according to information received here. One of the first cars of Austrian manufacture to reappear is the Austrian-Daimler which is making a strong bid for business on the Japanese market.

It is reported that the Austrian-Daimler clearly shows the effect of the airplane design. The engine is aluminum, with steel cylinder block, water jacket and upper half of the crankcase being one casting, with cylinders of 85 mm. bore and 130 mm. stroke. The detachable head carries the valves, which are angled slightly, and supports the overhead camshaft, which is driven by a short vertical shaft and bevel gears from the crankshaft.

#### Lubrication Force Feed

Lubrication is force-feed throughout, with a gear-driven pump and dash oil pressure indicator. The cooling system depends on a centrifugal gear-driven pump, with a very large V-shaped honeycomb radiator. The flywheel is vanned to assist the air flow. The carburetor is mounted on the right side, directly on the water-jacket, and the inlet manifold is within the water jacket. The magneto is a variable-spark Bosch, and the whole engine is declared to be of exceptionally clean design.

The transmission, which provides four forward speeds and a reverse, is carried in an aluminum housing, and the gear and hand brake levers are mounted in a central position. The transmission is provided with a tire pump and speedometer drive. A large transmission brake of the contracting type is mounted on the drive shaft directly behind the transmission. The propeller shaft has but one universal, and is completely inclosed in a large torque tube, which is oil-tight.

#### Radiator on Crankcase

The chassis presents several unusual features. For instance, the radiator, instead of being mounted on the frame, is mounted on an extension of the crankcase, thus permitting a more or less floating construction. The gasoline tank, mounted at the rear on an extension of the frame, holds 30 gallons and in addition to the vacuum feed, has an engine-driven pressure pump.

The wheelbase is 135 inches, but due to the use of a V-shaped radiator, an unusual amount of body space is provided, and the chassis will take bodies suitable for cars up to 140 inches wheelbase. Due to the wide use of aluminum, the car is not heavy, weighing only about 2500 pounds.

## Lincoln Appraisal Report Completed

**Assets Total \$9,490,811.13; Liabilities, Exclusive of Capital Stock, \$9,073,105.46**

DETROIT, Dec. 19—The appraisal of Lincoln Motor Car Co. property as filed in the United States District Court today shows a reduction in the assets of about \$5,500,000, the total assets as carried on the company's books being reduced from \$15,061,492.89 to \$9,490,811.13. Liabilities, exclusive of the \$7,313,600 capital stock outstanding, total \$9,073,105.46. With the capital stock included in the liabilities there is a deficit of about \$7,000,000.

Cash on hand is \$35,273.18. Other current assets carried on the company's books at \$898,445.60 are reduced to \$698,207.33 in the court appraisal. The inventory is cut from \$3,863,484.49 to \$1,998,929.87. Such items as prepaid taxes, manufacturing expense deferred, commercial work deferred and development work deferred, totaling over \$2,400,000 on the company's books are wiped out in the appraisal.

### Tax Claim Not Included

Items in the fixed assets such as buildings, machinery, plant equipment, long lived tools, diamonds, office fixtures and motor vehicles show heavy deflation in the appraisal report, the difference between the company's and the appraisal figure being about \$4,300,000. Land holdings show an appreciation, the totals being \$1,562,743.62 and \$1,709,401.

Principal items in the liabilities are: Accounts payable \$1,276,470.59, notes payable \$4,930,476.79, drafts discounted \$428,261.68, notes receivable discounted \$144,938.61, land contracts payable \$237,280, bonds payable (first mortgage) \$1,882,000. The Government claim of \$4,500,000 for additional taxes is not considered in the financial statement.

### To Borrow \$35,000

A statement to creditors and stockholders made simultaneously with the financial report, declares application has been made to the court by the receiver for authority to borrow not to exceed \$35,000 for payment of preferred labor claims and for authority to issue and sell receiver certificates not exceeding \$500,000 in amount for use as found necessary. The United States Commissioner of Internal Revenue has agreed that these shall be prior in lien to the Government's claim.

Notice that the hearing on the additional tax sought by the Government is now in progress, is also contained in the statement. Harold H. Emmons, counsel for the Lincoln Motor Co., is conducting the contest of the claim. The decision by the Commissioner of Internal Revenue will be reported by the receiver to the creditors and stockholders.

Show preparations are being carried through by the receiver. Four vehicles

## STATEMENT SHOWS WIDE DIVERGENCE IN ESTIMATES ON LINCOLN ASSETS

DETROIT, Dec. 19—A statement of assets and liabilities of the Lincoln Motor Co., as of Nov. 8, 1921, showing the comparison between the company's estimates and the receiver's appraisal, has been mailed to the creditors and stockholders by the Detroit Trust Co., receiver. It is as follows:

ASSETS	COMPANY'S BOOKS	COURT APPRAISAL
Cash .....	\$35,273.18	\$35,273.18
Notes receivable .....	\$237,470.58	173,795.08
Accounts receivable .....	183,551.21	54,366.09
Outstanding drafts .....	536,448.15	433,084.15
Sundry debtors .....	2,582.96	1,716.83
	<u>\$960,062.90</u>	
Less reserves .....	61,607.30	
Inventories .....	898,445.60	\$698,207.33
	<u>3,863,484.49</u>	<u>1,998,929.87</u>
Total current assets .....	\$4,797,203.27	\$2,697,137.20
Deferred:		
Prepaid insurance .....	\$10,786.62	\$12,631.43
Prepaid taxes .....	53,349.94	
Prepaid interest-bank .....	30,074.70	30,350.49
Mfg. expense deferred .....	1,034,297.50	
Com'l expense deferred .....	1,027,257.60	
Development work deferred .....	309,393.59	
	<u>2,465,159.85</u>	<u>42,981.92</u>
Special tools, dies, forms, etc. ....	1,858,646.89	755,616.73
Fixed assets:		
Land .....	\$1,562,743.62	\$1,709,401.00
Buildings .....	4,389,191.58	1,872,863.00
Machinery .....	2,361,392.69	1,658,480.17
Plant equipment .....	1,227,643.67	488,429.96
Long lived tools .....	494,423.83	196,639.89
Diamonds .....	9,706.75	6,902.27
Office furniture .....	117,929.06	35,072.57
Motor vehicles .....	53,778.06	27,296.42
	<u>\$10,216,809.26</u>	<u>5,995,075.28</u>
Less reserves for:		
Normal depreciation .....	\$776,393.25	5,940,482.88
Amortization .....	<u>3,499,933.13</u>	
	<u>4,276,326.38</u>	
Total assets .....	\$15,061,492.89	\$9,490,811.13
LIABILITIES		
Accounts payable .....	\$1,276,470.59	
Notes payable .....	4,930,476.79	
Accrued interest payable .....	38,406.84	
Accrued pay rolls .....	36,617.73	
Unclaimed wages .....	1,689.64	
Delinquent and accrued taxes .....	36,182.58	
Excise tax withheld .....	57,741.27	
Employees subscription account .....	3,039.73	
Drafts discounted .....	428,261.68	
Notes receivable discounted .....	144,938.61	
Land contracts payable .....	237,280.00	
Bonds payable (first mortgage) .....	1,882,000.00	
(\$632,000 pledged as collateral to note payable)		
Total liabilities .....	\$9,073,105.46	

NOTE:—Liability for uncompleted purchase contracts estimated at \$1,500,000.00.

Books show Class A stock \$3,000,000.00 with \$7,313,600.00 outstanding.

Above statement does not contain any liability on account of U. S. Government claim of \$4,500,000.00 for additional income and profits taxes.

will be shown in New York and six in Chicago. R. C. Getsinger, sales manager for the Lincoln company, will be in charge of the exhibits.

## Franklin Puts Force at Plant on Full Time

SYRACUSE, Dec. 19—Full time for its regular force of 3000 employees will be put into effect on Jan. 3 by the Franklin Automobile Co. Factory officials state that by Feb. 1 an output of 44 cars daily will be reached.

During January the actual output of cars will be somewhat under this mark, owing to time required to get all the fabricated parts to the assemblies. For a number of weeks recently, mostly on account of seasonal influences, production has varied with shipping requirements, the working week fluctuating from three days to five days.

## Upson Proposes Prizes for Airship Designing

NEW YORK, Dec. 19—Addressing the New York Chapter of the Society of Automotive Engineers on "aeronautical lessons from Europe," Ralph Upson, airship designer and international balloonist, proposed that the United States Government set aside each year \$500,000 which would be divided into a series of prizes for the best new designs to bring about safety for passengers, economy for merchandise and mail and night flying.

## LITTLE HARDWOOD BUYING

MEMPHIS, TENN., Dec. 19—In the hardwood market here it is stated that automobile manufacturers apparently have ample stocks on hand to carry them over the inventory period as none are buying, except from hand to mouth or day by day.

## FINANCIAL NOTES

Ajax Rubber Co. bonds in the amount of \$3,000,000 are being offered through W. A. Harriman & Co. The bonds are first mortgage sinking fund gold 8s and are priced at 99½ and accrued interest, to yield more than 8 per cent. They are callable as a whole but not in part except for sinking fund purposes at 110 and accrued interest. The proceeds of the financing will be used to pay off all bank loans. Report of the company for the nine months ended Sept. 30 shows a loss after interest charges of \$3,966,455 including inventory write-offs, operating losses and reserves. Net sales were \$8,037,382 again \$17,031,121 for the full year of 1920. The balance sheet as of Sept. 30 after giving effect to new financing shows cash, \$740,387; receivables, \$4,783,274 and inventories of \$2,594,036. The liabilities include: mortgage bonds, \$3,000,000; accounts payable, \$642,424; taxes, \$84,991 and reserves against commitments, \$181,000. Net quick assets were estimated at \$11,300,000 after new financing.

Wood Rubber Co.'s offering of 7 per cent fifteen-year notes aggregating \$6,000,000 has been oversubscribed and the books have been closed, according to Brown Brothers & Co. and Hayden, Stone & Co., through whom the offering was made. In connection with the new bond issue the company will retire by redemption or purchase at least \$200,000 par value amount of notes on or before Dec. 1, 1926, and at least \$200,000 additional par amount before every succeeding Dec. 1 to 1935 inclusive. The company's net quick assets are estimated at \$11,300,000 after giving effect to the proceeds of the notes and of an issue of 10,000 shares of its common stock.

Advance-Rumely Co. for the current year will probably show an operating deficit of close to \$750,000, which does not include losses to be charged off on account of inventory depreciation. Regardless of this the company will emerge in better shape than many of its competitors. Inventory at the end of this year will approximate \$8,000,000, against \$10,490,000 at the close of 1920. The company has reduced notes payable from \$4,000,000 earlier in the year to \$1,000,000 and has approximately that amount of cash in banks. Working capital at the close of 1920 was \$13,787,000, including \$10,490,000 of inventories.

Stromberg Carburetor Co. of America, Inc., for the first nine months of 1921 reports surplus earnings of \$126,091 after charges and Federal taxes, which is equivalent to \$1.68 a share earned on 75,000 shares of capital stock of no par value outstanding. Total earnings for the period, including other income, amounted to \$433,273, while expenses amounted to \$284,682 and Federal taxes \$22,500. The general balance sheet as of Sept. 30, 1921, shows a surplus of \$2,478,761 as compared with \$2,527,275 at the same time last year. Inventories are valued at \$654,668 as compared with \$967,090 in 1920.

American Bosch Magneto Co. management reports that it has more business in prospect to supplement the \$3,000,000 forward orders on its books than ever before. Gray & Davis, which manufactures for Bosch its starting and lighting systems, is already feeling the results of the latter's selling efforts. It has been gradually increasing its output and if releases continue to come in as they have of late it is expected that the output by March will be up 9000 or 10,000 systems a month, or practically capacity.

Republic Motor Truck Co., Inc., balance sheet as of Sept. 30, 1921, shows assets, including investments in and advances to

affiliated companies, of \$1,946,496; cash, \$488,097; notes and accounts receivable, \$819,642; government securities, \$10,411; inventories, \$4,318,442; deferred charges, \$135,335. The liabilities include a funded debt of \$2,591,162; notes and accounts payable, \$1,741,519; accrued accounts, \$199,540; reserves, \$355,000, and surplus, \$583,132.

Martin-Parry Corp. earned more than \$100,000 after all charges and federal taxes in the nine months ended Sept. 30, which is equivalent to slightly more than \$1 a share on the 100,000 shares of no par capital stock outstanding. This was accomplished in the face of deficits for the first quarter. Indications are that earnings in the current quarter will bring the total for the twelve months close to \$200,000, thereby showing the \$2 annual dividend fully earned.

Aero Cushion Inner Tire Co. has been authorized by the Utah securities commission to give with each bond of the company sold a 50 per cent par value stock bonus, the value of the stock being \$20 per share. The company has received permission to dispose of \$50,000 worth of its 8 per cent 5-year gold bonds. This company has a capital of \$250,000.

Grand Rapids Tire & Rubber Corp., Grand Rapids, has increased its capital stock to \$3,000,000, made necessary by the demand for larger factory space. The increased capitalization will permit the erection of buildings insuring a daily production of 2000 tires and 4000 tubes. The company has announced a 2 per cent dividend on preferred stock payable Jan. 1, 1922.

F. B. Stearns Co. earnings for 1921 will compare favorably with 1920, according to President G. W. Booker. He states that there are fewer than 200 cars in dealers' hands. The plant will close down during the holidays for the usual inventory.

Torbenson Axle Co. states that payment of the 1½ per cent quarterly dividend on preferred stock due Dec. 1 has been deferred.

Federal Motor Truck Co. has declared a dividend of 1½ per cent, payable Dec. 24 to stock of record Dec. 17.

Rolls-Royce of America  
Develops Organization

SPRINGFIELD, MASS., Dec. 19—In further development of its organization, Rolls-Royce of America, Inc., has made several additions to its staff. M. A. Pollock, formerly with the Locomobile Co., has been appointed assistant sales and advertising manager. P. D. LeVeness, associated at different times with the Pierce-Arrow, Locomobile and other companies, has joined the sales organization as territorial representative. A. C. Warren, of long experience as an automobile salesman in that city, has become identified with the New York branch.

Julius A. Olivier has been named to have charge of body designing and engineering. George W. Kerr, the veteran designer of coaches and carriages, has been added to the staff. Olivier was associated with the Locomobile company, and was previously identified with the coach-building organization of Brewster & Co. Kerr, originally a builder of horse-drawn carriages and coaches, has been connected with automobile manufacturing concerns for the last fifteen years.

Beginning with the first of January Rolls-Royce is to enter on a season of expansion in production and selling.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

During the past week the tendency in the call money market was toward firmness, quotations remaining at 4½ per cent to 6 per cent as in the previous week. The rate quoted for fixed-date maturities from 60 days to 6 months remained unchanged at 5 per cent to 5½ per cent, all industrial loans being negotiated at ¼ of 1 per cent lower. Prime commercial paper remained unchanged at 5 per cent to 5½ per cent.

The Federal Reserve statement as of Dec. 14, 1921, showed that the cash holdings of the Reserve System have passed the 3-billion mark for the first time in its history. During the past week the inter-bank borrowings were further reduced. The Atlanta institution settled its entire indebtedness by redeeming \$4,300,000, the total amount of bills held under discount with the Boston bank, while Dallas reduced its indebtedness from \$1,900,000 to \$1,000,000.

The total reserves of the New York institution decreased \$10,865,000, while total bills on hand increased \$7,070,000. Total earning assets increased \$23,121,000 and total deposits \$7,927,000.

On Dec. 9, the directors of the Federal Reserve Bank of Richmond announced a reduction in rates for all classes of paper from 5½ per cent to 5 per cent. This is the second reduction which the Richmond institution has made this year, the reduction from 6 per cent to 5½ per cent having occurred about three months ago.

One of the most noteworthy features in the week's investment markets was the flotation of an issue of \$55,000,000 50-year 4½ per cent corporate stock of the city of New York to refund part of its floating debt. This offering was made to the public on approximately a 4.25 per cent basis. This borrowing marks the first long-term borrowing which the city has made in more than four years and the price at which the issue was sold to the bankers, 103.407, was the highest the city has ever received for similar issues.

Further evidence of the demand of the investing public for prime securities, even of short-term maturities, was shown by the fact that subscriptions to the offering of \$250,000,000 of 4½ and 4½ per cent Treasury Certificates of 6 months and 1 year maturity aggregated more than \$1,000,000,000.

## SPLITEX MAKES ASSIGNMENT

RACINE, WIS., Dec. 19—The Splitex Radiator Mfg. Co., manufacturer of passenger car, truck and tractor radiators, has made an assignment in favor of creditors. Richard G. Harvey has taken charge as trustee and after completing inventory will offer the assets for sale. The concern was incorporated in 1918 with \$150,000 capital, and in 1919 built a new plant, which for six months has been operating at minimum production.

## INDUSTRIAL NOTES

**Cogswell Manufacturing Co.**, maker of automobile parts, is enlarging its plant at Springfield, Mass.

**Auto Metal Body Corp.**, Springfield, Mass., is operating its plant at full capacity to fill rush orders for bodies for Hupmobile cars.

**Hoover Body Co.**, York, Pa., has established a direct factory sales branch at the northeast corner of Webster Avenue and Boulevard, Long Island City.

**Robert H. Hassler, Inc.**, of Indianapolis, an Indiana corporation, has been granted a charter in Wisconsin. A branch has recently been opened in Milwaukee in charge of I. M. Cornelius as manager.

**Farmers' Sales Co.** has been organized in Lansing, Mich., by John H. Chapman to distribute Durant cars in Lansing and the four adjacent counties. The company will occupy the sales building which has been built at the plant.

**Chadwick DeLamater Corp.**, 623 West Twenty-third Street, New York City, has been appointed distributor by the Timken-Detroit Axle Co. of its axle parts. It will serve the metropolitan territory. The company is also distributor of Continental Motor parts.

**Diamond Hofast Rubber Co.**, tire manufacturer, will complete its new factory in Atlanta and be ready for operations by Jan. 1, 1922, officials of the company announce. The factory is being built on an 11-acre tract, the main unit occupying a site 80 by 200 feet. Production will be greatly increased.

**International Harvester Co.** Akron plant is rehiring several hundred of its former employees. Effective Jan. 1 the company will go on a production basis of five speed trucks and 40 tractors a day, officials report. Indications are that spring orders will necessitate a substantial increase in this schedule.

**Wilson Foundry & Machine Co.**, the Willys subsidiary at Pontiac, will reach a production of 150 Knight engines by Feb. 1, instead of 75 daily by March 1, as was originally scheduled. Machinery will all have been shipped from Elyria this week and production will start on the engines early in January.

**Pan American Motors Co.** directors, Decatur, Ill., have voted to dissolve the corporation. A meeting of the stockholders has been called for Jan. 17 to ratify this action. It is stated that the corporation is solvent but has been affected by the business depression and that money will be saved the stockholders by winding up the company's affairs now.

**Alfred J. Tank**, secretary and treasurer of the Wisconsin Gear & Axle Co., Wauwatosa, suburb of Milwaukee, is one of the incorporators of the Milwaukee Parts Corp. of Wauwatosa, organized to manufacture, buy and sell axle castings, tools, machinery and mechanical appliances of all descriptions. The other incorporators are John L. Michalski and Louis Schieble, Milwaukee.

**C. R. Wilson Body Co.**, Detroit, has purchased the painting and trimming plant of Henry E. Hund Co., which will place the company in a position to furnish automobile bodies complete. All construction work will continue to be centralized in the main plant, but the painting and trimming operations will be done at the newly acquired plant. Henry E. Hund will remain in charge under the Wilson management.

**Stewart Storage Battery Co.** has been incorporated at Marshfield, Wis., with \$125,000 capital stock to manufacture and deal in storage batteries, supplies, etc. The business was established about eight months ago by P. A. Stewart, a veteran battery manu-

facturer, in association with local capital. The factory has been in production about four months and is steadily increasing its working schedules to catch up with unfilled orders.

**States Oil Co.** of Louisville has been purchased by the Ohio Refining Co. of Cincinnati for \$250,000. The business of the local concern is to be carried on as formerly by the new owners. The tangible assets of the States Oil Co., which operates thirty-five filling stations in Louisville and a distributing station in Memphis, are estimated to be worth \$300,000. A. Mathis, president of the company, becomes a director of the Ohio Refining Co.

**Commonwealth Motor Co.**, Rockdale, Ill., is employing 100 men on night shifts due to increased orders. A contract signed with a Chicago taxicab company will extend over a period of five years. All necessary cars and accessories will be supplied by the Rockdale plant and it is planned to centralize the body, trim and paint shops there. Production during the last year has averaged two cars a day. This schedule it is planned to increase to three a day in 1922.

**Midwestern Tractor Wheel Co.** is establishing a plant at Amherstburg, Ont., and expects everything to be in readiness for operations by July 1, 1922. The plant will employ 450 men and will have a capacity of 150 sets of wheels. The company is capitalized for \$1,000,000. The officers are E. Edminston, president; T. H. Fox, first vice-president; Charles A. Cuddy, second vice-president; J. G. France, treasurer; A. E. Carpenter, secretary. H. H. Lane is an additional member of the board of directors. The production manager and chief mechanical engineer is Glen J. Walker, long associated with automobile factories in the United States.

## Robinson Is Chosen Head of U. S. Tractor Company

MENASHA, WIS., Dec. 20—J. M. Robinson, formerly president and general manager of the Rumley Products Co., has been elected president of the United States Tractor & Machinery Co. He has had long experience in all branches of the implement and tractor industry.

Robinson was first recognized in the commercial world when he was made sales manager for Ohio by the Milwaukee Harvester Co., of which he later became general manager. When this company was merged with the International Harvester Co., Robinson was made divisional manager. At the time C. S. Funk assumed charge of the Rumley company, he selected Robinson as president and general manager, in which capacity he served until he was appointed general sales manager of the Acme Harvesting Machine Co. His next position was general manager of the D. M. Sechler Implement & Carriage Co. of Moline. Robinson was with the International Harvester Co. in the days when the first gasoline farm tractors were developed.

## PREMIER HEARING POSTPONED

INDIANAPOLIS, Dec. 20—Judge Anderson has postponed the hearing on the application for a receiver for the Premier Motor Corp. V. A. Whipple reports that reorganization plans are progressing and hopes to have some definite statement on this subject within a short time.

## Foreign Inquiries Show Good Volume

### Conditions in December Further Dissipate Pessimism Among Export Managers

NEW YORK, Dec. 20—Foreign orders and inquiries are being received this month in good volume by numerous companies in the Detroit district, to judge from the statements made there last week during the visit to that city of Gordon Lee and William I. Irvine of the automotive division of the Bureau of Foreign and Domestic Commerce and George F. Bauer, foreign trade secretary of the National Automobile Chamber of Commerce. November export business was either equal to or somewhat higher than that enjoyed in October and the pessimism that was so widespread among export managers and executives has been largely dissipated, Bauer stated here to-day.

"The companies which have gone after foreign trade are receiving numerous orders and inquiries," Bauer declared. "Others, of course, are not so fortunate but it is plainly indicated that American manufacturers, through concerted efforts can develop a large demand for automotive products in foreign countries. The improved exchange situation and the generally better tone to all business are responsible for the present status of our export trade."

The trip to Detroit was made by Lee, Irvine and Bauer in order to acquaint the trade with the efforts of the new division of the Commerce Bureau. Conferences were held with a number of export managers and a well attended luncheon was held at one of the Detroit clubs. The export managers, according to Bauer, were keenly interested in plans for financing their foreign trade and this will be made a special subject at the meeting to be held here during show week.

Lee visited several other cities in Michigan and Ohio during his westward trip and Irvine went also to St. Louis to effect contact with manufacturers there.

## Italian Automotive Plants Show Increased Activity

WASHINGTON, Dec. 19—Increased activity was noted during the past month in the automotive factories of Italy, according to a cablegram received by the Bureau of Foreign and Domestic Commerce from its commercial attaché at Rome.

The Ansaldo Co., one of Italy's largest industrial corporations, is reported to be in financial difficulties, arising from over-expansion previous to the recent collapse of business. The cable reports, however, that a banking syndicate, with a capital of 600,000,000 lire, has been formed to take over part of the Ansaldo stock.

The general economic situation in Italy is said to be undergoing a gradual improvement that takes in most manufacturing and industrial lines.

## MEN OF THE INDUSTRY

Arthur F. Linneman, Elgin, Ill., has been elected a director of the Duty Motor Truck Corp.

E. M. Eshnaur, formerly connected with the Baker Lockwood Mfg. Co., has been appointed Pacific Coast representative of the Pennsylvania Plaston Ring Co., Cleveland.

E. W. Goodwin, body designer, has joined the engineering department of the Maxwell-Chalmers companies. He was formerly a body engineer with Cadillac and later with Packard.

Roger W. Angstman has been appointed sales manager of the automotive division of the Liggett Spring & Axle Co. of Monongahela, Pa., with offices in the General Motors Building, Detroit.

Louis C. Block, president of the Philadelphia Automobile Trade Association and until a year ago branch manager of the Ford Motor Co. in that city, will handle the new Gray car in the Detroit territory.

Edwin Allan Lightner, who has been western Connecticut sales manager for the B. F. Goodrich Rubber Co. at New Haven, has been appointed eastern district manager of the Republic Rubber Co. with headquarters in New York.

Roy D. Hartz has been appointed general sales manager of the Leach Biltwell Motor Car Co. For a number of years Hartz was associated with the Premier Motor Co. and the Hupp Motor Car Co. He was sales manager for the Moreland Motor Truck Co. of Los Angeles for a considerable period and more recently was general manager of the Lynn C. Buxton Motor Co. of Los Angeles.

Homer V. Hawk has resigned as general purchasing agent of the Willys-Overland Co., with which organization he has been associated for the last twelve years. The work of his department will continue to be under the direction of M. P. Cromling, formerly of the Buick company, who joined Willys-Overland interests in 1920 and whose headquarters have been at the executive offices of John N. Willys in New York City.

Albert U. Wildman has been appointed manager of manufacturing of the Cadillac Motor Car Co. to succeed George H. Layng, who has resigned. From 1910 to 1914 Wildman was treasurer and general manager of the Auto Parts Mfg. Co. and in the latter became associated with the Cadillac company as a superintendent. During the war he was engaged in the production of Liberty motors for the government and in 1919 returned to Cadillac as assistant manager of manufacturing.

Edwin B. Tozier has been appointed district manager of the Republic Rubber Corp. for the Chicago territory. Tozier was connected for a number of years with the Diamond Rubber Co. as manager of the Cincinnati and Minneapolis branches. In 1912 he became affiliated with the United States Tire Co. and served as district manager at both the Minneapolis and Chicago branches. Following this connection he became general sales manager of the General Tire & Rubber Co.

Orville E. Truesdell, for the past five years manufacturer's representative of the Firestone Steel Products Co., has joined the Bimel Spoke & Auto Wheel Co. as secretary and sales manager. L. P. Sims, secretary and treasurer, has resigned to engage in business in Los Angeles. Ollie V. Garrison, until recently purchasing agent for the Service Motor Truck Co., has been appointed assistant to the president of Bimel Spoke, his duties also placing him in charge of purchases.

G. W. Mason has joined the Maxwell and Chalmers companies as assistant to Vice-President W. Ledyard Mitchell. Mason has been associated with Studebaker and Dodge Brothers and the Wilder Tanning Co. in production work and was assistant in production and purchasing to the general manager of the American Auto Trimming Co. He has also been manager of the business extension department of the Irving National Bank in New York.

Designer of Northway  
Truck and Car Resigns

BOSTON, Dec. 21—Ralph E. Northway has resigned as vice-president and director of the Northway Motors Corp. of Boston and Natick, Mass. He was the designer of the truck and car which bears his name.

The Northway Motors Corp. has listed the right to its exclusive use of the name Northway as its most valuable asset.

Northway himself has been associated with the automobile industry for many years.

Doughty Will Exhibit  
Air-Cooled Car at Show

DETROIT, Dec. 20—Plans for the manufacture in Detroit of a new car with an air-cooled engine by a corporation in which W. J. Doughty, for years the Franklin distributor in Detroit, is to be a prominent figure, are being hurried to completion so that the car may make its appearance early in 1922.

Its first showing will be at the Detroit show. The car will sell in the \$1,000 class and will weigh about 1500 lb. The wheelbase will be about 110 in. Doughty recently resigned the Franklin franchise to devote his entire attention to the development of the new car.

## EARL ANNOUNCES SCHEDULE

JACKSON, MICH., Dec. 21—The Earl Motors, Inc., during the holiday period, Dec. 23 to Jan. 3, will install needed machinery in its plant here. It is planned to build 1000 cars during January, and this number will be increased to 1200 in February and March. Increased production is expected during the summer as orders are coming in steadily.

## WRIGHT BEARING RECEIVERS

PHILADELPHIA, Dec. 20—Judge Dickinson in the United States District Court has appointed W. B. Stratton of New York and Harry W. Champion of this city receivers in equity of the Wright Roller Bearing Co. The company's assets are placed at \$884,000 and the liabilities at \$529,000.

## GRAY HAS 100-IN. WHEELBASE

DETROIT, Dec. 21—The Gray car, which will be produced by the Gray Motors Co., will have a 100-in. wheelbase, sliding gear transmission, ventilating windshield, self starter and demountable rims. The chassis will be of alloy steel.

## METAL MARKETS

ALTHOUGH the few days that remain of the old year are bound to be featured by the quiet which always characterizes automotive steel demand during the inventory period, a very fair quota of business is in process of negotiation and expected by the steel mills to result in actual sales contracts shortly after the holidays. Passenger car builders are displaying keen interest in quotations for sheets, especially full-finished 22-gage, not only for first but also for second quarter 1922 deliveries. It may be said without fear of contradiction that there is in evidence more willingness on the part of sales managers and purchasing agents to get together than has been the case in a long time.

Especially those steel producers who cater to the wants of the automotive industries are striving to facilitate the placing of orders for deferred deliveries by making their quotations as attractive as present-day costs permit. In the sheet industry, for instance, one notices as energetic opposition to a renewal of inflation among producers as among consumers. Stabilization of prices, permitting of a good backlog of orders, is apparently the aim rather than the artificial and always dangerous upward manipulation of price levels. In fact, the tendency in the steel market appears to be toward price reductions in those commodities in which demand has gained sufficient momentum to warrant hopes of its further expansion under the impetus of reductions.

An illustration of this was furnished by the recent \$5 per ton reduction in the price of steel pipe, for some time one of the most active items in the list of steel products. Somewhat of a similar tendency is noted in the pig iron market, where foundry iron amid somewhat more active demand has declined from the nominal quotation of \$20.50 to the actual one of \$19.50. If Ford has been correctly quoted in the newspapers to the effect that "so long as rails are more than \$40, we shall not buy a rail for the Detroit, Toledo & Ironton Railroad; we'll use the ones we've got until they are worn down to wires before we will pay more than \$27 or \$28," he is following out one policy with reference to his railroad's steel needs and quite another with reference to the Ford Motor Co.'s steel requirements. The latter has been placing orders for steel products right along at much higher prices than would correspond to the \$28 limit set for rails by Ford.

Pig Iron.—Automotive foundries in the Middle West are beginning to inquire for fair-sized tonnages of malleable. The market is easy but cheerful.

Steel.—Automotive inquiries for first quarter 1922 deliveries embrace full-finished sheets, cold-drawn steel bars, cold-drawn wire and alloy steels. Several makers of alloy steels have revised prices slightly upward. Demand for bolts and nuts is in abeyance.

Aluminum.—Several fair-sized inquiries for 1922 shipments are in the market, the tone of which is perceptibly improved. Virgin ingots 98 to 99 per cent pure, are quoted by importers at 17c. to 18c., duty paid, with sellers reluctant to book much forward business at the lower figure of this range. Sheet demand is modest but in the ascendancy.

Copper.—The market is permitted to enjoy a period of rest. Speculative commitments, however, are on the increase.



# Calendar

## SHOWS

- Jan. 7-13—New York, National Automobile Show, Grand Central Palace. Auspices of N.A.C.C.
- Jan. 9-14—New York, Motor Car Body Exposition, Automobile Body Builders Association. Twelfth Regiment Armory.
- Jan. 28-Feb. 4—Chicago, Automobile Salon, Hotel Drake.
- Jan. 28-Feb. 4—Chicago, National Automobile Show, Coliseum. Auspices of N.A.C.C.
- Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.
- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment

Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

- March, 1922—Santiago, Chili, Annual Automobile Show.
- April 16—Mexico City, Annual Automobile Show, Auspices of the Automotive Division of the American Chamber of Commerce.
- April 22-May 1—Prague, Czechoslovakia, Fourteenth International Automobile Exhibit.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.
- Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

- Dec. 20—Philadelphia, American Society of Mechanical Engineers.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.
- Jan. 17-20, 1922—Chicago, American Road Builders Association.
- Jan. 30-31—Chicago, Fifth Annual Convention, N. A. D. A., La Salle Hotel.
- Jan. 30-Feb. 2—Boston, Sixth Annual Conference of the International Delivery Association, Copley Plaza Hotel.
- May 10-12—Philadelphia, Ninth National Foreign Trade Convention of the National Foreign Trade Council.

- June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.
- Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

- Detroit, Dec. 23, Feb. 24, Mar 24, April 28, May 26.
- New York, Jan. 10-13, 1922—Annual Meeting.
- New York, Jan. 16, First Annual Meeting of Advisory Board on Highway Research, Engineering Societies Building.
- Chicago, Feb. 1
- Minneapolis, Feb. 8-9—Annual Tractor Meeting.

## Price Plan Violates Sherman Trust Law

### Supreme Court Hands Down Decision Affecting Conduct of Associations

(Continued from page 1245)

cident to the industries and the commerce of this country.

That the only alternative for the continuation of trade association work such as that carried on by the hardwood producers lies in legislative action, is the opinion of L. C. Boyle of Washington, general counsel for the American Hardwood Manufacturers Association. In his opinion the decision makes it absolutely impossible for industrial groups to study their economic problems and as a consequence "it is a stranglehold upon progress." Attorney Boyle said he probably would ask for a rehearing of the case, but admits that motions of this kind are very rarely granted.

The Government's bill in this case was devoted almost exclusively to the distribution of information through market letters and the acquiring of trade data by means of questionnaires. In the opinion of Justice Clarke, the market letters were not the controlling influence, but the plan whereby statistics were exchanged as to past conditions.

The market letters of which the Government complained were sent to the membership weekly and, as prepared by the manager, discussed various subjects of interest to the trade. The Government insisted that they were devoted principally to conditions affecting production and other elements which control prices. The questionnaires which were sent out were declared by the court to have much to do with future sales and production.

Justice Brandeis and Justice Holmes delivered dissenting opinions. These opinions developed the situation as contended by the industry. Justice McKen-

na joined Justices Brandeis and Holmes.

Delivering the dissenting opinion, Justice Brandeis said:

It may be that the distribution of trade data, editorial comment, and conferences enabled the producers to obtain on the average higher prices than would otherwise have been possible. But there is nothing in the Sherman law to indicate that Congress intended to condemn co-operative action in the exchange of information merely because prophecy resulting from comment on the data collected may lead, for a period, to higher market prices.

He declared that the plan had a tendency to promote desirable competition "by substituting knowledge for ignorance, rumor, guess and suspicion. It tends also to substitute research for gambling and piracy, closing the door to adventure or lessening the value of prophetic wisdom. In making such knowledge available to the smallest concerns, it creates among producers equality of opportunity, making it available also to the purchasers and general public. It does all that can actually be done to protect the community from extortion."

### Justice Brandeis Fears Centralization

Furthermore, Justice Brandeis said:

The refusal to permit a multitude of small rivals to cooperate as they have done here in order to protect themselves and the public from the chaos and havoc wrought in their trade by ignorance, may result in suppressing competition in the hardwood industry. Keen business rivals, who sought through cooperative exchange trade information to create conditions under which alone rivalry and competition is possible produced in the aggregate about one-third of the hardwood lumber of the country.

Justice Brandeis directed attention to the decision of the court in the steel corporation case in which it was held "that it was not unlawful to invest in a single corporation control of 50 per cent of the steel industry of the country and in the United Shoe Machinery case where the court held it was not unlawful to vest in a single corporation control of practically the whole shoe machinery industry." Justice Brandeis fears that the decree will lead to consolidation and centralized control of industries.

## Willys Receivers Working Out Plans

### Reduce New York Office Staff—Sale of Chrysler Plant Pending

NEW YORK, Dec. 20.—C. O. Miniger, who is one of the receivers for the property of the Willys Corp. in all districts, has held conferences with his co-receivers and plans are being worked out rapidly for the continuance of operations on an economical basis. Inasmuch as the affairs of the corporation are now exclusively in the hands of receivers, it has been found possible to dispense with the services of most of the office staff at the executive headquarters in New York. Those who have retired include D. J. Welch, who has represented the bankers as treasurer of the company.

No announcement has been made as to plans for the sale of the Chrysler plant at Elizabeth which probably will include the Chrysler car upon the development of which \$1,500,000 has been spent. It is understood, however, that negotiations are now pending.

Miniger and his co-receivers have designated C. R. Burt, president and general manager of the New Process Gear Corp. as their manager for the property within the northern district of New York. Business in the Syracuse plant will be continued as usual except that operations will be expanded rather than contracted. The same probably will be true in the Electric Auto-Lite plant at Toledo. It is significant that on the trip to Syracuse the receivers were accompanied by Arthur W. Loasby, a vice-president of the Equitable Trust Co. of New York and a member of the bank creditors' committee.

### CULTIVATOR CREDITORS SUE

OSHKOSH, WIS., Dec. 19—An involuntary bankruptcy petition has been filed by three local creditors against the International Motor Cultivator Co.

# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

Vol. XLV  
Number 26

PUBLISHED WEEKLY AT 239 WEST 39th STREET  
NEW YORK, DECEMBER 29, 1921

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# AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XLV.

NEW YORK—THURSDAY, DECEMBER 29, 1921

No. 26

## Crude Petroleum Survey Shows Need for Fuel Conservation

Mexican production, 20% of U. S. consumption in 1920, is falling off. Domestic consumption has not kept pace with demands. Automotive industry has definite duty in research and conservation. Here is a survey of 1921 and an evaluation of the future.

By Joseph E. Pogue\*

THE importance to the automotive industry of an adequate commercial supply of crude petroleum is obvious. Automotive transportation has grown to such tremendous proportions that even those who are closest to this field find difficulty in visualizing its ramifications; and yet this vast structure is absolutely dependent upon the flow from about 270,000 oil wells in this country and about 300 wells in Mexico, every one of which has a natural tendency to decline in output. What are the prospects that new wells may be drilled in sufficient numbers to support the normal growth in automotive fuel requirements? This is a pertinent question, for each year a growing number of successful new wells must be completed merely to compensate for the decline in the production of old wells, and after this is accomplished an additional quota of new wells is prerequisite to any increase in aggregate output. Moreover, the Mexican wells, which in 1921 produced nearly half as much petroleum as was raised to the surface in the United States, are rapidly being destroyed by the invasion of salt water. Should the Mexican supply fail, or even decline sharply, a supply that in 1920 filled 20 per cent of our petroleum needs and 9 per cent of our gasoline requirements, a still

greater burden would fall upon our domestic oil fields and it would be questionable whether the full requirements of our ten million motor vehicles could be met without considerable readjustment.

In 1921 the United States produced approximately 465,000,000 barrels of crude petroleum, imported about 120,000,000 barrels, and consumed about 516,000,000 barrels. These figures, though striking in magnitude, carry little significance if viewed for a single year. It is far more important to know the rates at which these items have been growing and to compare these rates of increase with one another. The problem is dynamic, not static.

A comparison of the production of crude petroleum in the United States with the quantity of crude petroleum imported into this country is afforded by Fig. 1 for the 9-year period, 1913-21. The data are plotted on a ratio scale in order that the slopes of the curves may be proportional to their percentage changes and hence directly comparable. Then the trend of production and the trend of imports are determined by fitting straight lines to the data by the mathematical method of least squares, and these trend lines entered on the chart. The trend lines may be looked upon as the "normal" course of the items, around which the actual figures fluctuate from year to year.

\*Consulting engineer, New York.

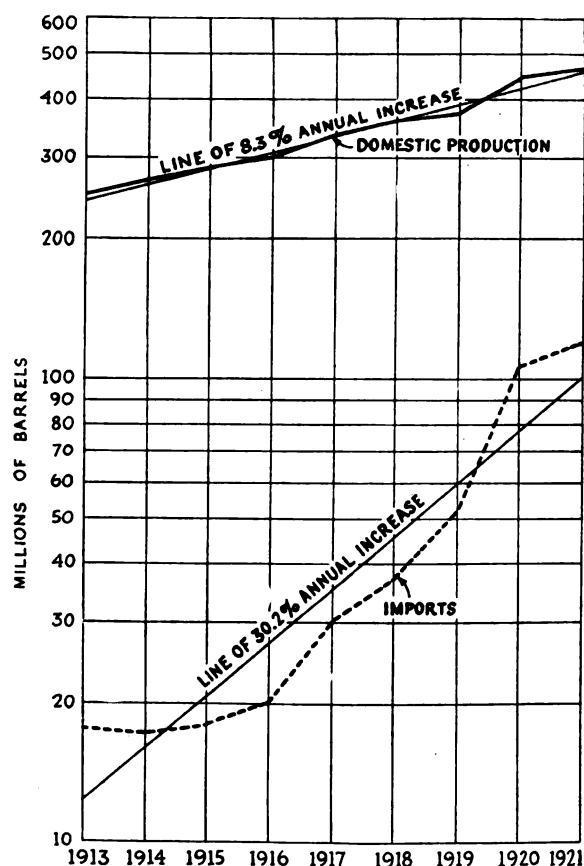


Fig. 1—Trend of domestic production and imports of crude petroleum in the United States by years, 1913-21

The trend is shown in the following table:

Year	(Relative to 1913)						
	Domestic Production, Million Bbls.	Imports, Million Bbls.	Domestic Consumption, Million Bbls.	Imports in Per Cent of Domestic Consumption	Domestic Production	Imports	Domestic Consumption
1913 ..	248	17.8	262	6.8	100	100	100
1914 ..	266	17.2	261	6.6	107	97	100
1915 ..	281	18.1	273	6.6	113	102	104
1916 ..	301	20.6	319	6.5	121	116	122
1917 ..	335	30.2	378	8.0	135	170	144
1918 ..	356	37.7	413	9.2	143	212	158
1919 ..	378	52.8	418	12.6	152	297	160
1920 ..	443	106.0	531	20.0	179	596	203
1921 <sup>1</sup> ..	465	118.0	516	22.8	187	663	197

<sup>1</sup>Estimated.

It is apparent from Fig. 1 that the average increase in the domestic production of crude petroleum during the period shown was 8.3 per cent, while imports increased at the much faster rate of 30.2 per cent. This disparity in growth is strikingly shown by the rapid convergence of the two trend lines on the chart. If we bear in mind that the curves follow the compound interest law, with rates of 8.3 per cent and 30.2 per cent respectively, compounded continuously, we gain some idea of the remarkable degree to which these items have been advancing, particularly imports.

This method of analysis measures accurately the *tendency* of the items, but cannot give assurance that the trends will continue in the future as they have in the past. The rational deduction would rather be that such phenomenal rates of increase must of necessity slow down. Should imports, for example, continue to 1930 at the rate of 30.2 per cent, this country would then be receiving from abroad the incredibly large total of one billion barrels per annum! Such a volume of

imports, needless to say, is not to be expected, and the calculation is given merely to show how inordinately our dependence upon imported petroleum has been recently growing.

Having observed the trend of the supply of crude petroleum, we may turn next to certain aspects of demand. Fig. 2 shows, on a ratio scale, domestic production of crude petroleum compared with consumption and with price. The data, as in the first instance, have been plotted and then fitted with trend lines by the method of least squares; that is to say, through each curve has been drawn a straight line which expresses the general trend or direction of the curve more closely than any other straight line that might be constructed. It is apparent at once that consumption has been increasing at the rate of 10.4 per cent a year, thus outdistancing domestic production with its rate of 8.3 per cent. We now have an accurate measure of the growth of production and consumption, and it will be clear that the greater growth of consumption as compared with production has been sustained only by virtue of a still greater rate of increase in the growth of imports.

The rapid growth in the consumption of crude petroleum in the United States may be strikingly visualized by reducing the figures to a per capita basis, as shown in the following table and expressed graphically in Fig. 3:

Year	Barrels per person	Year	Barrels per person
1909 .....	1.84	1916 .....	3.19
1910 .....	2.07	1917 .....	3.70
1911 .....	2.25	1918 .....	3.99
1912 .....	2.52	1919 .....	3.98
1913 .....	2.72	1920 .....	4.98
1914 .....	2.67	1921 <sup>1</sup> .....	4.57
1915 .....	2.75		

<sup>1</sup>Estimated.

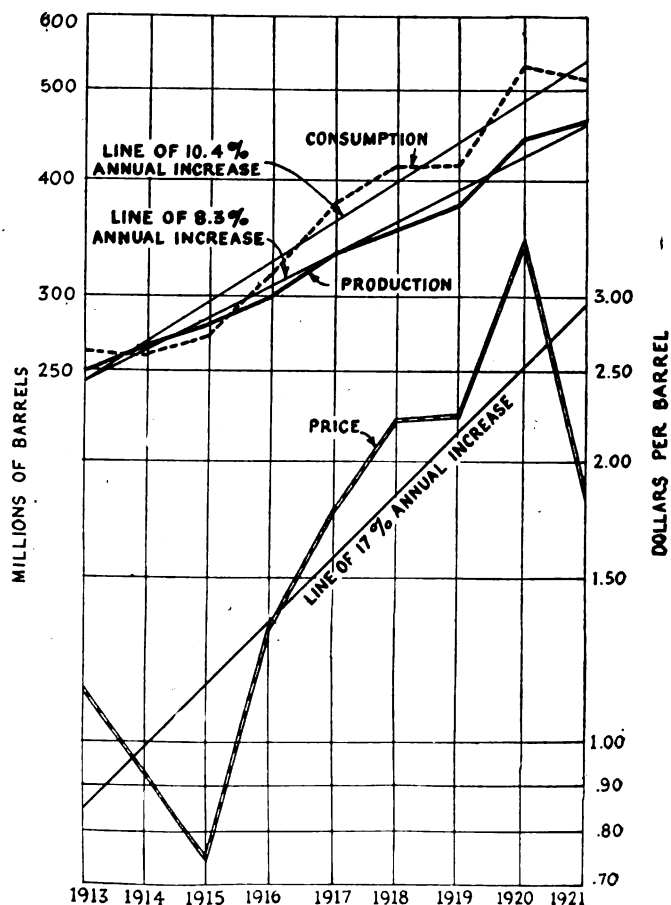


Fig. 2—Trend of domestic production, consumption, and average price of crude petroleum in the United States by years, 1913-21. Note especially the different rates of increase of the three items



Coupled with the enlarging disparity between domestic production and consumption, the price of crude petroleum has been advancing, as also shown in Fig. 2. The price curve represents the weighted average price of crude petroleum in the United States. The trend of this item, as determined by the method of least squares, indicates an average increase of 17 per cent a year. Closer examination of the price curve reveals the extent to which the price of crude petroleum receded in 1921, when it fell about the same degree below "normal" as it did under quite similar circumstances in 1915. The 1921 drop in price was contemporaneous with a decline in consumption and a slowing up in domestic production. In addition to the trend relationships of the three curves of Fig. 2, the detailed variations show a consistency that is interesting and significant, the three tending to accelerate or decelerate in unison.

We have now had, perhaps at the risk of some tedium, an accurate measure of the rates of growth of the principal factors entering into the supply of crude petroleum. Again, it should be emphasized that the differences in the rates of growth of the several factors are fundamentally important and give a valuable clue to the developments that lie ahead.

Reverting to the price of crude petroleum which, as we have seen, has increased 17 per cent a year, on the average, over the past nine years, the question naturally arises as to whether this advance is merely a part of the general increase in prices or represents a fundamental increase as compared to the general price level. This is an important question, because if crude petroleum is really becoming more costly as compared with other commodities, that fact will have an important bearing upon automotive transportation. To arrive at an answer to this question, the actual price of crude petroleum was corrected for the variation in the pur-

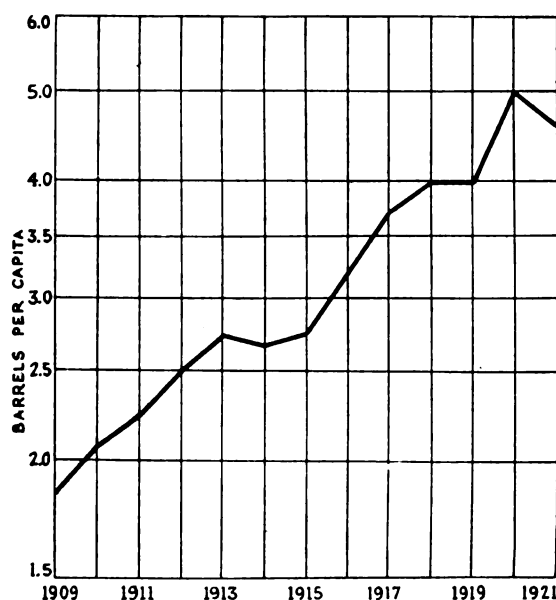


Fig. 3—Per capita consumption of crude petroleum in the United States by years, 1913-21

chasing power of the dollar and a new price in terms of 1913 dollars arrived at.

The course of the actual price, together with a curve of this relative price is given in Fig. 4, where it will be seen that the price as expressed in 1913 dollars has an unmistakable upward trend over the sixteen-year period shown. By fitting a straight line to the price as expressed in 1913 dollars, using the method of least squares, the trend of this item is determined to be upward at the rate of 3.5 per cent a year, compounded continuously. We thus arrive at a measure of the funda-

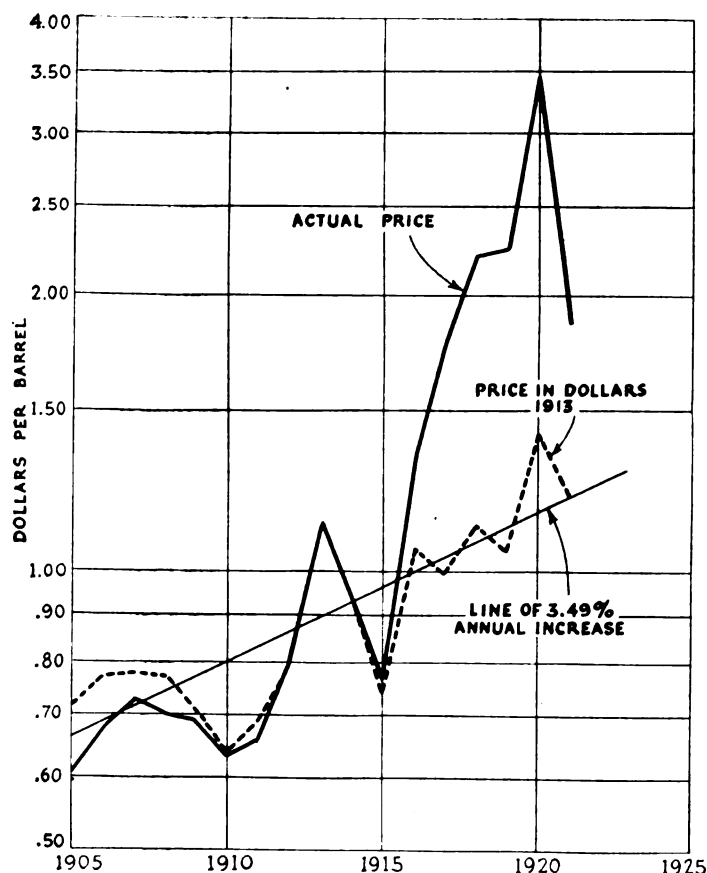


Fig. 4—The actual average price of crude petroleum in the United States compared with the deflated price as expressed in 1913 dollars, by years, 1905-21

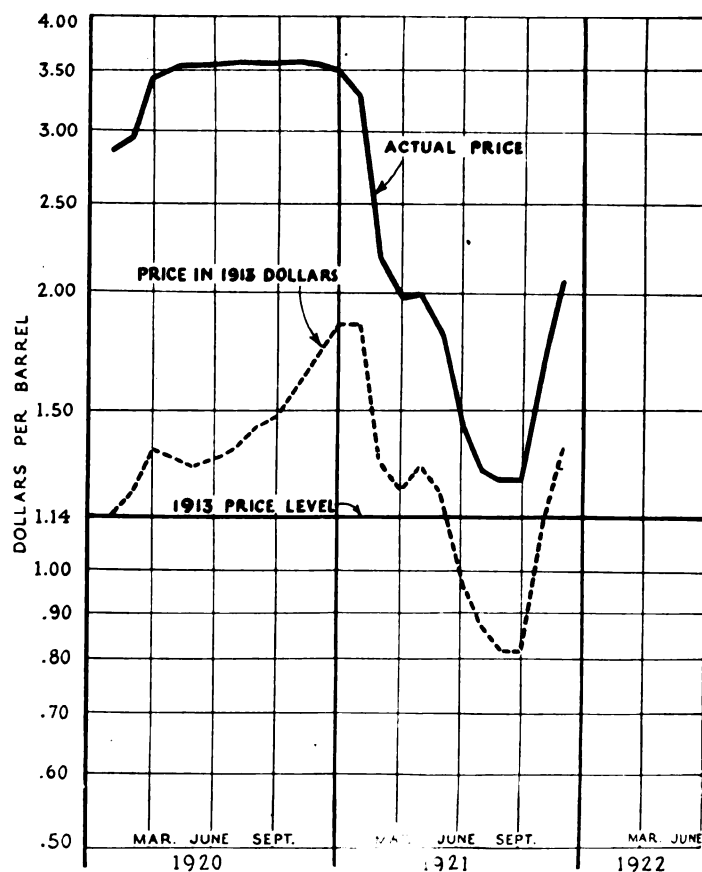


Fig. 5—The actual average price of crude petroleum in the United States compared with the deflated price as expressed in 1913 dollars, by months, 1920-21

mental upward trend of the price of crude petroleum, upon which is superimposed an additional advance by virtue of the upward move in the general price level.

#### Average Prices

Year	Average Price of Crude Petroleum. In actual Dollars	Average Price of Crude Petroleum. In 1913 Dollars	Year	Average Price of Crude Petroleum. In actual Dollars	Average Price of Crude Petroleum. In 1913 Dollars
1905 ..	.61	.72	1913 ..	1.14	1.14
1906 ..	.68	.77	1914 ..	.93	.93
1907 ..	.73	.78	1915 ..	.75	.74
1908 ..	.70	.77	1916 ..	1.33	1.07
1909 ..	.69	.71	1917 ..	1.77	1.00
1910 ..	.63	.64	1918 ..	2.22	1.13
1911 ..	.66	.69	1919 ..	2.25	1.06
1912 ..	.80	.79	1920 ..	3.44	1.42
			1921 ..	1.86	1.20

<sup>1</sup>Estimated.

This fundamental upward trend is to be attributed to the increasing cost of maintaining our domestic production through deeper wells and enlarging field activities. This residual price trend, it may be added, offers a scientific means for forecasting the minimum price advance that may be expected in the future, although a shortage in supply would accelerate the rise from such a minimum.

The deflated price of crude petroleum will repay further study. Accordingly the actual and deflated prices are plotted by months over the past two years, as shown in Fig. 5. The curve representing actual price depicts the price history of crude petroleum during 1920 and 1921, showing clearly the high level reached in 1920, the precipitous decline suffered during the first half of 1921, and the sharp upward reaction that characterized the fourth quarter of the year. The curve representing

remarkable rate of increase in imports from Mexico. Such is the balance between the major factors in supply. Had it not been for the prolific oil-pools of Mexico, either our supply of crude petroleum would have already fallen short of requirements, or else domestic fields would have been forced to higher productivity under the impetus of a higher price level. These alternatives, neither wholly satisfactory to the automotive industry, lead us to the crux of the situation—the impending decline in imports owing to the rapid exhaustion of the proven oil-pools of Mexico. An appraisal of this factor requires a careful examination of the evidence as regards the condition of the Mexican fields.

In 1920 Mexico produced 24 per cent of the world's output of crude petroleum, or 37 per cent of the production of the United States, with slightly greater proportions in 1921. Most of the Mexican output is consumed in the United States, and the relative importance of this increment is indicated by Fig. 6, which shows our consumption of crude petroleum over the past nine years divided into the part contributed by domestic fields and the part supported by imports from Mexico.

Practically all the oil thus far produced in Mexico has come from a restricted zone on the Gulf Coastal Plain, a few miles inland from Tampico and Tuxpam. The productive area (see Fig. 7) is divided into the Northern Field, yielding heavy crude almost devoid of gasoline, and the Southern Field, producing light refinable crude with about a 12-15 per cent gasoline content. The Northern Field has been producing about one-quarter of the total output of the country; the Southern Field, about three-quarters. Each field comprises a number of individual oil-pools, as shown in Fig. 7.

The oil occurs under remarkable geological conditions, without parallel elsewhere in the world. It occupies porous and cavernous portions of a limestone formation in proximity to intrusive masses of igneous rock and rests upon a salt water table under artesian head. In consequence, when a pool is tapped, the productivity of the well is phenomenal, but its life under unrestricted flow is apt to be relatively short and finally the water level rises and the well ceases to produce oil, but instead becomes an artesian well. These conditions have enabled the producer to deplete through a few wells and within a brief period of years a reserve of oil that under ordinary conditions would have required thousands of wells and several decades to exhaust. The Mexican pools to date have produced about 700 million barrels of crude petroleum, and there are probably about 200 to 300 million barrels of proven oil still remaining to be produced, not counting future developments and discoveries.

But, here again, the fundamental question is not a matter of magnitudes, but of rates. This distinction cannot be stressed too strongly. The question is not how much oil we are going to recover eventually, but how rapidly we are going to get it. This has been the controlling factor so far and bids fair to continue so.

The salt water, which underlies the oil in the Tampico-Tuxpam area, is rapidly encroaching upon the productive oil-pools. During 1921 many of the pools became extinct, some with sensational suddenness. So far the aggregate output of the country has not fallen to a degree suggested by these events, since a decline in some of the pools has been partly compensated by an increase in productivity of the less exhausted deposits. So large are the individual wells that a given pool may be made to produce with almost unbroken intensity up to the very end—a condition in marked contrast to the performance of pools in the United States which display a prolonged period of declining output before exhaustion.

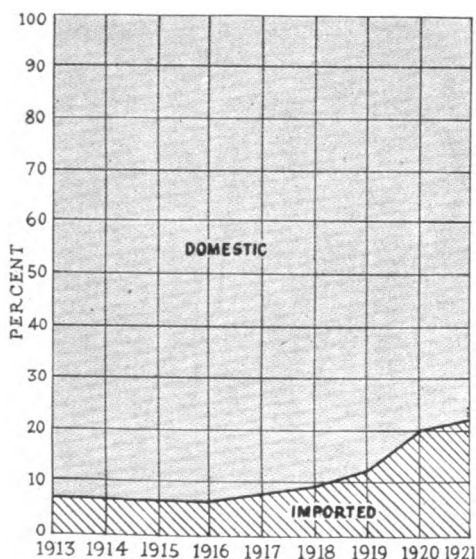


Fig. 6—Percentage analysis of the consumption of crude petroleum in the United States by years, 1913-21, showing the ratio of the imported to domestic supply

deflated price brings out certain additional features, especially the growing resistance experienced in 1920 in holding up against the decline in the general price level and the amazingly low level reached in August and September of 1921.

The analysis to this point may be summarized: A rapidly mounting consumption of crude petroleum in the United States has been supported by (a) a marked, but less rapid, increase in domestic production, (b) a rising price level for domestic petroleum in the course of exploiting deeper and more extensive pools and (c) a

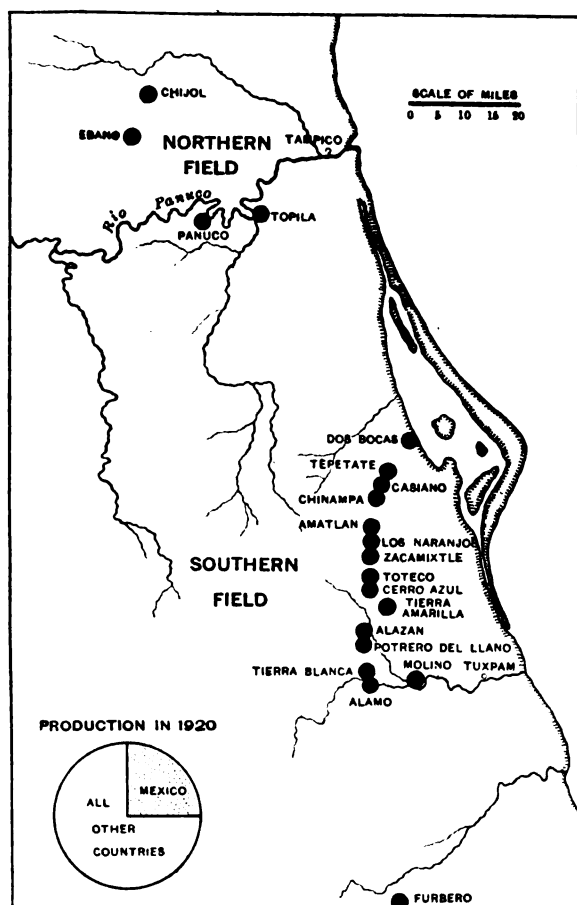


Fig. 7—Sketch map showing the location of the important proved oil-pools of Mexico. Many of the pools shown are extinct. (After Pogue, *The Economics of Petroleum*)

The seriousness of the situation in the Mexican oil-fields may be perhaps most convincingly conveyed by a series of quotations from informed individuals who have publicly expressed themselves on the subject.

In March, 1921, Ralph Arnold, a well known petroleum engineer, stated in *Mining and Metallurgy*, a publication of the American Institute of Mining and Metallurgical Engineers:

"Mexico is now producing at the rate of about 600,000 bbl. per day; approximately two-thirds of this is coming from Los Naranjos, a pool which will probably be extinct by early summer on account of the encroachment of salt water. If the present rate is maintained throughout the year, 1921 will see about 220,000,000 bbl. of oil brought to the surface in Mexico, or about one-half the probable production of the United States for the year. But Mexico's proven reserve is less than twice this amount, hence, at the present rate of production, the latter part of 1922 will see the end of the proven big fields in Mexico. There is little wildcatting going on in Mexico now, probably not over 25 strictly wildcat wells now being actively drilled outside the main producing district. Whether it is 1½ years or 2 years, or even a little longer or a little less before the break comes, it is certain to come."

In September, 1921, L. G. Huntley and Stirling Huntley, two petroleum geologists, published an article in *Mining and Metallurgy*, in which they described the salt water flooding of the Mexican pools, but expressed the opinion that a reduced yield could be maintained for several years until new fields in Mexico could be developed.

"...after all the southern pools have been flooded," they stated, "there will still be a production in the Mexican fields of 250,000 barrels per day at the end of 1000 days from July 1, 1921 (Dec. 1, 1924) on the assumption that the new drilling in the Panuco River field increases

production....It seems probable that the present fields will continue to produce oil in large quantities during the time necessary to carry on prospecting for additional pools....However, the opening up of these new fields will require new roads, railways, and pipe-lines....Costs of producing and operating will be higher than in the past, wells, in general, will be smaller, fields will be more disconnected."

In October Roy H. Flamm, expert, Latin-American Division of the U. S. Bureau of Foreign and Domestic Commerce, published in *Commerce Reports* a detailed compilation on the petroleum industry in Mexico, in which he said:

"The older fields of Mexico will continue to give oil for a considerable time to come, but such production probably will be increasingly smaller from the peak of 1920-21. Many of the wells now being developed in the Amatlan pool show tendencies to develop salt water more rapidly than heretofore."

Later on in the article Mr. Flamm apparently contradicts his earlier conclusion in stating:

"The present fields in Mexico will continue their large production for a sufficient time necessary to develop known areas and to wildcat less known territory." He adds: "It is expected that the cost of production and operation in the future will be higher than in the past, due to the fact that the wells will be smaller, the fields more disconnected, taxation higher, and Government regulations more stringent."

In an address before the annual meeting of the American Petroleum Institute in Chicago on Dec. 8, Harry F. Sinclair, chairman of the Board of Directors of the Sinclair Consolidated Oil Corporation, said:

"We are told that the Mexican fields are doomed. It must be admitted that the situation there is serious, but although I personally believe that the Mexican produc-

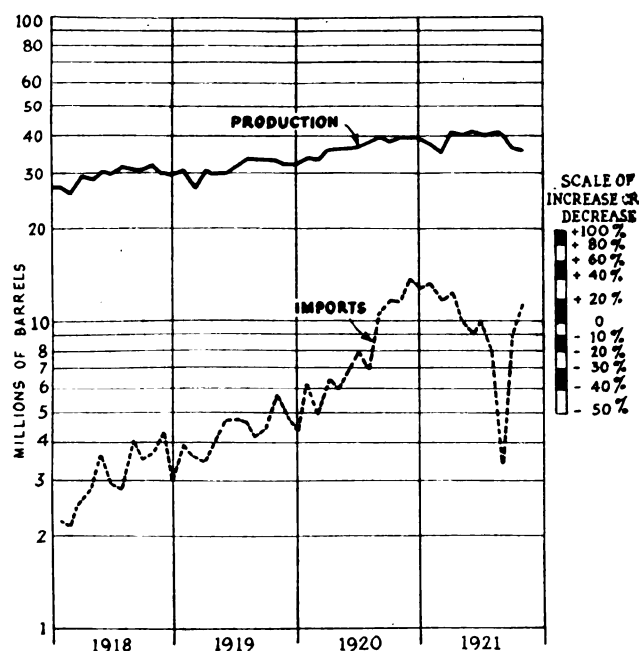


Fig. 8—Current trend of domestic production and imports of crude petroleum in the United States by months, 1918-21

tion will be as great ten years from now as it is to-day, we cannot safely, as American citizens, disregard the possibility that the Mexican production may fall to an insignificant total, at least temporarily, and that Mexico may disappear as a real petroleum factor until new Mexican fields are discovered."

"Mexico, last year, produced 23 1-3 per cent of the world's total production of petroleum. If Mexico drops out, what will be the effect on the petroleum situation? What will be the effect on the United States? Can

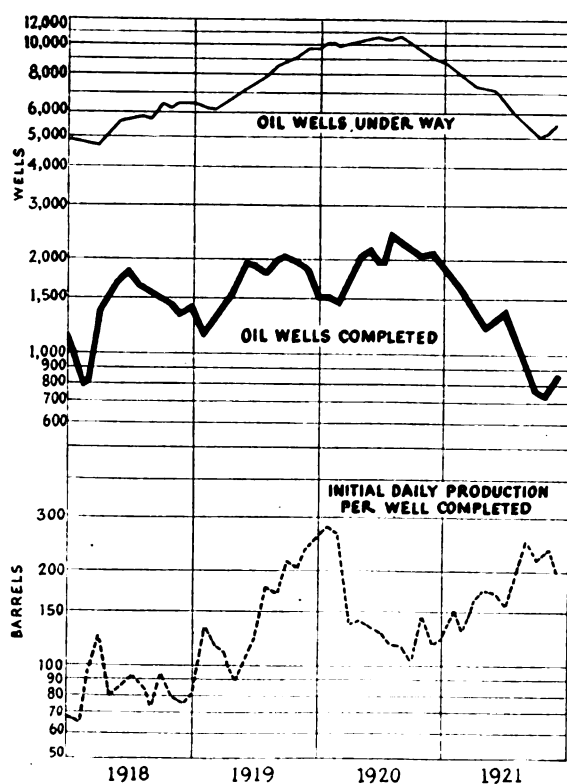


Fig. 9—Trend of oil-field activity in the United States (exclusive of California) by months, 1918-21

you cut off a quarter or a fifth of the world's production without placing a strain upon the petroleum market of the United States?"

"A large part of the Mexican production comes to this country. Suppose that source of supply were shut off. Some will point to our large stocks of crude oil in storage. But do you realize that the total quantity of crude oil above ground in this country is only about four months' supply?"

The December number of *The Lamp*, an official organ of the Standard Oil Company of New Jersey, discusses the Mexican oil situation in some detail, stating among other things:

"It is the belief of some producers that districts now yielding about 500,000 barrels of oil a day will be practically exhausted in the latter part of 1922. These are the fields from Tepetate to and including Cerro Azul... all of the oil taken from Mexico to-day has come from big wells, where the cost per barrel has been down to minimum. If Mexico is to continue to figure it will be necessary to assume the heavier cost per barrel of getting oil from small wells. This is not justified by the prevailing margin of profit after paying taxes... Since the prospects of the practical exhaustion of the southern fields has become real, the complications of Article 27 of the Mexican Constitution, together with political unrest and inadequate protection for workers, have effectively limited wildcatting."

In the *Economics of Petroleum*, published in December, the present writer expressed an opinion on the Mexican outlook in these words:

"The output of Mexican petroleum is probably due for a slowing down in the period immediately ahead. If the rate of production of early 1921 is sustained, 1922 may see the end of the proven big fields of Mexico. On the other hand, special conditions may lead to a reduced rate of output earlier and a consequent spread of the remaining supply over a period of years. In either event, new productive pools, either in the Tampico-Tuxpam area or elsewhere in Mexico, can scarcely be developed with sufficient celerity to maintain an unbroken increase in that country's production of petroleum."

The conclusions quoted above, coming both from technical and commercial sources, are perhaps sufficient to indicate that the production of crude petroleum in Mexico at best cannot be expected to increase during the next few years and at worst may fall to a startlingly low level during 1922. It also appears certain that the cost of producing petroleum in Mexico is bound to advance and the flood of cheap Mexican oil which has come upon the American market during recent years will soon be a thing of the past.

What effects will these developments have upon the domestic petroleum situation? Fig. 8, comparing the growth of production and imports of crude petroleum by months during the past few years, should be examined with this question in mind. The significance of a downward trend in imports will then become clearer. One-quarter of our supply of crude petroleum would in that event gradually withdraw its support at a time when our requirements are increasing. Mexico, therefore, holds the possibility, in fact the probability, of throwing a greatly increased burden upon our domestic oil-fields. Let us now examine domestic production with a view to determining its capacity for expansion.

We have previously seen that domestic production during the past nine years has been increasing at the annual rate of 8.3 per cent, compounded continuously, and this rate of increase has been supported by a fundamental increase in price of 3.5 per cent annually over and above an increase due to the rise in the country's general price level. Production statistics are informing in respect to tendencies, but give no assurance of what may be expected in the future; there are data, however, that have usefulness in this direction and these are records of drilling activity as compiled from month to month by certain of the oil journals, notably *The Oil and Gas Journal*.

Fig. 9 brings together in graphic form the more significant of the well data for the oil-fields east of California. The data are plotted by months over the past four years. The most striking feature of the chart is the upward trend of the curve representing the number of oil-wells completed and the notable downward departure from this trend during 1921. If we fit a straight line to the curve representing the number of oil wells completed for the three years, 1918-20, by means of the method of least squares (excluding 1921 because of its obviously abnormal character), we find that the "normal" increase in successful well completions necessary to support our increase in production of 8.3 per cent is 18.2 per cent. In other words, oil-field activity, before the slump of 1921, was speeded up to the phenomenal rate of 18.2 per cent per year and this was only capable of maintaining an increase in production of 8.3 per cent.

Reasoning further along the same line, and for the moment eliminating from consideration variations in the size of new wells, we find that in order to sustain production at its past rate of 8.3 per cent, we should have drilled 28,000 successful wells in 1921 (instead of approximately 14,000), and in 1922 should drill 33,000 wells. As a result of a decline in drilling during 1921 of 50 per cent from "normal," the rate of increase in domestic production has slowed down during the second half of 1921 to approximately 0, that is, production is barely being maintained at an even level. To advance drilling to a total of 33,000 successful wells in 1922, even granted that such expansion could be financed, would not compensate for the momentum lost during the restricted drilling of 1921. The conclusion to be drawn from this rather tedious line of reasoning is that our past rate of domestic production has already slowed down and cannot be forced up to its former rate of perform-

ance without the intervention of a tremendous campaign of drilling over the next few years such as could be expected, if at all, only under the impetus of further and perhaps drastic rises in price.

The analysis as drawn in the preceding paragraphs is in broadest outline merely. There are many fluctuations which temporarily tend to upset any deductions drawn from past performance. For example, the exploitation of the Mexia Pool in central Texas during the fourth quarter of 1921 has contributed oil to the extent of about 8 per cent of the country's entire production. This sudden increment to supply has, for the time being, partly offset the effect of curtailed drilling at large. Such sensational developments are always possible in oil, but their effect is progressively less from year to year; five years ago a pool the size of Mexia might have already broken the market by creating a great surplus of oil. The Mexia Pool has recently displayed some disquieting signs of being short lived.

Reference again to Fig. 9 will disclose that during the past twelve months the number of oil-wells under way in the oil-fields of this country exclusive of California has declined about 50 per cent, the curve representing this item synchronizing closely with the curve of oil wells completed. The marked rise of the former curve during 1919-20 is very suggestive of the intensive and even feverish campaign of oil-field development that was waged in those years. Coincident with the decline

in drilling since the middle of 1920, there has been an increase in the productive size of the new wells completed. This feature is clearly shown by the curve in Fig. 9 marked "initial daily production per well completed." The explanation is that during the industrial depression such wells as were drilled were almost exclusively confined to the best-proven territories where the chances of tapping rich deposits were a maximum. In other words, the decline in drilling that characterized late 1920 and 1921 was largely a decline in explorational drilling, as contrasted with developmental drilling. This fact will tend to retard an increase in production, since exploration must, of course, precede development. For the past eighteen months we have been using up our blocked out ore, so as to speak.

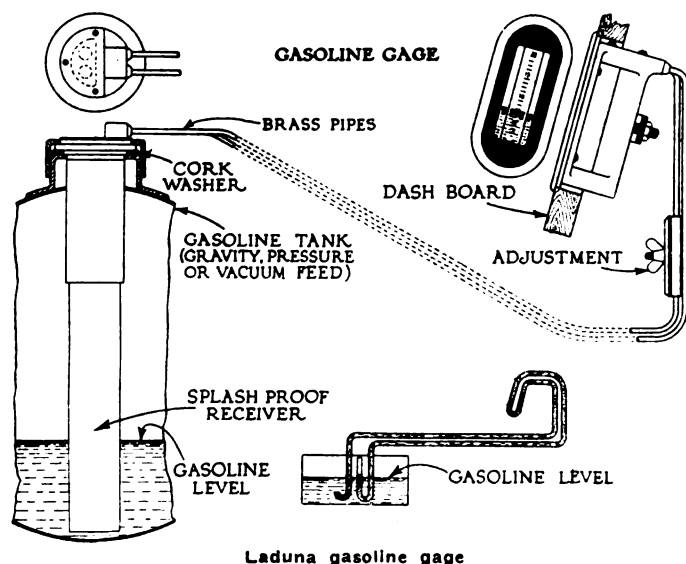
Bringing together, in conclusion, the various strands of our argument, we find (a) domestic production of crude petroleum slowing down, and (b) imports threatening to decline with sharp curtailment probable upon further exhaustion of the proven oil-pools of Mexico. Should the demands for oil fail to fall off proportionately, we may expect to see an increased burden placed upon our domestic oil fields, such as will accelerate the rising price level of crude petroleum. Should domestic production not be able to respond quickly enough under this impetus the alternative will be a readjustment in consumption pending the development, if possible, of adequate foreign sources of supply.

## Level Gages Operating on the Hydrostatic Principle

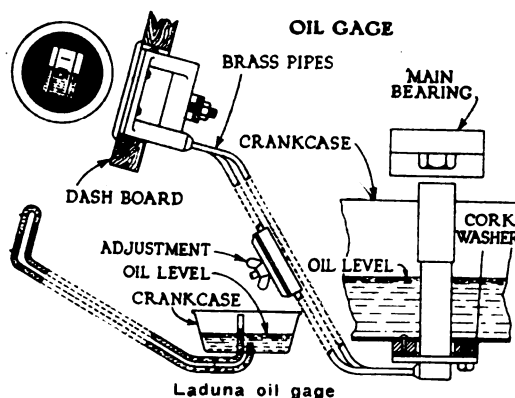
**A** LINE of gasoline and oil gages without moving parts has been brought out by the Laduna Products Co. The action of these gages is based entirely on the hydrostatic balance of inelastic liquids.

For the gasoline gage a tubular receiver is inserted into the gasoline tank, and from this receiver two small brass pipes are led to the gage proper on the dashboard. The indicating red level in the glass tube of the gage registers the contents of the tank in gallons. The gage is said to be very sensitive and accurate at all points of its scale, there being no lost motion in the parts of the apparatus.

The receiver may be removed from the tank and replaced without affecting the accuracy of the apparatus, provided the pipes are not disconnected. The gasoline



Laduna gasoline gage



also may be completely drained from the tank, as, for instance, for railroad transportation over a short distance. For a long-distance shipment and for winter storage it is necessary, in order to prevent the evaporation of the liquids in the tubes, to lock the receiver by giving a half turn to the locking tube.

The readings of the gage are said to be unaffected by the various driving conditions, especially if the receiver is placed in the center of the tank. The indicating level remains stationary and quiet under fast driving on rough roads, hills and curves when accelerating or braking.

The temperature effect on the pipes is nearly balanced and made practically negligible. The scale may be easily adjusted for correct readings for winter or summer conditions by simply giving an adjusting screw a turn.

The oil gage has a receiver fitted into the crankcase from the bottom. This receiver may be also removed and replaced without disturbing the accuracy of the gage.

These gages were invented and developed by the Russian scientist, L. A. Dunajeff.



# Original Engineering Features in New Six-Cylinder Car

Extra flywheel at front of engine is said to minimize vibration and permit wide speed range on high gear. Cylinders and half of crankcase are in one piece, but bell housing and chain case are bolted on units. This is done to facilitate production. Cone clutch running in oil is employed.

By J. Edward Schipper

**T**HE new Rickenbacker six, which is now in production and will be introduced to the public at the New York show, has been designed and will be manufactured almost entirely by the Rickenbacker Motor Co. in the Detroit plant originally erected by the Springfield Metal Body Co., and later known as the Dissteel Wheel Plant of the Detroit Pressed Steel Co. The production schedule calls for 12,000 cars the first year, and the factory is tooled up in a way to make this number or a greater quantity easily attainable.

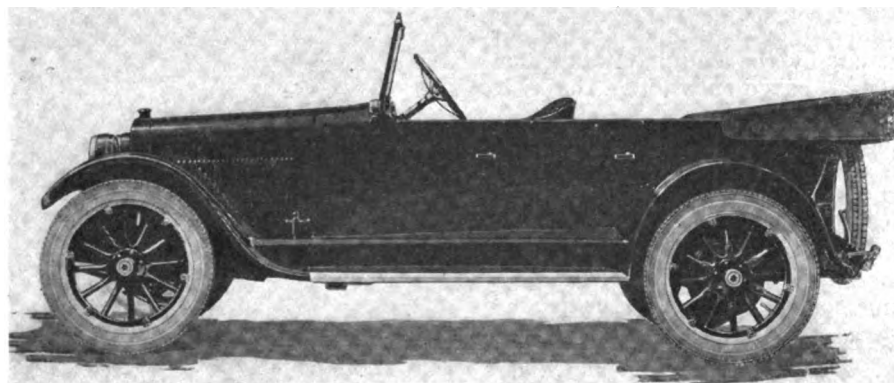
The new car is of considerable interest because it incorporates departures from usual engineering practice, as well as original ideas from a production standpoint. When it is considered that the car will sell for under \$1,500, according to factory officials, although the price will not be announced until the New York show, the speed range and general construction are particularly noteworthy. The touring car, ready for the road, incorporating a six-cylinder, block cast engine, weighs 2650 lb. The wheel base is 117 in. The car has a speed range of from 2 to more than 60 miles per hr. on high gear. In driving over roads around Detroit the writer was unable to detect any engine period between 3 and 63 m.p.h., and on allowing the engine to race while idle, practically no vibration of the fender or other sheet metal parts was discernible up to very high speeds.

Outstanding features of the car are its heavy box construction frame, flywheels at front and rear of the engine, and extra long rear springs. A number of new processes are used in manufacturing. The cylinder block and the upper part of the crankcase, which latter is of deep section for rigidity, are cast together. The cylinder bore is  $3\frac{1}{8}$  in. and the stroke is  $4\frac{3}{4}$  in., giving a stroke-bore ratio of 1.52. The block casting is so designed that the chain case and the flywheel housing are bolted on, thus simplifying the casting and the machining processes. The cylinder bores are given a ground finish and because of the elimination of the usual unit bell housing, the casting makes an exceptionally good

manufacturing proposition, easy to handle in the shop.

With a clearance volume of 21 per cent of the total volume the engine develops 58 b. hp. at 2800 r.p.m. With a displacement of 218 cu. in., this is at the rate of 3.76 cu. in. per hp. The final drive ratio is 4.63 to 1, with 32-in. tires. The cylinder heads are cast separately and incorporate the combustion chambers, which are machined completely and polished to prevent carbon accumulation.

The pistons are of cast iron and are  $4\frac{1}{4}$  in. in length, in accordance with the trend toward long pistons. Three piston rings are used, these being of the hammered type,  $\frac{3}{16}$  by  $\frac{1}{8}$  in. The piston pin bears in the piston bosses and is  $\frac{3}{4}$  in. in diameter by  $2\frac{3}{4}$  in. in length. The nominal piston clearance at the top is 0.011 in. and at the bottom, 0.00325. The pistons are finished by grinding and the bottom of the piston is provided with a sharp cutting edge to act as an oil scraper. The

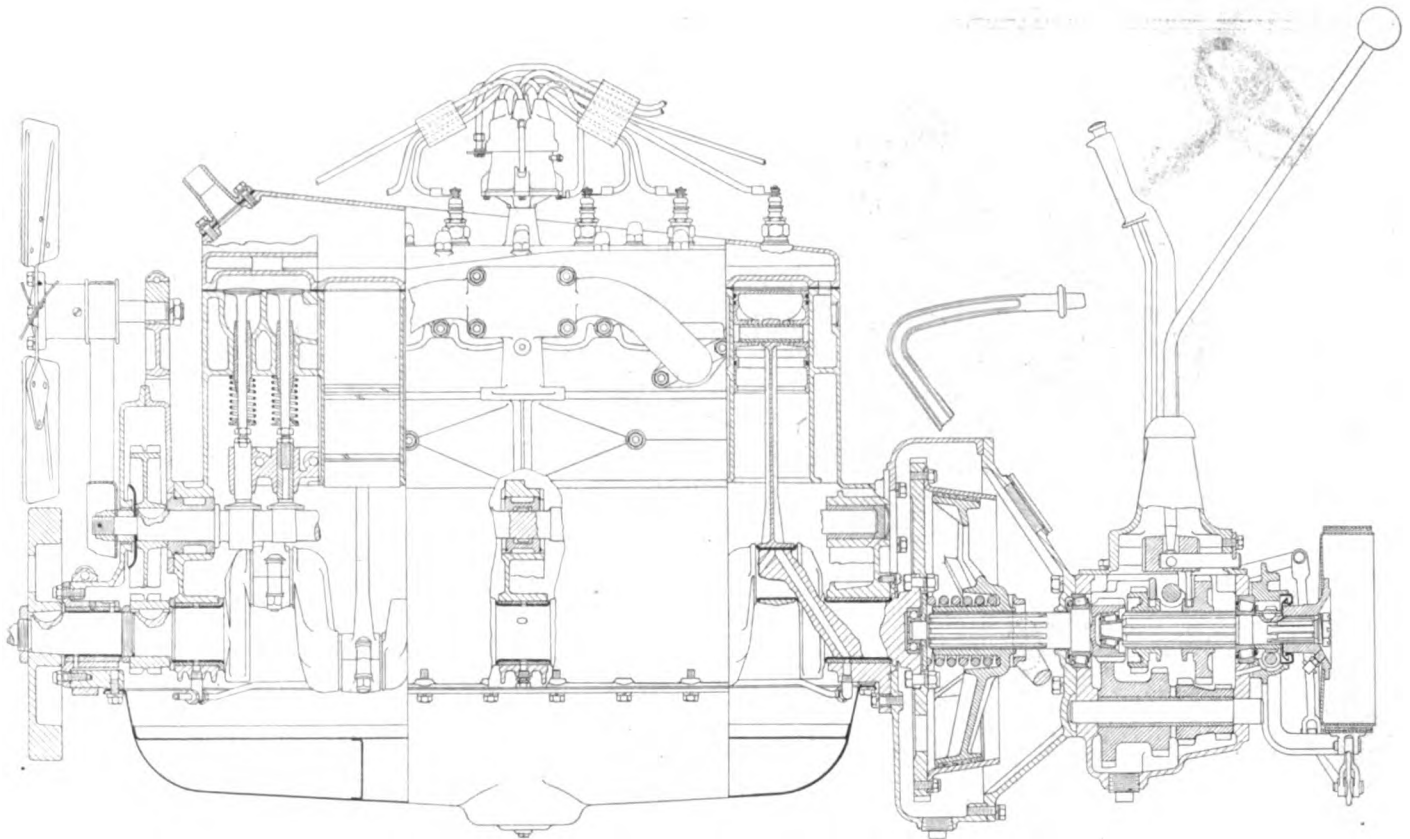


Five-passenger Rickenbacker touring car

bottom surface on each of the three piston rings is also finished in the same manner so as to remove the oil from the cylinder walls on the downward stroke. It is claimed that in tests with this type of piston as many as 150 miles have been attained to a pint of oil.

The connecting rods are drop forgings with a heavy babbitt liner at the large end. The feature of the connecting rods is the method of finishing. It is usual practice to check the alignment of the rod on a gage, and if it is not true, to bend the rod to check properly on the gage. On the Rickenbacker car, on the contrary, the small end of the connecting rod is ground to assure alignment. This process was developed by several manufacturers in grinding connecting rods for airplane engines during the war. The alignment is for the purpose of eliminating side friction of the piston, which insures an easier and smoother running engine, and will have a tendency to eliminate scoring. The lower connecting rod bearing is  $1\frac{3}{4}$  in. in length by 2 in. in diameter.

The crankshaft is a three-bearing type, the nominal diameter of the shaft being  $2\frac{1}{4}$  in. The shaft is dynamical-



Longitudinal elevation, sectioned, of Rickenbacker power plant

ly balanced and is of the curved cheek type. It is a Wyman-Gordon forging. An unusual feature of the crankshaft and flywheel assembly is that there are flywheels at both ends, of about equal weight. This breaking up of the flywheel into two parts is claimed to have a great deal to do with the smoothness of the engine. The total flywheel weight is about 50 lb. The crankshaft bearing dimensions from front to rear, diameter and length, are:  $2\frac{1}{4}$  by 2-3/16 in.,  $2\frac{1}{4}$  by  $2\frac{1}{2}$  in.,  $2\frac{1}{4}$  by 2-5/16 in.

A Morse chain is employed for the front end drive. The chain runs over three sprockets, one on the crankshaft, one on the camshaft and the other on the generator and water pump shaft. The latter shaft is provided with a screw adjustment to take up slack in the chain.

The drive for the oil pump and distributor is taken from the camshaft by helical gears. The ignition distributor is placed in a very accessible position on the top of the cylinder head at about the center of length, which keeps the ignition device away from oil and water and also shortens the length of the high tension leads. The oil pump is driven from the bottom of the same shaft, which gives a balanced drive for these two units.

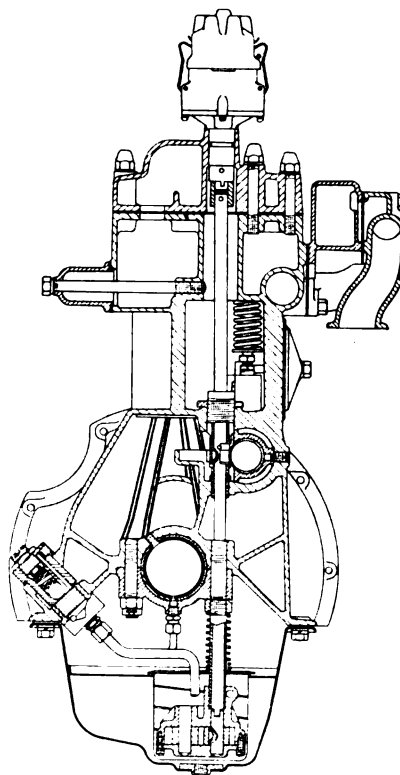
The valve drive is conventional in layout, the valves being on the left side of the engine and driven by push rods of the mushroom type. The guides are in groups of six and are readily removable without taking off the cylinder block. The valve material is the same

for both the intake and exhaust valves, the head being of cast iron and the stem of cold-rolled steel. The valve diameters are  $1\frac{1}{2}$  in. in the clear, with a lift of 5/16 in.

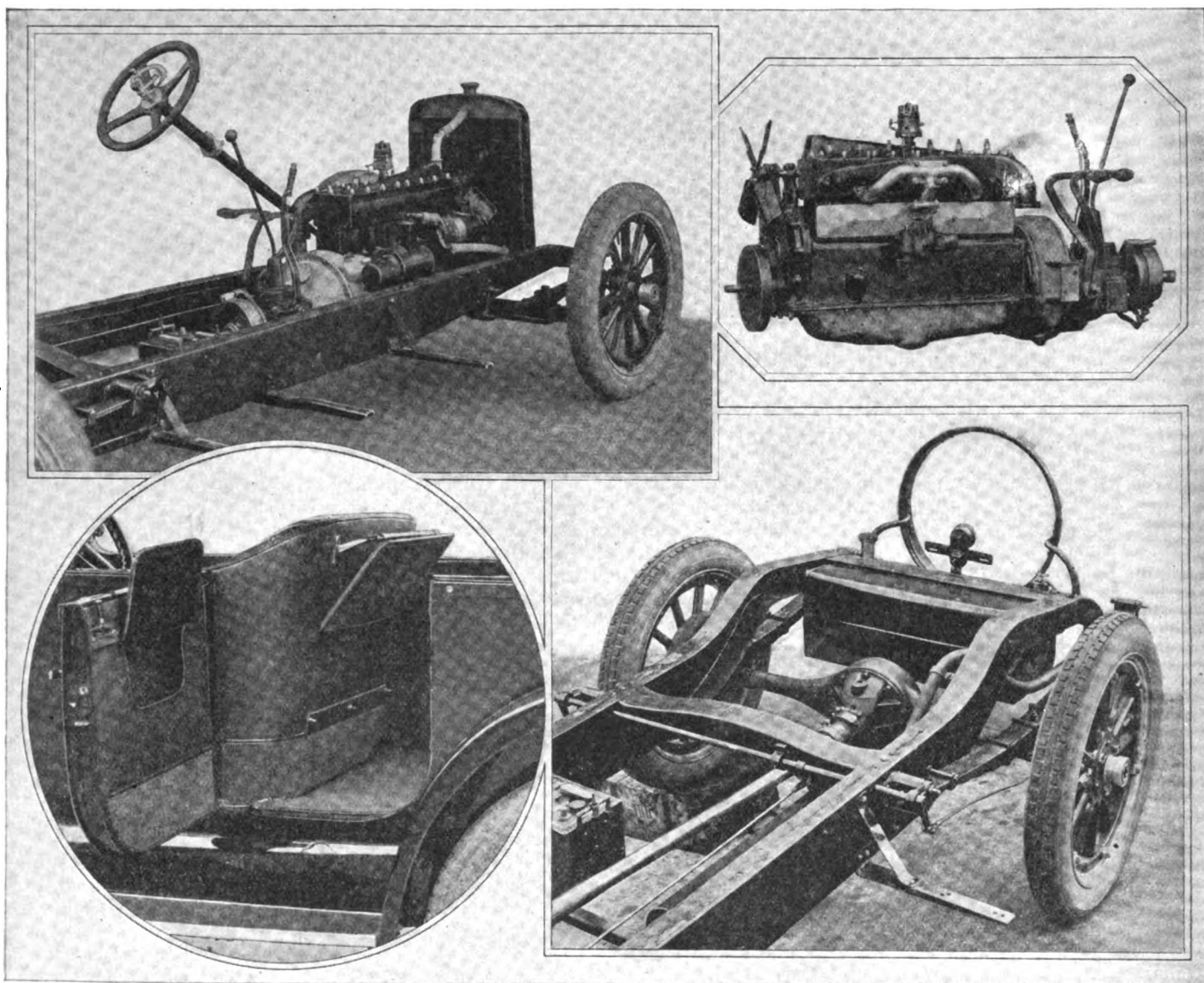
Lubrication is by a pressure system, the oil passing from the pump at the center of the engine and at the lowest portion of the sump through a lead contained in the crankcase to the crankshaft, which is drilled to supply oil to all the main bearings and the connecting rods. There is a lead also to the extra bearing, which is provided at the extreme front end of the shaft to support the balancing flywheel. The oil pump assembly is accessible from the lower end of the engine and can be removed for inspection without dropping the bottom pan. The oil filler opening is large and high so that it is readily accessible and the pressure regulator for the oiling system is also accessible upon lifting the hood.

Cooling is by pump circulation, the centrifugal pump being located immediately behind the generator on the right side of the engine and driven through the generator shaft. Water enters the block at about the center of its length and is distributed both ways from this point. The water flows upward to the cylinder head casting, where it enters the water header and discharge pipe. The radiator is a cellular type and the water system has a capacity of 4 gal. The fan is a four-blade unit driven by a leather fan belt 1 in. in diameter from a pulley on the end of the camshaft.

The gasoline system is fed from a



Cross section of engine



Front end of Rickenbacker chassis, showing running board support and mounting of unit powerplant. Left side of Rickenbacker powerplant, showing ramshorn hot-spot manifold, two flywheels, fan drive and other details. Door pockets and pocket in rear of front seat for side curtains. Rear-end of frame, showing mounting of rear springs for Hotchkiss drive

21-gal. tank mounted in the rear of the chassis under a sheet steel cross-member, which is pierced for the filler and gage. Gasoline is fed from a Stewart vacuum tank to a  $1\frac{1}{4}$ -in. Stromberg carbureter. The intake manifold is of the ramshorn type with a hot-spot center, carrying the gases to the intake passages which are cored in the cylinder head and so arranged as to be in contact with the water spaces to prevent reconcondensation of the gases.

An inverted cone clutch of Rickenbacker design is used. This clutch has a Raybestos facing running in a bath of oil. It is claimed that the combination of the Raybestos facing and the oil bath eliminate any possibility of burning and, at the same time, insure a smooth action. The clutch on demonstration held perfectly when the car was started in high gear. The remaining power transmission units are conventional in design, the gearset being a three-speed unit with an aluminum transmission case. This same material is used for the rear flywheel housing. A transmission brake is employed for emergencies, this being a contracting band type mounted just behind the gearset. The propeller shaft is tubular with two Bowling Green universal joints. The final drive is through a floating axle with spiral bevel gears. The spiral gear ratio is 4.63 to 1.

The axle is housed in pressed steel and has  $1\frac{1}{2}$ -in. alloy steel shaft. The foot brakes are on the rear wheels and act on 14-in. drums. They are external contracting type with 2-in. Thermoid bands. The front axle is drop forged I-beam, with ball-bearing steering knuckle.

One of the interesting features of the car is the deep and wide section of the frame channels. There are seven cross-members and this, in combination with the wide flanges, gives exceptional rigidity. Picking up one corner of the frame from the ground, it can only be lifted  $2\frac{1}{2}$  in. before the other extremity of the same side member leaves the ground. Usually the spring in the frame, on lifting up one corner in this way, is 4 or 5 in., at least, and sometimes 7 and 8 in. Both the front and rear springs are long, the front being 36 by 2 in., and the rear 57 by  $2\frac{1}{2}$  in. The wheels are wood artillery with embossed spokes. The tire equipment is 32 by 4 in. cord with Firestone rims. The steering gear is a Gemmer, worm and wheel type.

Three types of body will be furnished. A five-passenger touring, four-passenger coupe and a five-passenger sedan. One of the body features is the windshield design which merges into the trim rail so as to provide a water-tight joint with the body. The windshield is

wider at the top than at the bottom, which eliminates the usual projection of the front corners of the top.

The body is of 20 gage, deep drawing steel. The doors are hung on concealed steel hinges and equipped with inside and outside handles of offset bar type. The rear fender merges into the body and frame, covering the springs and axle parts. The running boards are covered with linoleum bound with corrugated aluminum molding. The top is a one-man type with five bows designed to harmonize with the body lines. It is covered with pantasote, double lined, and equipped with a plate glass window 26 in. long by 7 in. deep. The side curtains are of the winter type with special rods attached to the doors. The curtains are carried in a pocket in

the back of the front seat, where they are accessible and at the same time are protected against dust and can be packed flat.

The rear cushion dimensions are 47 in. by 21 in. by 9 in. deep. This seat is reclining, and in common with the front cushion is upholstered over Marshall springs. The instrument board is equipped with an oil gage, and an ammeter in an oval panel. The speedometer head is provided with a cowl lamp just above the center, and in another oval panel are the starting and lighting switches. The steering wheel is all walnut. Lamp equipment consists of drum type headlamps finished in nickel and black, side or curb lamps attached to the windshield arms and tail light on license bracket.

## Refinement in Design of Band Brake

**H**ENRY M. CRANE is among the advocates of the band-type brake, providing it is properly constructed. A design incorporating the desirable features of this type of brake, prepared by Mr. Crane is shown in the accompanying cut.

One of the chief advantages of the band brake is the fact that it can be made to bear on almost the full circumference of the brake drum, whereas in the internal shoe-type brake it is difficult to secure an effective contact over more than one-half the circumference. The expanding shoe-type also tends to distort the drum, while there is no such tendency in the band type. Partly because of the large arc of contact, and partly for other reasons it is possible to make a band brake of given capacity much lighter than one of the internal shoe-type.

Smoothness in brake operation depends to a considerable extent upon using a low unit pressure on the braking surface. With the band type a low uniform pressure is readily secured in combination with a brake of adequate capacity and moderate weight. Smooth operation is also facilitated by providing a rigid brake anchorage.

Referring to the cut it will be noted that two narrow drums, placed back to back, are employed, and that two relatively narrow bands are used in place of a single wide band. There are two primary reasons for using this dual construction. In the first place, two narrow drums are less apt to distort due to heating than a single wide drum. In the second place two narrow bands are less likely to bear unevenly than a single wide band. Uneven bearing on a wide band may tend to cause chattering. By placing the brake drums back to back with spacers between and drilling holes in the web of the drum, air is drawn through the space between the drums and assists in cooling them.

A single, rigid anchorage is provided. The link K, attached to the anchorage at one end and to the band at the other, is held against the stop screw J by the spring L. The spring keeps the band lining out of contact with the drum at all times when the brake is in the off position. Two views of the linkage employed for operating the brake are shown. The operating shaft A carries a heavy bent arm, the outer end of which engages the hole C in the link D. The outer end of link D is pinned to the long arm of the lever E. This lever is pivoted on the pin F to which is attached the adjustable link G. The lower end of link G is pivoted in a fitting H riveted to one

end of the brake band. The other end of the brake band is connected to the short arm of lever E. A spring surrounding the link G holds the two ends of the band apart. The fitting H rests against the adjustable stop screw I in its off position. Motion of the long arm of the lever E away from the drum causes the two ends of the brake band to come closer together and brings the braking surface into engagement with the drum.

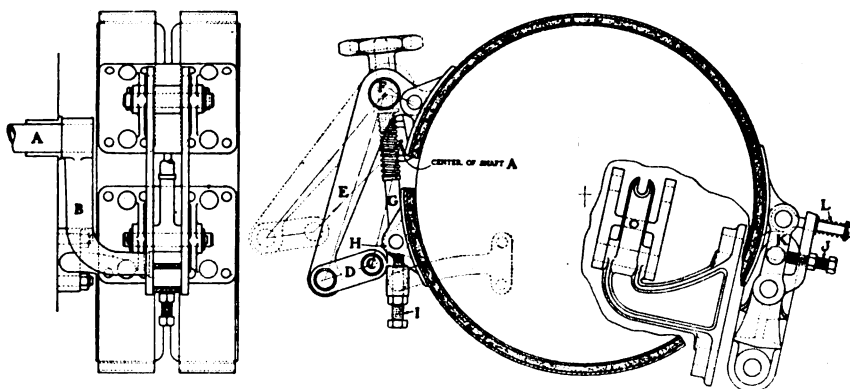
The brake band is rolled to a true circle, consequently, the brake cannot drag if the stops I and J are properly adjusted. It will be noted that the link D remains in a substantially radial position in all positions of lever E. This prevents any tendency there may be for the brake to jam or become self-acting due to the tendency of the braking friction to carry the band around.

It will be noted that the difference in the length of the arms of lever E is sufficient to give considerable multiplication of the pull applied to the long arm. This makes unnecessary other multiplication of pressure than that provided by the normal difference in the length of the two arms of the operating pedal.

The brake band is, of course, stiff enough to clear at all points, but it is sufficiently flexible to insure uniform contact pressure over the entire braking surface and thus distribute wear.

This brake is designed for application to the gearbox. The use of only a light pedal pressure is sufficient to easily lock the wheels of a heavy car even when there is oil on the braking surface. The use of a small quantity of oil on the brake is, in fact, recommended as a means for facilitating smooth operation and minimizing wear.

The brake drum is 12 in. in diameter and each of the two bands is 2 in. wide. The heavy anchorage bracket employed is shown at the right.



Crane design of band-type transmission brake

# Fuel and Lubrication Changes Feature New Premier Model

Fitted with Nelson vaporizer and aluminum piston, which latter has permitted a higher compression ratio. Output and economy of engine increased. Body lines have also been changed and instrument layout improved. Design of connecting rod bearing is somewhat different.

**T**HE Premier 6-D, a new series, incorporates a number of refinements in the engine, largely from the standpoint of more efficient handling of the fuel and better lubrication. The structural parts of the chassis remain the same, and the bodies have been altered only in detail.

The Nelson vaporizer takes the place of the former water jacketed intake. As shown in the sectional view of the engine, part of the exhaust is carried across the cylinder block through a steel tube contained in a cored passage in the block between cylinders 3 and 4. The gases are conducted by this pipe to the exhaust jacket of the vaporizer, which is located in an elbow in the intake just before the gases enter the cylinder head. The exhaust gases are permitted to flow around the ribbed vaporizing stove in this elbow, and pass back through a separate line to the exhaust pipe, entering it at a point just ahead of the muffler.

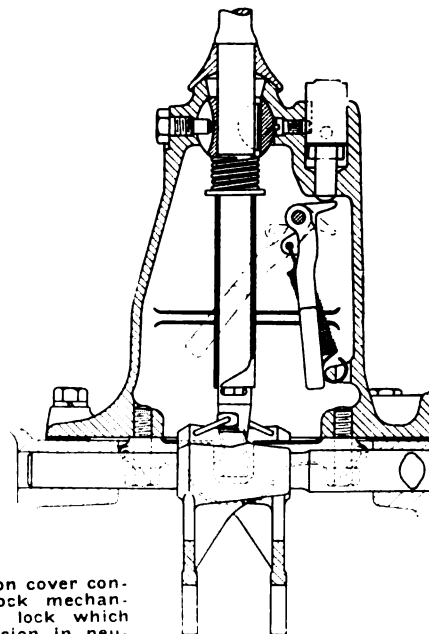
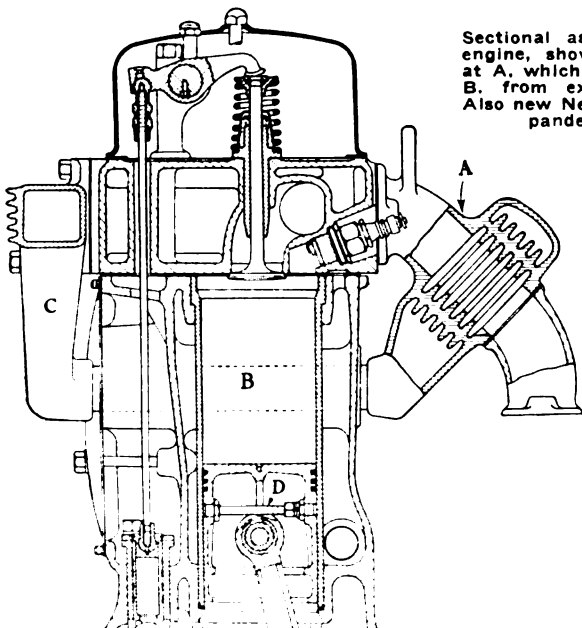
The exhaust pipe section has been reduced sufficiently to make up for the additional exhaust passage through the vaporizer. This results in sufficient back pressure in the main exhaust passage to cause a flow of exhaust gases around the vaporizer. Owing to the elbow form of the vaporizer, the heavier particles of fuel are thrown against the outer circumference of the stove, while any of the fuel which is creeping along the walls of the inner radius comes in contact with the stove also. As the corrugations extend entirely around the jacketed elbow, no portion of the intake wall is unheated, which prevents any possibility

of seepage of raw gasoline along the walls of the intake.

A new piston, also a Nelson patent, is now used, which has made possible an increase in the compression ratio from  $4\frac{1}{4}$  to  $4\frac{3}{8}$ . This has resulted in a higher mean effective pressure and, consequently, greater output and greater economy. The Nelson piston, which is also shown in the section of the engine, is an aluminum alloy type which is expanded to an oval shape while cool. The piston is machined from .010 to .012 in. undersize and then is expanded at right angles to the wrist-pin by the bar or strut shown in the section. It is expanded in this way to 0.002 to 0.00215 in. clearance in the plane of this expander. The theory of the piston is that this expander puts the initial expansion in the piston, so that under heat no further expansion takes place in the plane of the expander. In other words, as the piston becomes warm it goes to a round shape and more completely fills the bore of the cylinder.

A detail refinement in the construction of the cylinder head is the incorporation of a slot in the metal just below the spark plug, so as to bring the cooling water closer to the plug. The increased compression has induced a change in the valve timing. The exhaust is now closed and the inlet opened 4 deg. after top center; the inlet closed 60 deg. after bottom center, in place of 45 deg., and the exhaust opened 52 deg. before bottom center, in place of 45 deg. This timing provides for higher speed of the engine.

Sectional assembly of Premier engine, showing new vaporizer at A, which is fed by steel pipe B, from exhaust manifold C. Also new Nelson piston with expander shown at D



Premier transmission cover containing the interlock mechanism and gearshift lock which locks the transmission in neutral



On the new series there is no groove in the connecting rod bearing, while in the main bearing there is a single circumferential groove all around for continuous oil feed. In the previous series, the connecting rod bearings were grooved, and a different system of grooving was used in the main bearing.

Flanges have been put on the connecting rod bearing bushings so as to provide stiffness and render them independent of the connecting rod bearing caps in this respect. The function of the bearing cap is now only to hold and not to stiffen the bearing. The bearing has been so arranged that the shims are now flush with the edges of the bearing, and, consequently, there is no oil scraping edge at the point where the bearing cap joins the bearing. Another improvement in the oiling system is the increase in size of the oil suction line from 5/16 to 3/8 in. Oil leakage has been further guarded against by placing gaskets under the cap over the valve action. Ten instead of four splines are now used in the Borg & Beck 10 in. clutch. The Cutler-Hammer electric gearshift has been replaced by a hand shift, the electric gearshift being now listed as

special equipment at an extra cost of \$200. The new cover incorporates a shifter lock and also has the interlock integral with it, so that the new head can be assembled to the old transmission case. The construction employed is shown in one of the accompanying cuts.

Spicer universal joints are now employed. The rear axles are a new Timken design. The chassis is lubricated by the Alemite system. There have also been one or two refinements in the fuel system, such as an increase in size of the D-shaped vacuum tank and the substitution of a 1 1/2 for a 1 1/4 in. carburetor.

The body lines have been improved, the enclosed cars now all having a sloping front. The instrument layout has been changed for the sake of better appearance; the curtains in the open cars are now carried in the front doors, and the top is lined. Putting the curtains in the front doors has necessitated placing the tools in another location, and they are now under the front seat. In changing the dash layout, the clock and speedometer have been combined and two instrument board lights are provided instead of one.

## Special Alloys in Exhaust Valve Construction

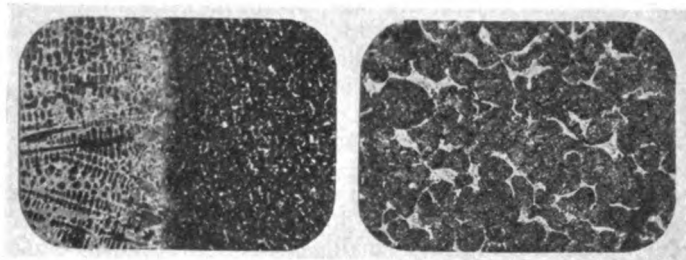
**I**N the recent description of the Wills Sainte Claire car which appeared in the November 10 issue of *AUTOMOTIVE INDUSTRIES*, it will be remembered that mention was made of a special exhaust valve construction. The various parts of these valves are made of different materials, depending upon the function each part has to perform. The stem and head are made of invar, a nickel alloy steel, while the valve rim is of another alloy steel having high heat-resisting qualities. The tip of the valve, which is subject to the continuous contact of the valve follower, is of chrome-cobalt steel.

The possibilities of welded valves are of interest to automotive engineers and have been made the subject of considerable investigation. Not long ago the Rich Tool Co. submitted a welded valve to the power plant section of the Air Service at McCook Field for tests. The results of these tests showed that this type of valve is likely to be very satisfactory, even under the exacting requirements of air service. The valve is a high chrome-tungsten steel with a seat of heat-resister material welded to it. According to the Rich company the seat material is composed largely of cobalt and chromium, and the alloy is said to possess non-staining and non-oxidizing properties to a high degree.

So far the tests have not included long service runs, but have been more or less of a laboratory nature. Satisfactory results are expected from the former tests, however, according to the material section at McCook Field. The bond between the body of the valve and the material in the seat is said to be very good and should withstand severe service conditions. On tests it was found that the welded-on seat material is resistant in large measure to attack by 20 per cent aqueous sulphuric acid. When the valve was subjected to a highly oxidizing flame at a temperature of about 1350 deg. Fahr., the chrome-tungsten steel of the valve proper scaled perceptibly, but the welded-on seat showed only slight oxidation.

As a result of microphotographic investigation, the weld is shown to be clean, with ample evidence of the alloying of the cobalt-chromium seat with the chromium-tungsten valve steel. The structure at the weld is shown in Fig. 1. The spine-shaped carbide particles on the steel side of the weld are at grain boundaries shown in Fig. 2. These particles are characteristic of an area

which extends back into the steel for about 1/16 in., and they find no counterpart in the deeper general structure of the valve steel. This can be taken to indicate that the depth of the alloy of cobalt and chromium with the steel is equal to about this distance.



(Left)—Structure at weld of valve seat showing the cobalt-chromium alloy on left side and the steel on right  
(Right)—Structure of steel adjacent to weld. Note the spine-shaped carbide envelope. This area probably represents an alloy of the cobalt-chromium with the steel

## Official Motor-Coach Body Revisions in Britain

**T**HE rapid and large development of road auto coaches for 16 and more passengers lends importance to the rumor of a coming revision of the permissible dimension of the bodies for these vehicles. It is anticipated that the Ministry of Transport will order that the overall length must not exceed 25 ft. and the wheelbase 16 ft. (excepting for special vehicles to be considered apart) and the overall body, including overhanging hoods width will be limited to 7 1/2 ft. The gasoline tank will have to be under the rear of the chassis, and all must be equipped with easy get-at-able fire extinguishers and must have fully opening doors.

**I**NCREASED financial aid from the government will be given civil aviation in Switzerland. This will include the assistance of the government in the establishment of an air mail line next year to connect with international services. Provision is made for grants in aid to enable civil aviation concerns to buy modern transport machines.

# Multiplicity of Models Feature British Motorcycle Show

Tendency toward simpler frames, use of pressed steel, ball and roller bearings in engine, and all-chain drive are noted. Overhead valves are gaining in popularity. Many two-stroke engines, some with two cylinders, are employed. Prices are lower than last year but still above pre-war standard.

By M. W. Bourdon

IT need hardly be said that considerable reductions in prices as compared with last year were general at the recent Motorcycle Show at Olympia. On an average these reductions approximate 25 per cent, and prices range from £21 for a 1½-hp. two-stroke single-speed belt-driven lightweight machine to £150 for the most expensive of the 8-hp. two-cylinder machines with four-stroke engines. In the case of the latter type, standard sidecar outfits still leave little remaining out of £200.

One outstanding feature of the show was the large number of new models supplementing existing types. As in the case of British car makers, so with the motorcycle firms; the endeavor which was apparent here and there immediately after the war to specialize upon one model only has been dropped and the pre-war policy of offering a multiplicity of models has been reverted to. Four distinct models is quite normal; five and six is not remarkable; and in one case the range comprises twelve distinct models.

This policy of returning to a big range of types is the result of the trade depression during the past year; makers who were specializing in small machines are endeavoring to cut into the trade in larger sizes, while those who have hitherto specialized in 6-hp. and 8-hp. machines are trying to supplement their output with lightweights.

The further development of the lightweight movement was another feature of the show, and whereas last year users who bought the increasingly popular 2½-2¾-hp. type of machine and fitted a sidecar to it, did so at their own risk, now a score of makers offer this type with a strengthened frame and minor variations for sidecar work. The majority of these lightweight combinations have four-stroke single-cylinder engines, but quite a number have a two-stroke engine rated at 2½-hp., a type which showed up extremely well in the Auto Cycle Union Six Days' Trials last August.

The endeavor to boom motor scooters two years ago has not been entirely given up, three or four firms at Olympia having this type of machine on view; but it has not by any means attained the popularity that was expected, and the total output has been very small compared with anticipations. But the scooter has developed in other directions into an ultra lightweight motorcycle with a 1½-hp. engine in a glorified pedal cycle with spring forks, lower frame and pedaling gear. As a rule, it is supplied with a single gear with belt drive; occasionally it is seen with a two-speed gearset and chain and belt transmission.

A great many of the new models at the show were of what is known as the "sports" type, or, as Triumph—the maker with the biggest motorcycle output in Great Britain—terms this model, "fast roadster." It is usually much

the same as the standard roadster solo machine, but has almost flat and wide handle bars, footrests instead of footboards, exhaust pipes without a muffler, narrower mudguards and a lower frame. In one or two instances, the engine is of a special high efficiency type, but these cases are exceptional.

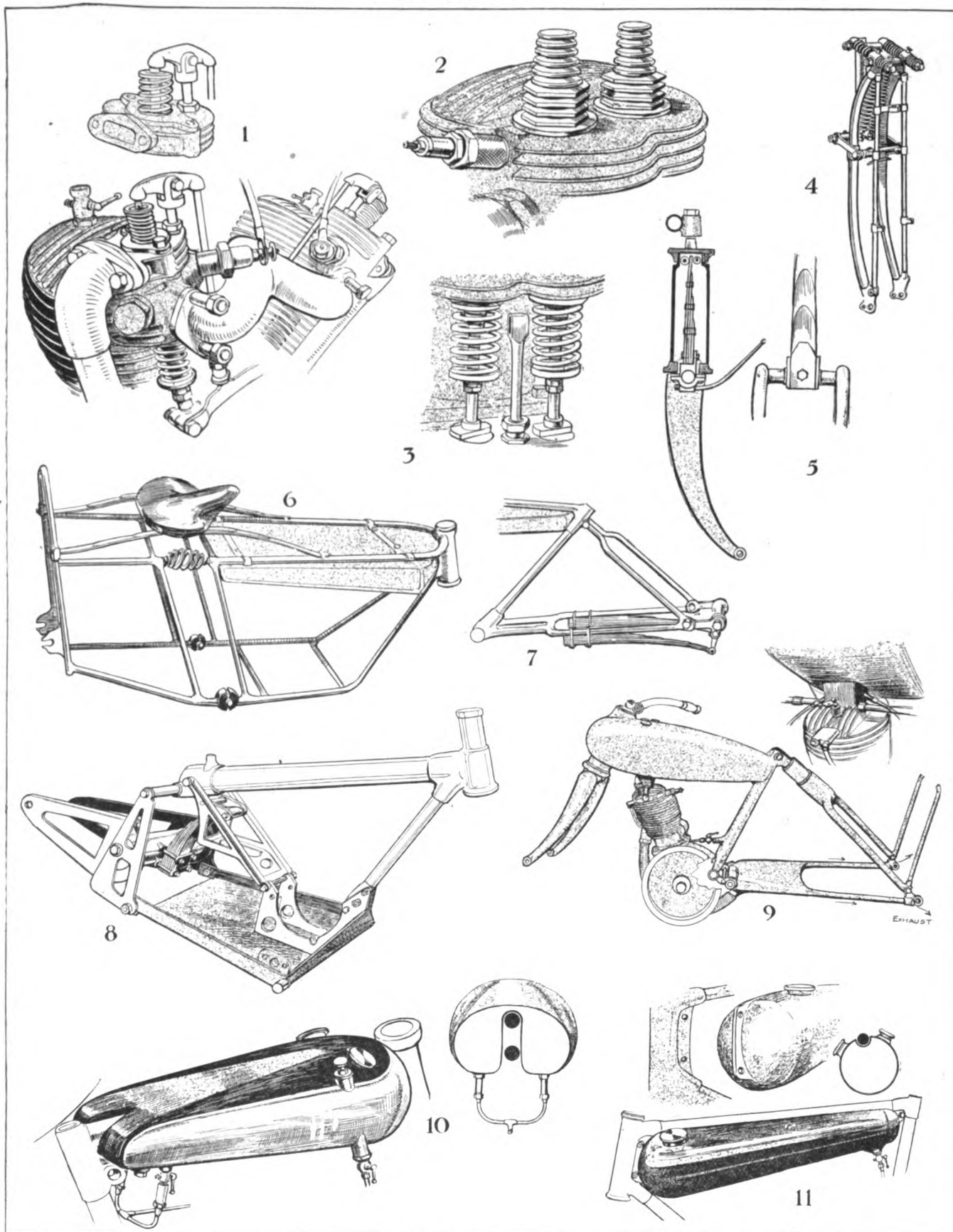
Overhead valves show distinct signs of increasing popularity, especially for the "sports" models just referred to, though this tendency is by no means only in that direction.

The pressed steel frame is unusual in British motorcycle practice, for there are very few examples of this form of frame construction. Nevertheless pressed steel is being more widely used in certain parts of framework. For example, it occurs here and there in the formation of a tank which displaces the top tube, combining the two functions. The Beardmore precision machine first exemplified this arrangement, and the practice of using pressed sheets for mudguards, combining the back one with a carrier and toolbox, is being continued on additional models of this and one or two other makes. The back stays are also formed of pressed steel in two cases, but, taken generally, frame design remains where it was in the vast majority of machines. The duplex type of tubular frame is, however, more frequently observable; in one machine (the Dot) the bottom part of the frame is some 16 in. wide and has tubular cross members which support the engine and gearset. A development of this will certainly be the enclosing of the engine and transmission by side panels, a feature which is to be seen in isolated cases already.

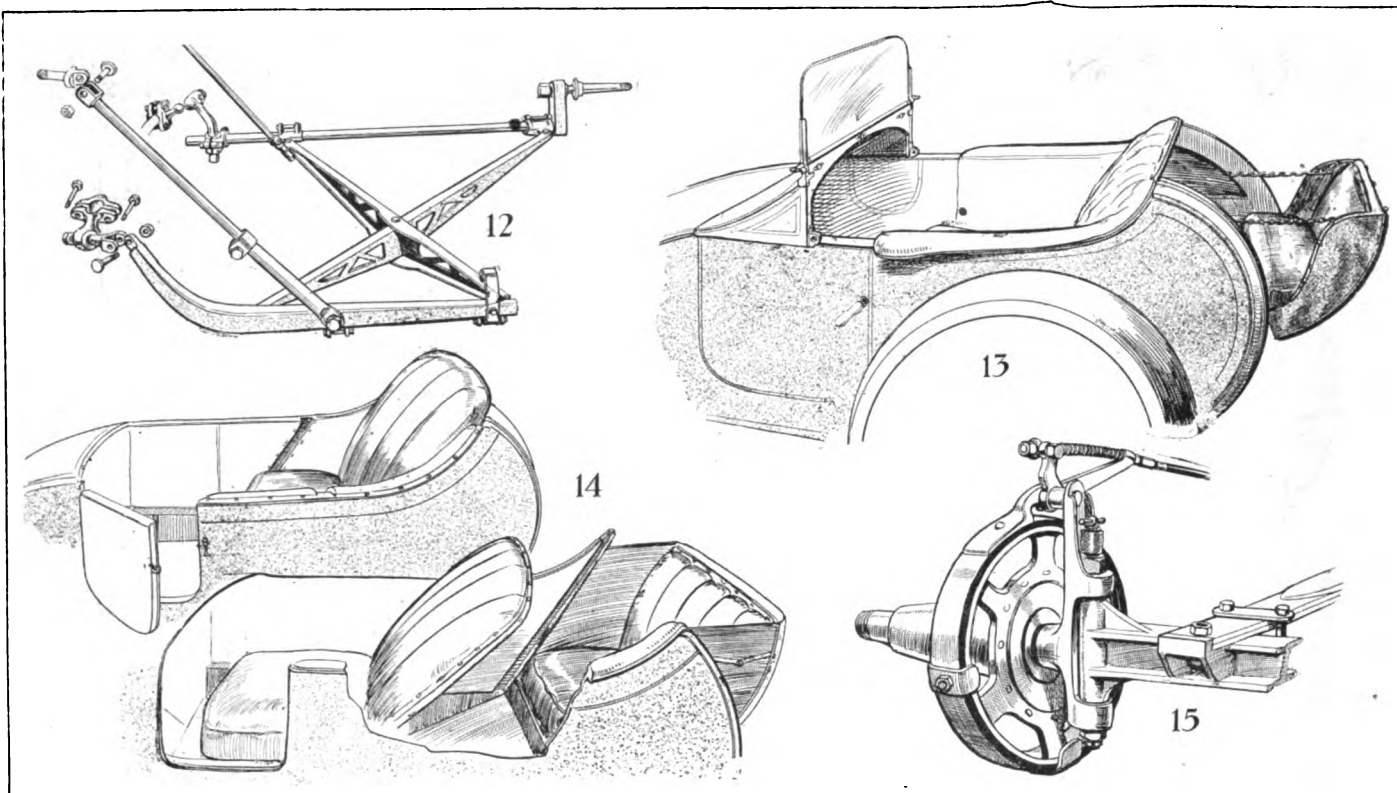
A notable development indirectly connected with frame design is the rapidly increasing popularity of what is termed the saddle tank, this consisting of a bifurcated unit which is dropped over the upper top tube of the frame and reaches just below the lower top tube (where the latter is used), thus giving the machine the appearance of having a tank displacing top tubing. The appearance is certainly improved by this arrangement. The tank is more or less cylindrical and streamline in form, for the bifurcation is not usually evident except at fairly close quarters. A branched outlet for the fuel is provided, with two taps, the well on one side forming a reserve tank.

Another move in the same direction is to use a streamline tank below the top tube with a depression along the top in which the frame tube is more or less hidden. Both of these systems have a more practical appearance, making the machine appear less "scrappy" than when a square section or straight-sided tank is used.

Still referring to frames, welded joints in place of brazed tubes and lugs are gradually becoming more popular, but they still appear only on a small minority of models.



1—Valve gear of Martinsyde engine; has overhead exhausts, and inlets operated by rocking levers. Upper view shows exhaust valve cage detached. 2—Aluminum "fir cone" radiators forming valve caps of new J. A. P. engines. 3—Crankcase breather on new J. A. P. engines ejects oil mist on to valve stems. 4—Popular type (Brampton) of sprung front fork providing both parallel and pivotal movement. 5—Peters spring fork design. Head tube encloses leaf spring attached to pivoted fork. 6—Example of duplex frame; the Dot, which has buffer springs for hinged rear half. Note inverted semi-elliptic saddle springs. Engine and gearset supported by transverse bottom tubes. 7—Simple adaptation of leaf springs to provide flexible rear frame—the Coulson. 8—Composite tubular and pressed steel frame with rear portion sprung on Hagg tandem. Rear seat is carried on pressed steel back mudguard. 9—Peters frame and engine, with detail view of cylinder and tank connection. Rear stays form muffler and duplex exhaust outlet. 10—Example of "saddle" tank. Inset is section in mid length looking rearward, showing location of frame tubes. 11—Streamline tank serving as frame brace, adopted by several makers



12—Pressed steel sidecar chassis with flexible couplings to cycle. 13—Typical sidecar with dickey seat for child. 14—Single seated sidecar convertible to tandem for two adults, as shown in lower view. 15—Simple contracting front wheel brake on three-wheel T. B. runabout. When band brakes are not objected to, the principle might well be applied to car. Actuation is by Bowden cable

Approximately 50 per cent of machines have engines made by the motorcycle manufacturer. On the remainder, the majority have the J.A.P. engines when a four-stroke type is used and the Villiers as a two-stroke. The J.A.P. engines are made in a big range of single and two-cylinder models, all four-strokes, and with an L-head cylinder arrangement. The two-stroke Villiers, on the other hand, is made in one model only, which has a flywheel magneto. It is termed  $2\frac{1}{2}$ -hp. with a bore and stroke of 70 x 70 mm. At the show a development was introduced in this engine. The flywheel magneto was accompanied by a lighting generator.

Apart from proprietary engines, the two-stroke is increasing in numbers, but decreasing in size, and more two-cylinder two-strokes are now on the market. The smallest two-stroke on motor bicycles proper, as distinct from scooters, is  $1\frac{1}{2}$ -hp.; the largest is now a 5-hp. 45-deg. V two-cylinder with a bore and stroke of 70 x 70 mm. The largest single-cylinder two-stroke, the Dunelt, is a 4-hp. engine (85 x 88 mm.), which has an annular space at the bottom of the working cylinder in which reciprocates a lower extension of the piston with an enlarged diameter to form a pumping cylinder. But, generally speaking, the machines above  $2\frac{1}{2}$ -hp. have four-stroke engines.

The increasing use of overhead valves has been mentioned, and the two British makers with the biggest output of motorcycles—Triumph and Douglas—have both adopted overhead valves in one or more of their models. Triumph confines this valve arrangement to the sports or "fast roadster" type, which has a single-cylinder Ricardo-designed engine with two inlet and two exhaust valves in the detachable head operated by exposed push-rods and dual rockers, a feature of the latter being that they are supported in ball bearings. This engine is termed  $3\frac{1}{2}$ -hp., having a bore and stroke of 81 x 87 mm. The inlet valves are of the "masked" type, the seatings of the

valves being countersunk into the surrounding surface of the cylinder head, in conjunction with a cam giving an additional period of lift at each end to compensate for what would otherwise be, in effect, a reduced period of valve opening. For this arrangement the advantage of a steep-sided cam is claimed, although the longer cam actually commences to open and closes finally quite gradually; consequently it is said that high efficiency is obtained with quiet valve gear.

The Douglas overhead valve engines are, like the remainder of the Douglas line, horizontal twin cylinder motors. The valve rockers in this case are enclosed within aluminum casings extending fore and aft beyond the detachable cylinder heads, the crankshaft being transversely arranged. One maker, Martinsyde—also responsible for the Martinsyde airplanes—has side inlet valves and overhead exhaust valves, reversing an arrangement seen in a few other engines, namely, side exhaust and overhead inlet.

In two of the J.A.P. engines with side valves, the sparking plug position has been altered so that the plug projects from the side of the valve pocket, and the valve caps consist of "fir cone" radiators of aluminum, the object being, obviously, to eliminate the hot spots usually occurring at the valve caps. This scheme is illustrated in one of the accompanying sketches.

The Bradshaw system of oil-cooling has not yet been adopted by any other maker beyond the firm responsible for the Zenith machines; but developments in this connection are to be expected, for a range of engines on this principle is to be made available for motorcycle manufacturers generally. In this engine design, it may be recalled, only the finned cylinder heads project from an enlarged crankcase, the cylinder barrels being exposed within the latter, where they and the pistons are cooled by the large quantity of oil circulated by a gear type pump. In the L head pattern the valve stem, spring,



guides and bottoms of the valve seatings are also exposed to the oil, which itself is cooled by radiation through the large area of the aluminum crankcase.

Motor attachments for pedal cycles have not taken hold of the public, and they are rarely seen except at Olympia. At the recent show there were two firms showing attachments of this type, one of the outfits exhibited also being applied to an invalid chair.

### The Ignition Systems

Magneto ignition still remains universal, a separate unit being general for four-stroke engines, though, as mentioned, the most popular two-stroke—the Villiers—has a flywheel ignition generator, and this scheme is also in evidence on one or two other comparatively unknown makes. Where electric lighting is fitted (invariably, by the way, as an extra), the generator is usually combined with the magneto. The three most popular outfits are the M-L, Lucas and B.T.H. In the M-L arrangement there is only one rotating unit operating within pole pieces of peculiar shape in conjunction with a stationary coil for the lighting circuit. It is truly a combined magneto and lighting generator, and yet the lighting and ignition circuits are entirely distinct. In the Lucas, on the other hand, there are two armatures, one for ignition and one for lighting current, that for the latter passing through the horseshoe magnets above the other, the armatures being intergeared. The B.T.H. system is known as the Spark-light, the current being drawn from the ignition armature during approximately 40 deg. of the latter's rotation, that is, during a part of the period when the armature is not called upon to supply current for ignition. A continuous, as distinct from an alternating current, is generated to charge a small cell, the commutator gear for the lighting current being an attachment to the standard contact breaker plate and designed for fitting to any of the B.T.H. magneto range.

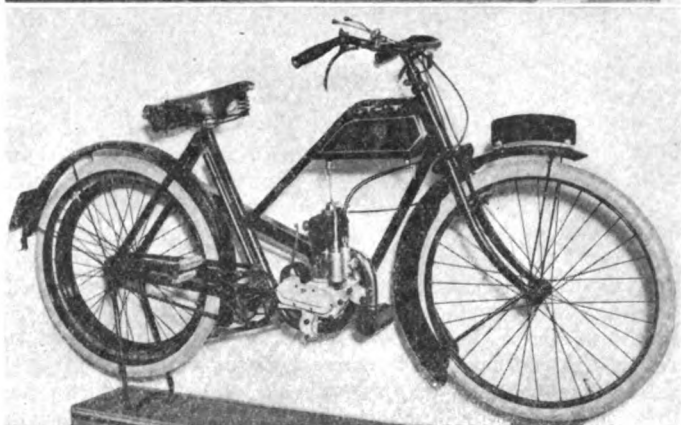
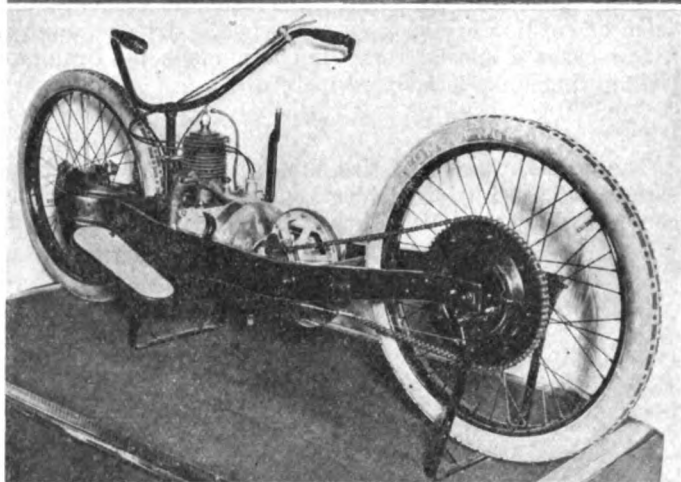
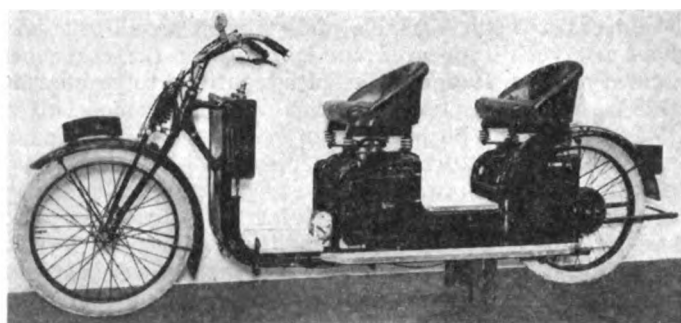
Two-lever carbureters, inferring hand adjustment of the air as well as of the throttle, are used on the majority of machines, and the single-lever type does not appear to have gained in popularity among either manufacturers or users.

Aluminum pistons show a slight gain and also floating wrist pins, but cast iron in the one case and wrist pins secured to the piston bosses in the other still remain predominant. A distinct development is evident, however, in respect of engine bearings. Ball bearings for the crankshaft journals and roller bearings for the big-ends are becoming increasingly popular; even the makers of the J.A.P. engines, who have hitherto held out against ball and roller bearings, have adopted them on new models.

### Lubrication Systems Show Little Change

There is no outstanding change to record in methods of lubrication, the splash system being used on approximately 96 per cent of engines, though methods vary considerably in the system of introducing oil to the crankcase. A mechanical pump for this purpose is used in the majority of the largest engine sizes, the pump working at one-sixtieth engine speed. It draws oil from the frame tank, pumps it to a sight feed, whence the lubricant runs by gravity into the crankcase interior. Semi-automatic systems are most prevalent in single-cylinder engines of the four-stroke type, the normal drip feed having to be occasionally supplemented by charges driven with a hand operated pump.

In two-strokes the "petrol" system (in which a proportion of lubricating oil is mixed with the gasoline) is rapidly being superseded by alternatives, the latter usually taking the form of a drip feed from a sight glass, the oil passing through a branched pipe to the cylinder wall and



16—Reynolds tandem, has 3½ hp. single cylinder engine under front seat. Transmission by chain through three-speed gearset. 17—Chassis of Ner-a-Car machine, which has pressed steel frame, friction variable gear and 2½ hp. two-stroke engine. 18—Typical featherweight machine, the 1½ hp. Hobart. Engine is of two-cycle type with direct belt-drive. Front forks have concealed springing. Sells at £21

to the crankcase; but in a few cases the drip supply is carried to the cylinder wall and to one of the crankshaft journals, thence through a drilled web to the crankpin, the other shaft bearing being of the ball or roller variety and without direct feed.

The unit construction of engine and gearset is exceptional. It is used only on two makes, and those with a small output by comparison with Triumph and Douglas and several others. The usual standard transmission is by primary roller chain from the crankshaft to the gearset and by V belt from the latter to the rear wheel. The all-chain drive is, however, becoming more popular with riders, and consequently few makers of machines of 3½-hp. and over fail to offer it at an extra cost. In only about 40 per cent of cases are the chains all-enclosed. In the remainder the secondary chain merely has a guard.

In the smaller sizes, more often than not, an all-belt drive is fitted to the standard machine, though a two or three-speed gearset with chain and belt drive is offered

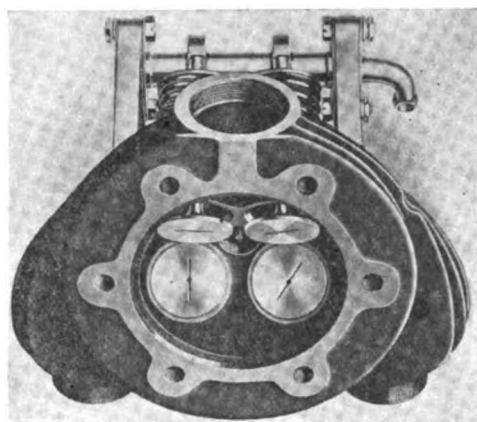


at an extra cost. Variable pulleys with an all-belt drive have not yet disappeared; in fact, two of the dozen best known makers, Rudge and Zenith, continue to standardize this form of transmission on certain of their models.

Approximately 50 per cent of gearsets are supplied by specialists, the Sturmey Archer being by far the most popular in either two or three-speed types. This make of gearset has a single plate clutch with cork inserts for the two-speed box and the multiplate pattern for the three-speed. Kick starters are general but not universal, for in some cases they are offered as an extra. When the transmission is by all-chain, it is usual to embody some form of cushion or shock absorber in the drive, though in a few cases a special form of chain made by Brampton with spring links is adopted instead.

### Brakes

The horseshoe type of tire rim brake is gradually being superseded, mainly by a block operating in a special rim corresponding to a V-belt rim, the block applying to the



19—Underside of detachable cylinder head of four-valve Triumph, showing inlet valve open

inside of the V as a rule, though in a few instances the reverse is the case. The same type of brake, pedal-operated, is most usual on back wheels, either when the final drive is by belt or by chain; but expanding brakes within a drum attached to the rear hub are becoming far more usual, and they appear in a few instances on front wheels also. The external contracting band brake is only used in one or two cases, the internal type being preferred. Only on the most expensive and largest machines, and on merely a few of those, are the front and rear wheels quickly detachable and interchangeable with that on the sidecar.

Electric lighting is not standard on any make, though in 40 per cent of cases it can be supplied as an extra, the generator, as already mentioned, being almost invariably combined with the magneto.

### Passenger Vehicles

Probably 50 per cent of the motorcycles sold in England are sidecar combinations, ranging from 2½ to 8-hp. In the case of the larger machines, the passenger seat and its springing have become more elaborate and even luxurious each year. Sidecar wheels are often separately sprung, as well as the seat, one of the most favored arrangements including a pair of semi-elliptic springs, one of which is located each side of the wheel. Cee springs, quarter-elliptics, cantilevers and semi-elliptics are all used for seat suspension, quarter-elliptics at the front and a pair of Cee's at the back being the usual combination. In view of the general overloading of sidecars by additional passengers, two-seated bodies, usually in tan-

dem form, are frequently observed. At the show a number of makers exhibited this tandem type, and one or two showed "sociables," in which the sidecar passengers are side by side. Single-seaters convertible into tandem bodies were also to be seen in several quarters, and also single-seaters with a small dickey seat for a child. Failing the dickey seat, it is quite usual for the rear panel to bulge rearward appreciably and serve as the hinged top and rear door of a luggage compartment.

Sidecar chassis tend to become more complex than ever, and have usually four, if not five, points of attachment to the cycle frame. In one or two cases a three-point attachment is adopted with flexible couplings, which, with a limited range of movement, relieve both the sidecar and motorcycle frames of a large proportion of road shocks. Screens for sidecars are general, though charged as an extra, and folding tops appear on probably 20 per cent of combinations one meets on the road, though these, again, are not included in the catalog price.

Distinct from the sidecar combination, the three-wheeled cyclecar continues to hold a certain amount of favor. The Morgan is the most popular of this type of vehicle; it is made in several models—some air-cooled, some water-cooled. In all cases the engine is a two-cylinder V, driving through a clutch and propeller shaft to a pair of bevel gears on a countershaft. From this point the transmission is carried through one of a pair of chains leading to the single back wheel, the chains being brought into use by dog clutches on the countershaft.

### Three-Wheelers Elaborate

Some of the three-wheelers are, however, far more elaborate in their specifications, one even including a four-cylinder engine. They have water-cooled engines, and the transmission differs hardly at all from that of a four-wheeled car, in one case the final drive being by worm gearing. But obviously these more elaborate three-wheelers have little to commend them in competition with the small light cars with four wheels. In price, even, they show no advantage, and in this respect they have contemporaries in both directions—sidecars on the one side and light cars on the other. In the case of the Morgan already referred to, which has been a popular make since 1913, this competes directly in its simplest forms with sidecars, one model selling at £150 with an 8-hp. two-cylinder air-cooled engine.

As regards the Olympia Show generally, from a spectacular point of view, it excelled anything of the kind previously held. Ninety-five makes of motorcycles were shown, including 3 American (Reading, Harley and Indian), 1 Belgian and 1 French. The total number of machines on view was 440, and 27 three-wheeled cycle cars in addition. Including accessories and tires, and 45 pedal-cycle exhibits, there were 318 stands in all. As to business done, this was appreciably better than last year, but the revival was not so pronounced as in the case of the car show. Dealers were still very diffident in placing contracts, preferring to wait upon events and order "from hand to mouth," being encouraged in this policy by the announcements of practically all makers that immediate delivery of all models could be guaranteed.

The following summary of retail prices of solo machines will give an idea of the variations since the show of 1920:

	1920	1921
2½-hp. 2-stroke lightweights..	£55-£84	£36-£66
2¾-hp. 4-stroke lightweights..	80-120	52-100
3½-hp. single-cylinder .....	85-140	75-115
4½-hp. two-cylinders .....	120-160	100-120
6 -hp. two-cylinders .....	135-170	105-135
8 -hp. two-cylinders .....	130-180	118-150

# New Machine Grinds Wrist Pin Holes Simultaneously

Double spindle grinder obviates "bell-mouthing" effect and inaccuracy due to great overhang of spindle. Accurate alignment of two holes is assured by method of trueing wheels. Increased production is claimed.

By P. M. Heldt

**S**INCE the advent of the aluminum alloy piston there has been a tendency among engine designers to dispense with bushings in the piston bosses, causing the piston pin to bear directly on the metal of the piston. Several advantages of this practice are obvious. The cost of the bushings is eliminated; the weight of the reciprocating parts is reduced, and the bearing area can be materially increased. It may be that the increase in bearing surface obtainable will practically do away with the need for refitting the bearings during the life of the engine, but if not, looseness in the wrist pin bearings may be eliminated by regrinding the bearings and fitting new wrist pins. Quite lately a few makers of low priced cars seem to have extended this practice of using bearings in unbushed piston bosses to cast iron pistons.

When the bearings of the wrist pin are directly on the metal of the piston it is very desirable that the holes in the piston bosses be ground, so as to obtain at once a good bearing surface which does not require any running in. Grinding of these holes is a rather difficult operation. If the job is attempted with a single spindle grinder, the wheel spindle has to have a great deal of overhang and consequently cannot be made as rigid as would be desirable. Moreover, the wheel has to pass entirely through

one hole, and it has been found that when the wheel is nearly through and the pressure of the work is limited to a narrow width of its face, it will cut into the stock deeper and a "bell-mouthing" effect will result, which is very objectionable.

To overcome these difficulties the Bryant Chucking Grinder Co. has brought out a special double head grinder which grinds the two holes simultaneously. It is a development of the standard machine of the Bryant company. The piston is held in a special chuck mounted on a cylindrical fixture on the bed of the machine. A sectional view of the chuck and fixture is shown herewith. The chuck is mounted on the fixture on ball bearings and is rotated by means of a round belt from the countershaft. The piston is laid into a sort of Vee groove on the chuck, the sides of the groove being turned to conform to the outside diameter of the piston, there being two bearing arcs each about 30 deg. in extent. A clamp made of aluminum extends into the piston from the open end and presses against the inner side of the skirt at about the center of the areas of support on the chuck plate. The reason for the use of aluminum in the clamp is that this makes it easier to balance the chuck and piston. In the drawing the clamp is shown held in position by means of a stud and thumb nut, but this mechanism will be replaced by a cam device to get quicker action. The piston is quickly located in the chuck by means of a hand centering plug which accurately fits a central hole in the chuck and the bored hole in the piston boss. The cam to be used is of the face type, as sometimes used for transmission brakes. There are springs on the clamping studs, the object of which is to permit of a firm grip in spite of slight variations in the thickness of the piston wall.

In the grinding operation the two spindles move simultaneously in the same direction, but in order to remove the pistons the two grinding wheels must be moved apart to clear the clamping fixture. This is accomplished by means of a gear on the shaft of the pilot wheel, meshing simultaneously with a circular rack on the wheel slide and with a rack below it connecting through a rod extending through the center of the wheel slide with the movable slide on the other end of the machine. Thus when the pilot wheel is turned in one direction the two wheel heads are moved apart, and when it is turned in the opposite direction they are moved toward each other. As they approach the position of greatest proximity, the movable slide is clamped at both ends to the wheel slide, this clamping operation being effected automatically by a stop pin on the wheel slide coming up against the lever of the clamping screw at one end of the movable slide, this lever connecting by a link to the lever of the clamping screw at the other end. The stop pin on the wheel slide by

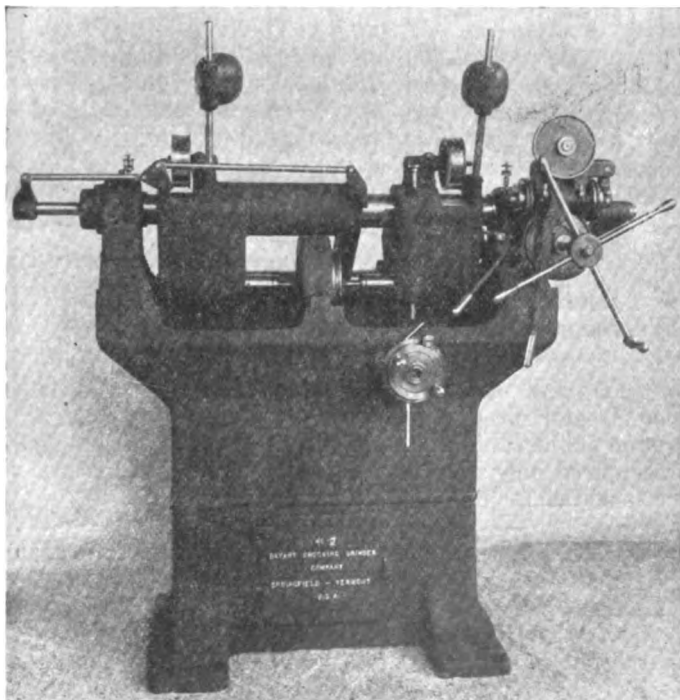


Fig. 1—Bryant No. 2 double head grinder, for grinding wrist pin holes in pistons

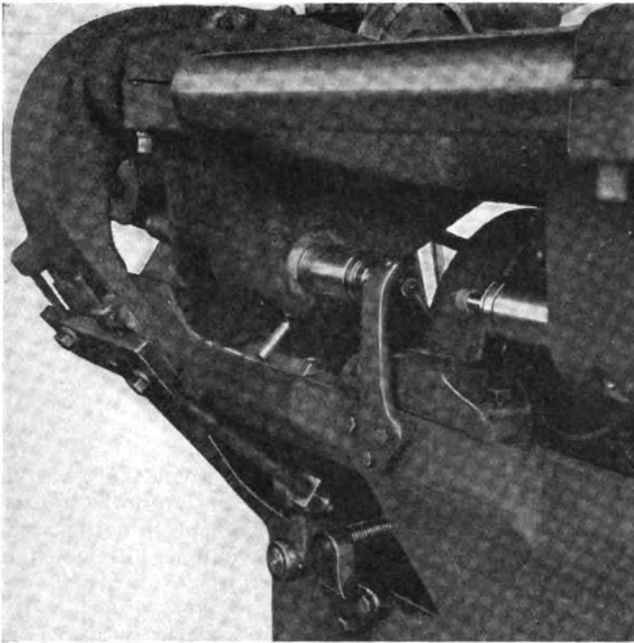


Fig. 2—Wheel heads swung back on cross feed extension for dressing wheels

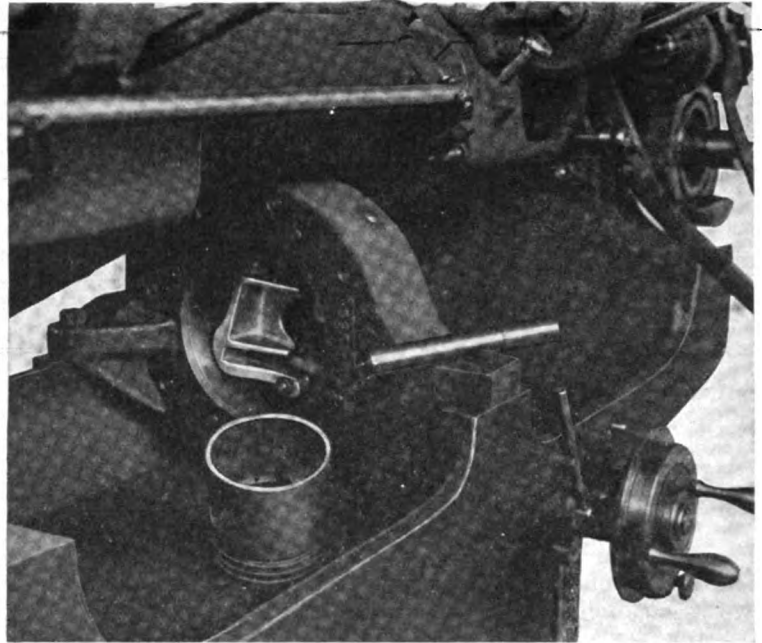


Fig. 3—Work holding fixture showing method of clamping

means of which this clamping action is produced is adjustable.

For the cross feed the same swinging bar is used as in the regular Bryant grinder. The wheel heads are balanced by two counterweights which are adjustable with respect to the axis around which the wheel heads swing. The counter movement of the two wheel slides is effected by hand, but the traverse during the grinding operation is by power, the change over from hand to power control being made by means of one of the levers in front of the machine. The motion of the wheel slides in grinding is reversed automatically by means of two clutches and reversing stops.

In order to prevent "bell-mouthing" of the ground holes, the wheels are passed only half way through. Concentricity of the holes in the two piston bosses is assured by the method used for trueing up the wheels. The trueing diamond is carried by an arm secured to the grinder bed at the rear directly in line with the work fixture. When the wheels are being trued the two wheel heads are clamped together, the same as in grinding, and the wheel slide is in the same position in its bearings as when grinding. The motion of the wheel slide for trueing of the wheels is governed by a control plate at the rear of the machine which slides on an extension of the cross feed screw. This extension of the cross feed screw is adjustable, but for any particular job it would be adjusted once for all. The control plate rides on the head of the cross feed screw in grinding and on the head of the extension bar in trueing the wheel. Hand feed is used for rough trueing and automatic feed for fine trueing.

In order to insure absolute parallel motion of the slide, a guide bar is arranged at the rear of the machine by which a lateral arm of the wheel slide is guided. There is a spring plunger in the wheel slide arm which insures that the contact between the wheel slide and the guide bar is always on the lower side.

Each of the two wheel spindles is driven by flat belt from the countershaft. Then there is a separate drive from the countershaft for the feed mechanism, by round belt, and a drive for the work holding chuck by another round belt. This latter drive is controlled automatically by means of a steel cable which winds around the cylindrical part of the wheel slide, so that when the wheel

head is moved out of the way to remove a piston, the chuck is automatically stopped from rotation.

In addition to the advantage of more accurate work as compared with that turned out by a single spindle grinder, for the reasons already explained, it is claimed

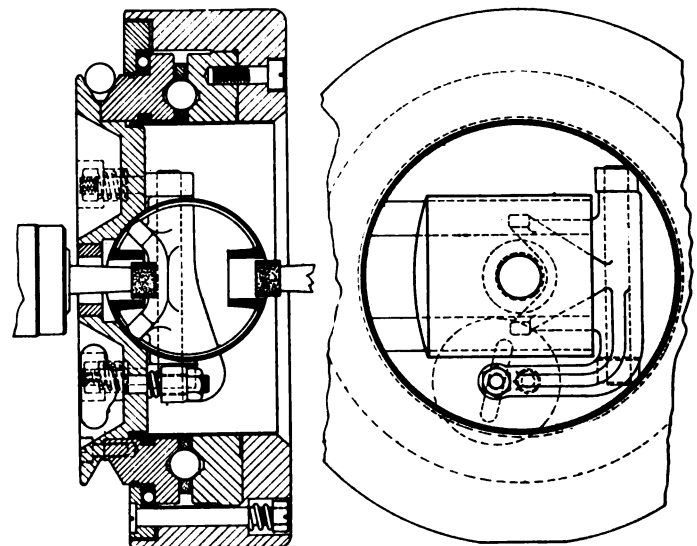


Fig. 4—Sectional view of work holding fixture with piston in place

for this new method of grinding out wrist pin holes that greater production results, because two holes are ground at the same time; the piston needs to be "plugged" or centered only once, and the semi-automatic feature of the machine facilitates the operation.

**T**ECHNOLOGIC Paper No. 186, entitled Oscillograph Measurements of the Instantaneous Values of Current and Voltage in the Battery Circuit of Automobiles, by George W. Vinal and C. L. Snyder, has been published by the Bureau of Standards. It contains the results of tests of the character indicated by the title, made on five different cars, as well as conclusions drawn therefrom. Copies may be had, for 10 cents, from Superintendent of Documents, Govt. Printing Office, Washington, D. C.

# Buenos Aires Show a Stimulation to Sales

Cars valued at 800,000 pesos sold directly at the exhibition which was featured by a large showing of passenger cars in the high priced class. Argentine body builders present many specially designed bodies suited to native tastes. More than one-half the exhibits were American cars.

Buenos Aires, Dec. 5.

COMING as it did in a year of business stagnation, with the Custom House full of rejected merchandise, including some hundreds of automobiles that are gradually being eased on to the market, the enterprise and forethought of the *Automovil Club Argentina* and the *Centro de Importadores de Automoviles y Anexos* in planning the fourth Buenos Aires Automobile Show was worthy of the success that crowned their combined efforts. The Show, under the auspices of the *Automovil Club Argentino*, was held in the *Pabellon de las Rosas* on the *Avenida Alvear*, near the *Palermo Gardens*, and lasted from the 12th to the 27th of November. In view of the depressed state of Argentine industry, the uncertain outlook for the future and the disastrous rise in exchange, it was eminently successful, in the indication it gave of the sources of immediate demand, as well as in the crowds who attended and the actual sale of cars. Perhaps the most significant feature of the show was the positive demonstration of the entrance of Argentine industry into the local automobile market in the building of specialized bodies to accord with the tastes of the wealthy Argentine.

Although trucks and tractors were well represented, the efforts of the organizers were chiefly directed toward the highly finished passenger car. They realized that business conditions prevented any great expansion in the sale of cars in the interior, and that the one point of attack where buying could be stimulated was among the wealthy classes of the city who can afford cars at any time. Consequently, fully half the makes represented were in the high priced class, while practically all the rest were what might be termed the medium price car. The representatives of low priced cars could be counted on the fingers of one hand.

## American Cars Predominate

There were in all 74 cars on exhibition of a total value of 1,200,000 pesos (paper), representing 38 makes. Of these slightly more than half were American, while the rest were scattered between England, France, Germany, Italy and Belgium. The models were mostly 1921 or 1922, though some 1920 models were exhibited.

One feature of the exhibit which was particularly striking was the strong showing made by the local body builders and designers. One-third, or 23 to be exact, of the cars shown had bodies that ranged from rich limousine and sedan designs to a special sport model for a Buick chassis that undoubtedly attracted more attention than any other single feature of the exhibition. Special de luxe bodies for Fords were also shown and favorably received.

Now this emphasis on special body designs and the success that attended it, as well as the abundance of high priced cars exhibited, indicates clearly the policy of the

promoters of the exhibition in appealing to the wealthy buying public of Buenos Aires for this year's sales. As each car was sold a neatly printed card was hung on the windshield of the model giving the name of the owner, thus stimulating the competition among the public to emulate their friends and acquaintances in purchasing new and expensive cars. The general success of the policy of pushing the higher priced models is indicated by the direct sales made at the show. When the results were fully tabulated it was found that 800,000 pesos (paper) worth of cars had been sold directly to the public.

## Should Stimulate Further Sales

These are the direct merchandising results of the exhibition. As to what the indirect results will be, it is too early to forecast an opinion. There are too many other outside factors which at the time of this writing are still undetermined. Certainly the local automobile importers are stimulated. Dealers from the country districts were present, and most of their interest was directed toward the lower priced cars. Whether the stimulation will extend to their market or not depends largely on the success or failure of the harvest that is soon to be gathered. If this proves good and it can be marketed at profitable prices, there will result both a quickening in demand and a lowering in exchange that ought to restore the market for automobiles for the interior to its former satisfactory condition.

There is undoubtedly a tremendous potential market in Argentina for automobiles, trucks, and tractors. As evidenced by the direction of emphasis in the Automobile Show, the one sure market under present unsettled conditions is among the wealthy public who spare no expense in order to have the very latest refinements both mechanically and artistically, in automobile construction. The market for cars in the low priced class has, in the past, been very strong. The present stagnation has hit the medium priced cars the hardest. That there will be a recovery is certain, but the exact time is contingent, as already stated, on the success of Argentina in marketing her products. The bad condition of the roads in the interior, which has been a deterrent in the past to the sale of automobiles, seems on its way toward a solution. Bills are pending in several of the provincial legislatures authorizing the construction of an extensive system of roads, and the Argentine public seems much more appreciative of the necessity of good roads to its future economic development. Next spring a Road Congress is to be held under the auspices of the Argentine Touring Club that has both official and private backing from the most influential sources. The popularization which it will undoubtedly give both to the advantages of good roads and of motor transportation ought to react strongly on the market for automobiles, trucks and tractors.

# Passenger Car Registration Fees Generally Low.

Proposed Uniform Vehicle Law would raise fees in most States for this type of vehicle. This would be desirable from the standpoint of the car manufacturer in that more money would be available for road maintenance and consequently more cars would be used. A few excessive fees.

**A**N analysis of state motor vehicle laws as they affect passenger cars reveals the fact that a great majority of the legislative bodies have failed to impose registration fees for this class of vehicle that are high enough to insure proper highway maintenance and a consequent increased use of motor cars.

This statement may seem rather surprising, coming as it does such a short time after the appearance of an article showing that the situation as regards motor trucks is quite the reverse in most states. The condition created apparently is one under which the motor truck owner is forced to bear more than his share of the taxation burdens, while the passenger car owner is let off with a slightly less amount than he should be charged. This is true, however, in only some states. In others the passenger car fees are considerably higher than those deemed fair, but even among these states there are few cases where the fees are high enough to deter the prospective car buyer from becoming a car owner. There is no case of an undisguised attempt to rule certain classes of passenger cars from the roads as was evident in many states when truck legislation was enacted. It is true that seventeen states have, within the past year, increased their registration fees for passenger cars with the result that some have required fees that are excessive and others have decided upon fees that are too low. These changes are shown in the table accompanying this article.

On the surface of things low fees would generally appear to be desirable, and so they are, but they should not be made so low as to prevent proper highway maintenance. This work should be paid for with money secured from automobile taxation and most car owners are, and should be, willing to bear their share of this expense. Good roads are an essential part of the proper functioning of a passenger car and have a direct bearing on sales.

Thus the passenger car industry faces two situations: one caused by excessive registration fees in a few states and the other by the reverse

being true in most states. Such a condition forcefully emphasizes the lack of uniformity that exists in motor vehicle laws. Those who studied the tables and charts presented in connection with the article on commercial cars will no doubt remember the highly diversified methods of determining registration fees and the great variance of fees in different states. It can readily be seen that the same condition prevails in the passenger car laws. There is the same diversity and variance, and while there is not as great a difference between the cost of registering a car in the state having the highest fee and the one having the lowest the difference is consider-

## Changes in State Laws Governing Passenger Cars

This table was prepared from data gathered by the Motor Vehicle Conference Committee.

State	Date new law is effective	Old Fees	New Fees	Old Speed Limits m.p.h.	New Speed Limits m.p.h.
Alabama	No new law	h. p. Fee Under 25.....\$15.00 25-29.....18.75 30-39.....26.25 40 or over.....30.00 Electrics.....20.00 Steam.....25.00	No change	30 m. p. h.	No change
Arizona	No new law	h. p. Fee 25 and less.....\$5.00 25 to 40.....10.00 Over 40.....15.00	No change	City.....10-15 Country.....30	No change
Arkansas	May 1, 1921	Flat rate.....\$10.00	Per h. p. ....\$0.25 plus 25c per 100 lbs. gr. wt. of vehicle and "vehicle load."		
California	No new law	Per h. p. ....\$0.40 Electrics (flat rate).....5.00	No change	City.....15 Country.....35	No change
Colorado	No new law	h. p. .... 20 or less.....\$2.50 21 to 40.....5.00 41 or more.....10.00	No change	General.....35 Mountain roads.....20 2% or more grade.....10 On curves.....18	No change
Connecticut	Jan. 1, 1922	Per h. p. ....\$0.50	8c per cubic inch or fraction thereof of piston displacement.	City.....30 Country.....20	No change
Delaware	No new law	Per 500 lbs. gr. wt. ....\$2.00 (Passengers at 125 lbs. each).	No change	City.....15 Country.....30	No change
Florida	Jan. 1, 1922	h. p. Fee 22 or less.....\$5.00 23 to 27.....8.00 28 to 35.....12.00 Over 36.....15.00	Per 100 lbs. gr. wt. of vehicle.....\$0.50	25	30 maximum. On bridges, turns, etc. 15. Passing street railway cars, 5.
Georgia	No new law	25 h. p. or less.....\$11.25 per h. p. over 25......60	No change	30	No change
Idaho	No new law	Wt. of vehicle lbs. 2,000 or less.....\$15.00 2,001 to 3,000.....20.00 3,001 to 4,000.....30.00 Over 4,000.....40.00	No change	City.....20 Country.....30	No change
Illinois	No new law	h. p. .... 25 and less.....\$8.00 26 to 35.....12.00 36 to 50.....20.00 Over 50.....25.00 Electrics.....12.00	No change	City.....10 to 20 Country.....30	No change



## Changes in State Laws Governing Passenger Cars.—(Continued).

State	Date new law is effective	Old Fees	New Fees	Old Speed Limits m.p.h.	New Speed Limits m.p.h.
Indiana	Jan. 1, 1922	h. p. Fees Less than 25 ..... \$5 25 to 40 ..... 8 40 to 50 ..... 15 50 or more ..... 20 Electrics ..... 5	h. p. Fees Less than 25 ..... \$5 25 to 40 ..... 8 40 to 50 ..... 20 50 or more ..... 30 Electrics ..... 5	City ..... 10 to 15 Country ..... 25	No change
Iowa	No new law	Per 100 lbs. wt. \$0.40 plus 1% of value of vehicle (minimum \$10).	No change	30	No change
Kansas	July 1, 1921	Flat rate ..... \$5.00	Minimum ..... \$8.00 Plus 50c per 100 lbs. gr. wt. in excess of 2,000 lbs. Electrics, flat rate, \$10.00		
Kentucky	No new law	Per h. p. .... \$0.60	No change	City ..... 15 to 20 Country ..... 30	No change
Louisiana	No new law	Per h. p. .... \$0.25 Minimum fee ..... 5.00	No change		
Maine	Jan. 1, 1921	h. p. .... \$5.00 15 or less ..... 10.00 16 to 35 ..... 15.00 over 35 ..... 15.00	Per h. p. .... \$0.25 plus 25c per 100 lbs. actual weight of car plus seating capacity multiplied by 150.	City ..... 15 Country ..... 25	No change
Maryland	No new law	Per h. p. .... \$0.60 Minimum ..... 10.00	No change	City ..... 15 to 20 Country ..... 35	No change
Massachusetts	No new law	h. p. Fee Less than 30 ..... \$10.00 30 to 39 ..... 15.00 40 to 49 ..... 20.00 50 and over ..... 25.00	No change	City ..... 15 Country ..... 20	No change
Michigan	No new law	Per h. p. .... \$0.25 Per 100 lbs. unladen wt. .... 0.35 Electrics: Per h. p. .... 1.00 Per 100 lbs. wt. .... 0.35	No change	City ..... 15 Country ..... 35	No change
Minnesota	April 25, 1921	Flat rate ..... \$5.00	1.8% of mfrs. list price during first 3 years. 25% reduction 4th and 5th years. 50% subsequent years. Minimum for car weighing under 1 ton ..... \$12 over 1 ton ..... 15		
Mississippi	No new law	Per h. p. .... \$0.50 (Minimum, \$5.00) Electrics ..... 15.00	No change	City ..... 15 Country ..... 30	No change
Missouri	No new law	h. p. Fee 2 or less ..... \$2.00 2 to 11 ..... 4.00 12 to 23 ..... 6.00 24 to 35 ..... 10.00 36 to 47 ..... 14.00 48 to 59 ..... 18.00 60 to 71 ..... 20.00 72 and over ..... 24.00	No change	25	No change
Montana	March 5, 1921	h. p. Fee 23 or less ..... \$5 23 to 37 ..... 10 over 37 ..... 15	h. p. Fee 23 or less ..... \$7.50 23 to 37 ..... 15.00 over 37 ..... 22.50 Electrics ..... 15.00	City ..... 15 Country ..... 25	No change
Nebraska	No new law	Wt. unladen, 1 ton ..... \$10 plus 50c per additional 100 lbs. (Minimum, \$10)	No change	Maximum ..... 35	No change
Nevada	No new law	Per 100 lbs. factory weight plus weight of passengers at 125 lbs. each ..... \$0.35	No change	Reasonable and proper.	No change
New Hampshire	Jan. 1, 1921	h. p. Fee 15 and less ..... \$10 16 to 30 ..... 15 31 to 40 ..... 20 41 to 50 ..... 25 51 to 60 ..... 30 over 60 ..... 40	60c per 100 lbs. weight of vehicle and rated load capacity.		
New Jersey	Jan. 1, 1922	h. p. Fee 10 or less ..... \$4.50 11 to 29 ..... 7.50 30 or over ..... 15.00	40c per h.p. up to 29 h.p. 50c per h.p. for 30 h.p. or more.	City ..... 12 Country ..... 30	No change
New Mexico	Jan. 1, 1922	Per h. p. .... \$0.40	Per h. p. .... \$0.40 Electrics ..... 12.00	Reasonable and proper.	Country ..... 30 20 in passing, 8 crossing railroad tracks. City ..... 15
New York	No new law	Per h. p. .... \$0.25 Subsequent Fees Yrs. after Mfg. date of list price 3 ..... \$0.40 4 to 5 ..... 20 over 5 ..... 10 Minimum 4 cyl. .... 5.00 5 cyl. or more ..... 10.00	No change	30	No change

able. This is especially true in cars of the higher price class. These differences are clearly shown in the following table which gives the high and low points reached for cars in five different price classes:

Price Class	High	Low
\$400 .....	\$22	\$5
\$1,000 .....	28	5
\$1,600 .....	40	5
\$2,000 .....	47	5
\$4,000 .....	72	5

These figures would, of course, vary on different cars within each price class, but typical cars have been taken from each of the five groups and the fees computed for them in each state on the basis of existing laws. These typical cars have also been used in determining the fees shown in the table that follows this article. It can be seen from these figures that there is the same lack of uniformity that existed in the truck fees.

Another feature running parallel with an outstanding one in connection with the truck laws is the various methods of determining fees. Nine different methods are in use at present, and while one may be as fair and equitable as the other, the variance is there nevertheless. These methods, with the number of states having each in use are shown in the following table:

Horsepower .....	25
Weight .....	11
Horsepower and weight combined ....	4
Percentage of original cost .....	2
Flat rate .....	2
Weight and percentage of cost .....	2
Horsepower, length of service and number of cylinders .....	1
Per cu. in. piston displacement .....	1
Weight, horsepower, percentage of cost and length of service .....	1

It can thus be seen that about every combination conceivable has been used in securing a basis for determining registration fees. The result has been indicated. Minnesota charges \$72 for registering a car in the highest price class, while not many miles away the same car can be registered in Colorado for \$5. These are extremes, of course, but they serve to illustrate the point.

This condition is not a new one. It has long been felt and some time ago a special committee which was composed of representatives from the American Association of State Highway Officials, National Automobile Chamber of Commerce, American Automobile Association and Highway Industries Association met and drafted the Proposed Uniform Vehicle Law, which if put in effect would equalize fees and restrictions all over the country. The fees imposed by this law would be based

upon the following principle:

Per horsepower .....\$0.25  
Per 100 lb. gross weight ..... .25

Were this law in effect the registration costs for a typical car in each of the five price classes would be as follows:

\$400 .....\$11  
\$1,000 ..... 15  
\$1,600 ..... 16  
\$2,000 ..... 18  
\$4,000 ..... 20

Under present conditions there are 13 states charging more for registering a car in the \$400 class than would be charged under the proposed law; 3 states charge the amount proposed and 32 states charge less than the uniform law fee. In the next price class 8 states charge more, 3 charge the amount proposed and 37 charge less; for \$1,600 cars 13 states charge more, 5 charge the amount proposed and 30 charge less. For the typical \$2,000 car 13 states charge more, 4 charge the amount proposed and 31 charge less; in the highest price class 14 charge more, 3 charge the amount proposed and 31 charge less.

In passing it may be interesting to note that 8 states charge less for registering a car in the highest price class than would be charged for one in the lowest group were the law in effect; conversely, 1 State charges more for registering a car in the lowest group than would be charged for one in the highest under the Proposed Uniform Vehicle Law.

There is also a considerable variance in some states as to the fees charged for the different types of cars. Minnesota again offers the best example of this, for in that State the fee for the highest priced class is \$72 and for the lowest \$12. It is hardly likely that the difference in the wear and tear on the highways between these two classes of cars is enough to justify such a difference in registration costs. It is quite probable that the man who buys an expensive car can as well afford to pay \$72 as the man who buys a lower priced one can afford to pay \$12. Such fees as the former ones, however, only add strength to the convictions of those who still maintain that the automobile is a luxury, and declare, "It isn't the original cost; it's the upkeep." There is bound to be a certain feeling of injustice when the man who buys an automobile has to pay \$72 to the State for the privilege of running it. Such a fee, however, is unusually high, for the next highest fee for such a car is \$56 and from there the decline is gradual until it reaches

### Changes in State Laws Governing Passenger Cars.—(Continued).

State	Date new law is effective	Old Fees	New Fees	Old Speed Limits m.p.h.	New Speed Limits m.p.h.
North Carolina	July 1, 1921	h. p. Fee 26 or less .....\$10 27 to 30 ..... 15 Over 30 ..... 20	h. p. Fee 24 or less .....\$12.50 25 to 30 ..... 20.00 31 to 35 ..... 30.00 36 or more ..... 40.00		
North Dakota	No new law	1st year Per dollar list price \$0.005 Per 100 lbs. wt. .... .20 Per h. p. .... .10 2nd year 10% reduction. 3d year 25% reduction, and 40% thereafter. Electrics pay \$2 in lieu of h. p. fee. (Minimum, \$5)	No change	City ..... 10 Country ..... 30	No change
Ohio	No new law	h. p. Fee 25 or less .....\$8.00 26 to 35 ..... 12.00 Over 35 ..... 20.00 Electrics ..... 8.00	No change	City ..... 15 to 20 Country ..... 30	No change
Oklahoma	No new law	List price Fee \$500 or less .....\$10 plus \$0.75 for each \$100 over \$500.			
Oregon	Jan. 1, 1922	h. p. Fee 1 to 23 .....\$15 24 to 26 ..... 22 27 to 30 ..... 28 31 to 36 ..... 36 37 to 40 ..... 48 Over 40 ..... 56	Wt. lb. Fee 1700 or less .....\$15 1701 to 2100 ..... 22 2101 to 2500 ..... 28 2501 to 2900 ..... 34 2901 to 3300 ..... 40 3301 to 3700 ..... 47 3701 to 4100 ..... 55 4101 to 4500 ..... 62 4501 to 4900 ..... 71 4901 to 5300 ..... 79 5301 to 5700 ..... 88 Over 5700 ..... 97	Maximum ..... 30	No change
Pennsylvania	No new law	Per h. p. ....\$0.40 (Minimum, \$10)	No change	30	No change
Rhode Island	Jan. 1, 1922	h. p. Fee 15 or less .....\$5 16 to 30 ..... 10 31 to 40 ..... 15 Over 40 ..... 25	Per h. p. ....\$0.25 per 100 lbs. gr. wt. .... .25		
South Carolina	No new law	Wt. of Car lbs. 2,000 or less .....\$6.00 Per additional 500 lbs. .... 2.00	No change		
South Dakota	Jan. 1, 1922	Flat rate .....\$6.00	Mfrs. wt., lbs. Fee under 2,000 .....\$12 2,000 to 3,000 ..... 15 3,000 to 4,000 ..... 18 4,000 and over ..... 30		
Tennessee	No new law	Per h. p. ....\$0.60 Electrics (each) ..... 25.00	No change		
Texas	No new law	Per h. p. ....\$0.35	No change	15-10	No change
Utah	April 1, 1922	h. p. Fee 25 or less .....\$5 26 to 40 ..... 10 Over 40 ..... 15 Electrics ..... 10	h. p. Fee 25 or less .....\$10 26 to 40 ..... 15 41 to 50 ..... 20 Over 50 ..... 25 Electrics ..... 15	Reasonable and safe.	30
Vermont	No new law	Per h. p. First year .....\$1.00 Second year ..... .75 Third year ..... .50 Subsequent years ..... .50	No change	On bridges ..... 10	No change
Virginia	No new law	Per h. p. ....\$0.60 (Minimum, \$10.00)	No change	City ..... 10 Country ..... 20	
Washington	No new law	Weight, lb. Fee 1,500 or less .....\$10 Over 1,500 ..... 10 plus 60c per 100 lbs. additional.	No change	City ..... 12 to 20 Country ..... 30	
West Virginia	Jan. 1, 1922	10c per 100 lbs. of weight up to 2,000 lbs. Over 2,000 lbs., 25c per each additional 100 lbs.	Per h. p. ....\$0.30 Per 100 lbs. wt. of car and load ..... 30 (Passengers at 150 lbs. each).	7-pass. car of 6,000 lbs. gr. wt. City ..... 15 Country ..... 35 Others—City ..... 15 Country ..... 25	No change
Wisconsin	No new law	Flat rate .....\$10	No change		
Wyoming	Jan. 1, 1922	Per h. p. ....\$0.40	h. p. Fee 22 or less .....\$8 23 to 30 ..... 12 31 to 40 ..... 16 Over 40 ..... 20		

## Passenger Car Registration Costs

This table shows the cost of registering a typical car in each of five price classes in all the States under existing laws.

		\$400 Price Class	\$1,000 Price Class	\$1,600 Price Class	\$2,000 Price Class	\$4,000 Price Class
1 Alabama	P	\$15.00	\$15.00	\$18.75	\$18.75	\$26.25
2 Arizona	P	5.00	5.00	10.00	10.00	10.00
3 Arkansas	P-W	11.00	14.00	16.00	17.25	19.65
4 California	P	9.00	9.60	10.95	11.75	12.50
5 Colorado	P	5.00	5.00	5.00	5.00	5.00
6 Connecticut	Disp.	14.16	16.98	19.28	23.04	25.12
7 Delaware	W	7.00	11.00	13.00	15.00	17.00
8 Dist. of Columbia		3.00	5.00	5.00	5.00	10.00
9 Florida	W	7.50	12.50	15.00	17.50	20.00
10 Georgia	P	11.25	11.25	12.65	13.90	15.00
11 Idaho	W	15.00	20.00	20.00	30.00	40.00
12 Illinois	P	8.00	8.00	12.00	12.00	12.00
13 Indiana	P	5.00	5.00	8.00	8.00	8.00
14 Iowa	W-Y	16.00	20.00	27.00	35.00	56.00
15 Kansas	W	8.00	10.50	13.00	15.50	18.00
16 Kentucky	P	13.50	14.40	16.40	17.60	18.75
17 Louisiana	P	5.00	6.25	6.85	7.30	7.80
18 Maine	P-W	6.85	8.10	9.35	9.80	10.00
19 Maryland	P	13.50	14.40	16.40	17.60	18.75
20 Massachusetts	P	10.00	10.00	10.00	10.00	15.00
21 Michigan	P-W	7.60	8.85	10.35	10.80	11.30
22 Minnesota	P	12.00	18.00	27.00	39.60	72.00
23 Mississippi	P	7.50	12.00	13.60	14.70	15.65
24 Missouri	P	6.00	10.00	10.00	10.00	10.00
25 Montana	P	7.50	15.00	15.00	15.00	15.00
26 Nebraska	W	10.00	12.50	15.00	17.50	20.00
27 Nevada	W	7.35	10.95	12.70	14.25	16.20
28 New Hampshire	P	9.45	15.45	18.45	21.45	24.45
29 New Jersey	P	9.00	9.60	10.94	11.76	15.65
30 New Mexico	P	9.00	9.60	10.94	11.76	12.50
31 New York	P	5.65	6.00	6.83	7.60	7.81
32 North Carolina	P	12.50	12.50	20.00	20.00	30.00
33 North Dakota	P-W-Price	7.75	12.40	16.23	20.94	31.13
34 Ohio	P	8.00	8.00	12.00	12.00	12.00
35 Oklahoma	Price	10.00	13.75	17.50	22.75	36.25
36 Oregon	W	15.00	28.00	40.00	47.00	55.00
37 Pennsylvania	P	10.00	10.00	10.94	11.76	12.50
38 Rhode Island	P-W	9.38	12.50	14.33	16.10	17.93
39 South Carolina	W	6.00	8.00	10.00	12.00	14.00
40 South Dakota	W	12.00	15.00	18.00	18.00	30.00
41 Tennessee	P	11.75	12.00	13.67	14.70	15.63
42 Texas	P	7.88	8.40	9.57	10.29	10.94
43 Utah	P	10.00	10.00	15.00	15.00	15.00
44 Vermont	P	22.00	24.00	27.00	29.00	31.00
45 Virginia	P	13.50	14.40	16.40	17.64	18.75
46 Washington	W	10.00	13.00	19.00	22.00	25.00
47 W. Virginia	P-W	13.50	16.95	19.45	21.57	23.78
48 Wisconsin	Flat rate	10.00	10.00	10.00	10.00	10.00
49 Wyoming	P	8.00	12.00	12.00	12.00	16.00

the low point of \$5 in Colorado, where the flat rate system is in effect.

The increases that have gone into effect in the past year have ranged from 1 to 440 per cent for a car in the middle price class. The percentages in the other groups would vary, of course, but to no considerable extent. The following table shows the old fees, new fees and percentages of increase for a car in this group in the seventeen states which have enacted new laws:

	Old	New	Percentage of Increase
Arkansas	\$10.00	\$11.00	1%
Connecticut	13.50	19.45	44%
Florida	8.00	15.00	87.5%
Indiana*	8.00	8.00	...
Kansas	5.00	13.00	160%
Maine**	10.00	9.35	...
Minnesota	5.00	27.00	440%
Montana	10.00	15.00	50%
New Hampshire	15.00	18.45	23%
New Jersey	7.50	10.94	46%
North Carolina	15.00	20.00	33 1/3%
Oregon	28.00	40.00	42%
Rhode Island	10.00	14.35	43.5%
South Dakota	6.00	18.00	200%
Utah	10.00	15.00	50%
West Virginia	4.50	19.45	332%
Wyoming	10.00	12.00	20%

\*No increase for the typical car in this price class.

\*\*A slight decrease for this price class.

From this table it can be seen that even among the states that have increased their registration fees there are ten that have not made the fees as high as they would be under the Proposed Uniform Vehicle Law. It is noteworthy, too, that many of the states increasing

the fees did not raise them as high as they are in other states that previously increased the registration charge.

Looking at the country as a whole it is generally believed that passenger car registration fees are too low. There are instances, of course, where the reverse is true. This serves to clearly show that the outstanding feature of the entire situation is the lack of uniformity. The Proposed Uniform Vehicle Law was set forth in the article dealing with motor trucks as a remedy to the situation, and it is outlined here as a remedy to the passenger car situation, both in the matter of reducing the fees where they are too high and of increasing them where they are too low to permit proper highway development.

It is quite probable that the adoption of the Proposed Uniform Vehicle Law for truck regulation in its entirety would be impractical in some states at the present time. Conditions of the highways and the money necessary to maintain them would be the most important factors entering into such a discussion, for there is no question but that heavy trucks play havoc with flimsy roadbeds. Such is not the case with passenger cars, however. The heaviest of this type of vehicle could scarcely be called destructive on the ordinary type of highway. It is for this reason that there can be found no sound reason for the lack of uniformity that exists. A comparison of the fees for passenger cars and trucks will show that in a few cases the fee for a 5-ton truck in some states is less than it is for a medium-priced passenger car in others. Certainly such a condition would not exist if careful thought and study as to the actual merits of the nation's automobile taxation system had been given.

## Siam Market for Cars and Trucks

DESPITE the increased use of automobiles in Siam the potential market there is not large, according to a report by James P. Davis, American consul at Bangkok. In all of Siam there are not 2000 motor vehicles, and while there will be more sold as time goes on the country is never apt to become one of importance so far as American exporters are concerned.

Poor roads, with chances for improvement small; lack of capital with which to buy cars; high cost of operation; Oriental dislike for new methods and other factors are the chief reasons automobiles are not to be found in large quantities in Siam. A few of the wealthy natives and Americans and Europeans are about the only prospective purchasers. Running conditions, however, are ideal, and cars that were bought in 1908 are still in operation, their owners seeing no real reason for buying new ones.

Bangkok at the present time is overstocked with cars, some 200 unsold cars being on hand, or almost as many as a year's importations. Sale of crops, however, is apt to cause the sale of some of these, but even after they are gone it is believed that many will be sent in from the Straits Settlements, Federated Malay States, India and China, as those countries are also overstocked with cars and they can be bought at low prices.

TESTS made in the mechanical engineering department of the Iowa State College, Ames, Iowa, with five different designs of muffler cutout on a four-cylinder 4 1/2 x 5 1/2 in. engine in a car, showed that the reduction in back pressure due to the use of a muffler cut-out at maximum engine speed and full throttle varied from 2 to 2.5 per cent of the total range of pressures in the cylinder engine, thus indicating that the loss in power and fuel economy due to the muffler are of this order of magnitude.

# 1922 Cornbelt Sales Limited, but Better Business Is Ahead

Farmers are holding corn for higher price with the result that money is scarce. Mr. Beecroft has just returned from making a personal survey of the area and analyzes here conditions as he found them.

By David Beecroft

THE cornbelt area, comprising the States of Iowa, central Illinois, northern Missouri, Nebraska and parts of other States in the Middle West, will come back into the motor car market just as soon as corn climbs from its present price of 28 cents to 40 or 50 cents a bushel. The automotive manufacturer need watch but one thermometer of business in that area—the price of corn. When that all-important product begins to bring prices that are a little less than half what they were a comparatively short time ago, the farmer will begin to unload his stock and he, as well as the town merchants, doctors and lawyers will have money with which to purchase automobiles. Then, and not until then, can the motor car dealer hope to find a market there with a capacity that will anything like equal the market in the past.

The cornbelt is literally stocked to overflowing with corn. Practically the entire crop of 1921 is on the farms, and in some areas 40 per cent of the 1920 crop is still in the hands of the farmer. There are farms where 1921 corn is piled in the open because the building storage capacity is filled with last year's crop.

The net result of such a situation is that the year 1922 will be even a poorer year from the standpoint of motor car sales than was 1921. The farmer was better off when the avalanche of falling agricultural prices first stampeded him. He had ready cash then, but to-day it is all gone and he is heavily in debt. He has not paid the town merchant, some farmers owing this important person from \$300 to \$500. The town doctor and lawyer are waiting patiently for their money and the car dealer is holding his notes. The farmer in the cornbelt has paid for very little that he purchased in 1921.

But the situation is far from being hopeless. As a matter of fact this period of depression is perhaps just what the cornbelt farmer needed. It is serving to bring him back to earth after a flight through undreamed of high prices and consequent luxuries. He was the prey for numerous vultures in the form of stock salesmen and promoters and is learning his lesson. Furthermore this valley in the curve of the automotive business is driving out those unstable firms that established themselves on a somewhat unstable foundation during the boom period. Those substantial automotive dealers who were in business before the war and who have conducted their businesses on a sound economic basis are still a considerable distance from the wall. The situation from their point of view is not particularly bright at the present, but they are fighting and fighting hard, and there is no doubt but what they will come out on top at the end.

An analysis of conditions affecting the cornbelt automotive market reveals the factors that have brought about the present situation. It also shows that the farmer to-day is a different citizen, mentally, than he was a year

ago. He no longer talks of \$1.35 corn, but his mind is on 50 cent corn. That looks big enough to-day and will satisfy him. The farmer has mentally adjusted himself to this new level of prices in the past year and is that much closer to liquidation. He is no longer asking for those conditions that prevailed during the war, but wants only conditions that will make him the substantial citizen he was before the war. That, of course, will be brought about and the sale of motor cars in the cornbelt will again reach a high point.

What brought about the present situation? A year ago the farmer went on a buyer's strike and continued on it most of the year. He has been firm in his refusal to buy. Not all have had money to buy, but many who might have been in the market have kept out of it. The buying capacity of not a few has been restricted by the inability of the country banks to loan money. These banks have tied themselves into a Gordian knot with the farmers and have no funds for loans. Farmers with 160 acres of good corn land worth \$200 an acre, and with a mortgage of but \$2,000 against it, have not been in the market due to lack of bank capital. They will buy on credit, but who can extend them credit? The motor car dealer, except in very isolated cases, cannot. Some country banks have not cashed a farmer's note in sixteen months. The country banks in the Sioux City, Iowa, radius owe the banks of that city \$6,500,000. These Sioux City banks are no different from those in Des Moines and other large population centers of the cornbelt area.

The country banks are largely responsible for their own condition. They got their feet tangled in the speculation period of 1917-1918-1919, when land jumped from \$200 to over \$500 per acre in many sections; when the wealthy agricultural sections were overrun with stock salesmen for a score of new ventures; when farmers went touring with their families to California or Florida in harvest time, leaving the farm with the hired help, and when many new luxuries in rural life were indulged in to the fullest extent. In those long-to-be-remembered days the farmer bought \$10,000 worth of stock in some new meat packing company, or other co-operative venture. He paid \$2,500 in cash and gave his note for \$7,500. The stock salesman took the note to the local banker and sold it at an attractive discount. These banks are still holding many of these documents, and will continue to hold them until the farmer decides to liquidate his corn and meet his obligations.

The banks are not closing on the farmers, for there is too much at stake. It is rumored that the bankers profited well on many of these flotations by the liberal discounts of the stock salesmen, and it is even further rumored that the stock salesmen got their lists of farmers capable of buying stock from many of these same rural bankers.

The bankers generally do not want to discuss the subject.

True, there is another aspect to this farmer-banker situation. The banker is not forcing the farmer to sell corn for fear that such a movement will result in too great a flow from the farmer to the market, which might result in knocking what bottom there is left out of the market. Instead of 28-cent corn the price might be 20 cents or even lower. This is good sound reasoning on the banker's part, and having, perhaps, made it easy for the farmer to get himself into his present financial straits, the banker is going to stay with him and get him out. There is nothing else left to do. In Iowa, for instance, where the State is 95 per cent agricultural, industry loses its grasp if the farmer goes into receivership. There is a general concerted movement to avoid this.

Like everyone else the motor car dealer in this section is hit hard. It is an impossibility for most of the farmers to pay their notes due to these dealers. Many are not even paying the interest as it comes due and yet few are foreclosing. Some are threatening to do so, but even they may decide otherwise. All classes are in pretty much the same boat. They went up together in war days and now they must stand together in days of deflation. The farmer is most in the public eye, and as all industries in the area are dependent upon him he must be saved at all costs.

So, as a result of this rise and fall of the farmer, the cities and towns of the area are affected in like manner. The merchants, doctors, lawyers—most everyone, in fact—are all out of the motor car market, and must remain out until the farmer pays them what he owes them. The farmer cannot come back until he has met his obligations to these people, consequently it might be reasonable to suppose that the first noticeable increase in sales in the area will be among the townspeople rather than on the farms. But that increase cannot be expected too soon. The picture is not a particularly pleasant one, but every cloud has a silver lining, and in this instance the lining is 50-cent corn. That is a possibility, and when it comes it will affect the cornbelt as 20-cent cotton has the Southern States in the last few months, although not quite to the same extent.

It is to the future, rather than to the present, that the automotive manufacturer must look in the cornbelt. Even after the 50-cent corn becomes a reality there must be time to bring about stabilization. The farmer must pay his debts and so must the men of the towns and cities. The year 1922 will not be a golden one so far as motor car sales are concerned, but all these conditions will gradually be removed and business will come back. The area has its face to the future. These days are man-making days. The cornbelt is suffering from a hard siege of recovering pains, but it is on the road to recovery, nevertheless.

The situation in Iowa is typical of what it is in the rest of the district. The statistics of that State are representative of other corn-growing States, and an analysis of conditions there will serve to show conditions of the cornbelt. The motor car dealers of that State are up against what they consider a pretty serious proposition, but they are not backing down. For a good many years the Iowa dealer was looked upon as something of a super dealer. Any State with a motor car for every 5.5 persons must have had some real motor car dealers. Iowa has

had real motor car dealers and still has some left, just as many real dealers as a year ago, but not so many unreal ones. A year ago the State had 4400 car dealers. Perhaps a majority of these were simply bowled off their feet and some of them have not gotten back on them yet. The Iowa dealers' lot was cast in pleasant places. He was not so great a salesman as the 5½-person-per-ratio would lead us to expect. The State had the money and bought cars. When the liquidation move hit the State many of these dealers had no real resistance to combat it or even stand up against it. They got a pretty severe solar plexus.

But Iowa, a year after this move of liquidation, still has a strong organization of motor car dealers, a group that will continue and will be on hand next year and the year following. Two hundred of the 4400 gathered recently in their two-day annual convention in Sioux City. The Iowa Motor Trades Bureau, which is the State dealers' association, had a membership of 1400 a year ago. To-day only 1000 are in good standing, and out of this 1000 only 200 registered at the convention. It was a small showing compared with 800 a year ago, but pretty

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**C**ONSIDERED as a possible purchasing unit the cornbelt is not so attractive as a year ago. The farmer was better off when the avalanche of falling agricultural prices first stampeded him. He is on the way to liquidation, however, and the rising price of corn will materially affect the sale of automobiles in the corn-growing states. The boom is over, its results are being felt and the cornbelt will soon be on the road to recovery.

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fairly represents the dealer situation in the cornbelt. Many sent regrets and openly stated they had not the ready cash and could not afford the trip. Many others are down and out, out of the sale of motor cars, perhaps for good. The mortality of Iowa dealers during 1921, however, has not been so great as might be imagined, for they are mostly running garages and doing a good repair business, but many have gone out of the car selling business. In one town of 2000

population in the eastern end of the State, there were eight car agents a year ago and only three to-day. The present three have garages in the town, but they have given up car agencies and declare they will not take on other lines. This percentage is fairly typical of how car lines have been dropped in all parts of the State. The newcomer dealer of two years ago, a product of war luxury, has been eliminated from the motor field, and while business failures are numerous they are from these ranks of newcomers, leaving old pre-war firms stable and pleasantly conspicuous. The cornbelt is sound. It is coming back.

The farmer has been out of the market this year. Ford dealers in such centers as Marshalltown, Waterloo, Cedar Rapids and Fort Dodge, who in years past sold 40 per cent of their cars to farmers, have sold 10 per cent this year, and in some sections not that many. In sections like the northeast corner, rolling Mississippi territory, where dairy farming is general, farmers have been good buyers, and have paid cash. Some dealers selling high-priced cars have sold three or four to the farmers where they formerly sold 50 or more. Motor truck sales to farmers have almost stopped. One Ford dealer who sold thirty-seven last year has sold ten this year. Tractor sales ceased entirely. Dealers who sold fifty to seventy-five a year ago have not sold one. Many tractors sold in the last two years have not been used. The farmer has worked his horses and saved gasoline. It has been a poor year for the sale of accessories. The biggest jobbers admit business has been from 40 to 50 per cent of what it was last year. To-day the accessory shelves of the dealers are empty or nearly so. The recent "Ask 'Em to Buy" campaign of the Automotive Equipment Association, how-



ever, has electrified the accessory business and awakened the garagemen to the realization that there is still some ready money in Iowa. One Des Moines dealer told of monthly accessory sales on his service floor, of \$3,200, by the foreman on the floor. The "Ask 'Em to Buy" campaign was a big stimulant. The dealer who does not expect to sell many vehicles in 1922 is going after the sale of accessories and repair business with hammer and tongs. The jobbers are co-operating in the effort. One of the biggest Iowa jobbers is putting double the number of road men on for 1922 that he had in 1921. He is putting them on a commission basis instead of straight salary and expects to double the business of this year.

The jobbing trade of Iowa did not escape war expansion. Two years ago there were eighteen jobbers in the State. To-day there are eight, or approximately the same number as in pre-war days. The newcomers have disappeared.

The automotive dealer has a full realization that even in the cornbelt the motor vehicle has not reached its point of saturation, and that the only saturation point of motor vehicles is the saturation point of transportation. The section has its own problems, but statistics indicate the possibility of automotive sales in many lines. Of a population of 2,500,000 in Iowa, 63 per cent live on the farms, of which there are 204,000. The Iowa farmer to-day owns 171,575 acres, according to the Government census, which means that there still are 32,000 Iowa farmers to be sold cars. Statistics do not tell what part of the 24 per cent of the population of the State living in towns under 25,000 population own cars; or what percentage of the 13 per cent of the State population residing in cities over 25,000 own cars. All of these offer future fields for the alert dealer who is preparing as never before to sell to all three of these divisions of population.

#### The Motor Truck Market

As a motor truck market statistics are poor compared with those for motor cars. To-day one out of every eighteen farmers in Iowa owns a truck. The total motor trucks on farms are 10,788 for 204,000 farmers. When the revival sets in many farmers will purchase trucks before cars. The truck is a growing essential chiefly in view of the highway program which has been going on this year. The year 1921 has been the greatest record in the road building history in Iowa. Up to Dec. 1 this year 1406 miles of a 2502-mile primary road system was either completed or under construction. This primary system will connect market centers and county seats. The estimated cost of it is \$20,500,000. From Congress Iowa gets \$2,102,000 as her share of Federal aid for the

fiscal year ending June 1, 1922. Ninety-eight of the ninety-nine counties in the State have been working on this system. Following this primary system is a secondary one for connecting lines. The stimulant to the automotive market that such a highway system is to a State 95 per cent agricultural can scarcely be estimated, and the motor truck will take its place alongside of motor car when this system is well under way.

#### A Field for Tractors

The automotive dealer is not asleep to the possibilities of selling tractors in a corn and oat belt where land is worth \$200 to \$250 per acre, and where farms average 120 to 160 acres. Government statistics place the number of tractors in Iowa at 22,319, or one tractor for each ten farms. The remaining 182 farms are without tractors. The automotive dealer has played his part in selling the 22,319 tractors now in the State. One Iowa tractor manufacturer, the Hart-Parr Co., has 25 per cent of its dealers automotive dealers, and it is estimated that approximately 25 per cent of the dealers of the State sell tractors. Although tractors are literally stagnant at present the tone of the market is optimistic and 1923 is now being chalked up as a better tractor year. November of this year was one of the best farm machinery months of the year in Iowa. The farmer gave evidence of having to come into the machinery market. It is estimated that the farm machinery of the State is at 60 per cent normal to-day, which means that the farmer must start buying soon. The automotive dealer is grasping the broader vision of selling tractors. He no longer sells it as a mere substitute of animal power on the farm, but rather as a production machine for the farm.

The corn growing period is from May 15 to Oct. 3, the date of frosts. The tractor makes it possible to increase the yield per acre of corn by waiting until the ground is ready to plow in the spring and getting the seed sowed in time. It is also possible to plow the ground late in the fall in order to kill weeds and prepare the ground for spring. In these two ways the tractor takes care of the peak of farming. It is truly a production machine for the farmer. What is true of the cornbelt is also true of the winter wheat areas of Kansas, where July plowing is needed, and is also true of the wheat areas of the Northwest. It is in this aspect of handling the peak loads that the dealer sees in the tractor a rapidly increasing sales field and one that logically lies at his door.

The dealer has sold cars to a good high percentage of the farmers in the cornbelt, and he is now setting his house in order to sell to those farmers who do not own trucks or tractors.

## Kiln Drying Course for Home Study

SINCE the announcement of the correspondence-study course, Kiln Drying of Lumber, by the Extension Division of the University of Wisconsin less than two years ago, almost 400 persons have enrolled. This course has been developed through co-operation of the U. S. Forest Products Laboratory. Men from thirty-seven States of the Union and seven foreign countries have taken up this mail instruction to learn more about the art of operating dry kilns, and the proper handling of lumber in general.

This correspondence-study course is an outgrowth of the resident short courses which have proved so successful at the U. S. Forest Products Laboratory, located on the University campus. It was early recognized that much of the information on improved methods of kiln drying

could be taught by mail. Many men who cannot avail themselves of the class instruction in kiln drying given at regular intervals at Madison enroll for the correspondence-study course and so obtain valuable information upon the latest developments in the seasoning of wood.

The course consists of ten assignments, taking up the subjects from the structure of wood, its moisture content, shrinking and casehardening, on through a discussion of the various types of kilns, heat, humidity, circulation, and the operation of kilns. Drying schedules for all of the more common kinds of wood are included.

The text used in this course is specially prepared and in such a form that it can readily be understood by any one with only a common school education.

# South African Tractor Market Demands Study

## Part II

Mr. Bell, in this second article on selling tractors in South Africa, points out the necessity for using careful sales methods. The demand will not be large in the immediate future, but the territories there offer a great potential market and should be prepared for the expansion that will come.

By George B. Bell\*

**I**N creating a market for tractors in South Africa demonstrations play a very important part, and because of the sparsity of the population and the large distances to be covered, they present some difficulties. Care must be exercised not to "over-demonstrate," as some salesmen have done in the past by speeding up their engines or tampering with their governors. There have also been occasions when salesmen have attempted to haul a greater number of plows than their machines could handle, or to plow too deep. In such cases a poor impression is created upon those interested in the trials, while in the case of over-demonstrating, the buyer is either dissatisfied when he finds that the machine will not keep up to that mark in regular performance, or ruins the machine in attempting to keep up with the demonstration. These things are, of course, fatal to a successful marketing of tractors. The technically qualified expert does not fall into such errors of judgment and will not attempt trials except under favorable conditions, utilizing the model that is best adapted to the particular problem. Manufacturers who are only represented by dealers cannot lay too much stress upon educating their dealers into the policy of tractor service rather than a mere physical sale of machines.

It is also necessary that care be exercised not to give demonstrations except where sales are possible as, otherwise, large sums may be squandered in useless efforts. Before undertaking a demonstration, it should be understood that a purchase will be made if definite results are obtained, with the further understanding that the cost of the demonstration, or a part of it, will be borne by the farmer in the event of a decision not to purchase. There are many farmers who are eager to have free demonstrations, but dealers cannot afford to undertake free plowing on the off chance of making sales.

English tractors are the strongest competitors of American makes. They have the advantage of being admitted into the Union free of duty, as are also tractors from reciprocating Dominions, including Canada. The duty on tractors from other countries, including the United States, is 3 per cent ad valorem, which is based on the Home Consumption Value. Despite the fact that the price of the English tractor is not subject to an exchange handicap and is imported at a cheaper freight rate, the American article has dominated the field.

Several Fiat tractors have been imported, but their

unsuitability for the market and their higher price do not make them strong competitors at the present time. German competition is limited to the Hansa Lloyd tractor, which is imported through a Cape Town firm. Its quoted price is £750, which is about the equivalent of other makes of equal power and size. It is understood that the company selling these tractors in Cape Town will take in exchange South African merchandise at its market value. This competition apparently is not greatly to be feared as there is no service given with the tractor. In this connection it should be stated that American tractors have been shipped to this market perfectly packed, and the question of service and spare parts has been handled practically the same as in the domestic market. In general, in making a shipment of tractors, it is advisable to ship spare parts amounting to 15 per cent of the value of the tractors.

Tractors are handled by three classes of agencies—automobile distributors, agricultural implement and machinery dealers and engineering firms. Distribution by automobile dealers has been altogether unsatisfactory. This is due, in a large measure, to the fact that tractors have been sold merely as machines, without any special attention to the work to be performed, or the type of tractor needed. These firms, which are generally located in the larger cities, carry tractors simply as a side line, and consequently reach a very small part of the farming communities. Distribution through the well-established agricultural machinery houses has been successful, because these houses are intimately acquainted with the needs and methods of the South African farmers, and that they have branch offices and sub-agents in all parts of the Union. Engineering firms as distributors undeniably offer great possibilities, as they should be able to render great service in adapting tractors to the special uses for which they are intended. The average farmer is skeptical to-day as regards the advantage of the machine over oxen, and every failure serves to make it more difficult to market other tractors. It is natural that the farmer is incapable of making an analysis of the reasons for the failure and attributes it to tractors as a class and not to the particular tractor that has not made good. While it would be entirely possible for a manufacturer to educate either automobile distributors or agricultural implement dealers up to a strict regard for a sales policy based on an analysis of the requirements of each particular inquiry, it is admittedly more difficult than securing the co-operation of an engineering house with which such a policy is well understood.

\*Chief Agricultural Implements Division of the Bureau of Foreign and Domestic Commerce. Condensed from an article appearing in this week's issue of Commerce Reports.

It is not good business to try to force upon the distributor a greater number of machines than he believes he can sell to advantage in the first year or two. If the distributor has a well-formed sales organization and the tractor meets with the approval of his trade, he will quickly take advantage of such a situation and decide upon the quantities that he can handle to the best interests of both the manufacturer and himself. It is also best when a contract is made with a distributor that he be furnished gratis with the proper electrotypes, literature and repair lists, all bearing the name and address of the distributor.

Agencies may cover one or several of the natural divisions into which the Union is divided. Capetown, Port Elizabeth, East London, Durban, Johannesburg and Bloemfontein are the leading distribution centers, each serving the surrounding territory. Lourenco Marques is the principal center for Portuguese East Africa, while Salisbury and Bulawayo are the leading centers for Rhodesia.

Distributors purchase tractors outright from the manufacturers, generally being required by contract to maintain a stock of the various models, as well as an adequate supply of spare parts, in order to give good service. Purchases are made both direct from manufacturers and through American commission houses. A 90-day draft is generally drawn by the manufacturer and attached to the shipping documents if the purchase is made direct. Generally, and under normal conditions, if the distributor makes his American purchases through a commission house financial arrangements can be made that are satisfactory.

The credit of the large distributors is of the best, and a good risk. In normal times local sales are on a cash basis or else a large percentage of the purchase price is paid down. At present, when farmers are receiving low prices for their products, and when they are finding it difficult to meet their current liabilities, cash sales are infrequent, and terms must be given in order to turn over stocks, which, while not large, are more than sufficient to supply the present demand. Even when favorable terms are given it is frequently difficult to consummate a sale. Selling tractors at auction is quite common. A light-weight tractor has been sold, complete with plows and spare parts, as low as £100, and it is understood that a fairly large stock of this tractor is held in the Union.

Much improvement cannot be expected until the economic balance of the world is restored and South African farm products are moving steadily to England, Europe, Japan and the United States. However, one of the hopeful signs is that the continental, especially the German, demand is improving, and this will react favorably on the financial position of the farming community. As American tractor prices have been reduced in line with other products, local dealers holding stocks of machines imported at peak prices and low exchange rates have had to take fairly heavy losses.

The future demand for tractors cannot be measured by the present situation or that of 1920. The Union is making steady progress along agricultural lines, and the farmers are becoming more and more progressive. The potential market for the sale of tractors looms large,

and within the next five or ten years the pioneer work that is now being done should bring satisfactory results. There should be a decidedly increased use of the tractor not only in the Union, but also in Rhodesia, Portuguese East Africa, British East Africa, the Belgian Congo and the Southwest Protectorate, where the demand is very small or practically non-existent. No separate statistics are available for these sections, and it is therefore difficult to gage the present demand. American representatives state that comparatively few machines are used in Rhodesia and British East Africa, while there is practically no demand in the Belgian Congo and the Southwest Protectorate. Rhodesia should offer a good field in the course of the next few years, as ranching is carried out there on a large scale. The rich island of Mauritius, with its large sugar estates, is not a potential outlet, according to the representative of a large American company. This is due to the fact that the land is of a lava rock formation, necessitating hand cultivation. The cane is grown in rows between rocks, and even plowing with horses is out of the question. However, it is known that one estate is experimenting with two tractors, in spite of these handicaps.

The subject of advertising is not a complex one, although it is often mishandled. It would be advisable to utilize a qualified advertising agency either independently or in conjunction with an American agency. The names of several of these agencies are on file in the Agricultural Implements Division and will be furnished to those interested on request. There is certainly no necessity of giving the work to other than South African or American agencies.

The tractor trials recently held at Pretoria under the auspices of the Union Department of Agriculture at the Experimental Farm of the Faculty of Agriculture of the Transvaal University College served to emphasize the development of the tractor trade in South Africa. They were a result of the activities of the Tractor Dealers' Association, which realized the need for a more accurate knowledge of the possibilities of the tractor, and that records of costs, etc., based on European or American tests were wholly inapplicable to local conditions.

The trial consisted of plowing eight acres of virgin soil and six acres of old land, and of a brake test. Moldboard plows were used, the minimum depth of plowing required being 5 in. in virgin soil and 7 in. in old soil, although deeper plowing was permissible. There were the usual conditions regarding fuel, lubricants, oil, grease and water. White labor was reckoned at 12s. 6d. per day and colored at 2s. 6d. The purpose of the trials was to determine the efficiency of the tractors considered as plow tractors, and to find the cost of plowing per acre for various types of soils and under the conditions generally prevailing in the Transvaal, not, however, with a view to awarding prizes, but merely for the purpose of securing data and making observations regarding the work of each tractor.

There were three types of tractors entered—wheel tractors, tracklayers and motor plows. In the first class there were six American and two British machines; in the second class five American tractors, and in the third class there was one entrant, the Swedish Avance motor

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**I**MPROVEMENT in the South African tractor market will not be great until the economic balance of the world is restored and South African farm products are moving steadily to England, Europe, Japan and the United States. Now, however, is the time for American manufacturers to pave the way for future sales in this market by systematic and intensive working of the field, so that they may be prepared for the development and expansion which may reasonably be expected.

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plow, which has the motor and plows all on one frame.

Points to which special attention was paid were weight of machine and percentage on driving axles; weight per inch, width of wheel and diameter of wheels; mechanical design and construction; accessibility of engine, gear-box, magneto, etc.; adaptability to various kinds of work; ease of control and safety in handling; ease of turning, and turning radius; facility of attachments; wheel devices; attendance necessary; oil circulation and means of telling whether or not the oil system is functioning; effectiveness of air cleaning and dust-proof construction. The majority of the tractors were fitted with four-cylinder, four-stroke cycle vertical engines, with high-tension ignition and water-cooling systems, although high-speed and low-speed engines were both in evidence. Automatic governors of the throttle type were most in favor, while the oiling systems were either force feed or a combination force and splash feed. The tracklayer type showed to advantage on soft ground, having a better grip with less packing of the soil. The wheel tractors moved over the soft soil quite effectively and have the advantage of less wear on the wheels than the track-laying type, which also absorbed more power. All the tracklayers moved with both tracks on the unplowed land and steering was not affected by the draft. The control of the wheel tractors was affected to some extent by improper hitching and by side draft. All the tractors were fitted with air cleaners, either of the washer or dry-air type. Most of the competing machines worked on paraffin, starting on petrol, excepting two, one using a mixture of the two and another crude oil. All were fitted with

drive pulleys for stationary work, with various degrees of suitability for road haulage.

The results of the plowing tests, as well as technical details regarding the various entries and local prices, are shown in the July issue of the *Journal of Agriculture*, of which a copy is on file in the Agricultural Implements Division of the Bureau of Foreign and Domestic Commerce. The loan of this copy may be secured by addressing a request to the division.

It is unfortunate that costs of oxen plowing under similar test conditions are not available, as they would be of considerable interest. However, the trials have undoubtedly served to focus attention upon the use of tractors and furnished some useful comparative figures. Under present conditions sales will be largely confined to progressive farmers who realize the advantage of the motor-propelled machine, especially in the dry period when the land in the Orange Free State and the Transvaal is sunbaked and cannot be broken with oxen. In other sections of the country the progress of the tractor will be made under more normal working conditions.

While sales for the next few years may not be large, it is believed that South Africa will in the near future offer an excellent market for tractors, all of which will be imported, as local industrial development is not capable of turning out such a highly complex product. Now is the time for American manufacturers to pave the way for future sales in this market by systematic and intensive working of the field, so that they may be prepared for the development and expansion which may reasonably be expected.

## English Char-a-bancs and Motor Buses

**I**N England the char-a-banc or motor bus is taking the place of a private automobile for many people of average means, according to George M. Sprowls, special field representative of The Goodyear Tire & Rubber Company, who was an interested visitor at the Olympia automobile show in London.

The char-a-banc, which carries from 30 to 35 passengers, came into general popularity immediately after the war and has developed rapidly. It is principally used for special excursions to the seashore and countryside. Most char-a-bancs have no tops, but there appears to be a development toward an "all-weather" top. The usual type is split up with long, cross-wise seats, each holding five passengers, with entries by side doors opposite each seat. One rather unusual body exhibited at the show had permanent tops at the front and rear of the car, while the center portion was open. This center portion, however, had windows which could be lowered into the sides and a top that could be rolled back, thus providing either open or closed driving.

Another type of passenger-carrying vehicle which is growing in popularity is the motor coach, which is used for regular trips between towns or for extended tours. These have closed bodies and are quite well appointed. One of the finest cars at the show was a motor coach built to carry 26 persons; the interior was finished in veneered walnut and divided into two compartments. Seats were not arranged in a fixed order, but consisted of leather upholstered chairs arranged as they might be in a drawing room. Each compartment also had a folding table.

Another type had permanent seating arrangements along more conventional lines, with aisles down the center. These seats have high backs and very easy springs, making them unusually comfortable. The bodies are mounted on

pneumatic tires and ride about as easily as a private touring car. This type of car seats about 20 persons.

A more inexpensive type of car was shown, which seats 26 passengers, the whole weighing less than a ton, and selling for \$1400.00.

## Materials Used for Spark Plug Electrodes

**T**HE chemical composition of spark plug electrodes was made the subject of an investigation recently conducted at McCook Field. Chemical analysis indicated that the center electrode is generally pure nickel wire; in some cases manganese was added, probably as a hardener and deoxidizer. In one case the center electrode is a nickel-chrome-iron alloy. The ground electrode in general has the same composition as the center electrode. The tabulation herewith shows the chemical composition of the electrodes analyzed.

	Ni.	Si.	Cu.	Fe.	Mn.	Cr.	C.	P.	S.
A-1	98.49 a	0.04	0.43	0.78	0.26	...	...	...	...
A-2	Nickel electrode too small for analysis.								
A-3	1.27	...	...	...	0.58	0.80	...	0.034	...
B-1	97.66 a	0.06	0.81	1.17	0.30	...	...	...	...
B-2	Nickel electrode too small for analysis.								
B-3	1.06	...	...	...	0.31	0.96	...	0.041	...
C-1	98.78 a	0.08	0.07	0.93	0.14	...	...	...	...
C-2	99.72 a	Trace	0.13	0.15	Trace	...	...	...	...
C-3	...	...	...	...	...	...	...	...	...
D-1	27.85	...	...	49.00	1.23	22.00	...	...	...
D-2	Plain carbon steel.								
D-3	Nil	...	...	...	0.88	...	0.16	0.106	...
E-1	94.96	0.21	0.97	1.61	0.56	...	...	0.093	...
E-2	Believed to be same material as E-1. Too small for analysis.								
E-3	94.96	0.21	0.97	1.61	2.40	...	...	...	...
F-1	29.01	High nickel steel.			0.80	...	0.16	...	...
F-2	...	...	...	...	0.54	...	0.21	0.110	0.135
F-3	29.01	...	...	...	0.80	...	0.16	...	...
G-1	97.23 a	0.07	0.36	0.96	1.38	...	...	...	...
G-2	Believed to be same material as G-1. Too small for analysis.								
G-3	97.23 a	0.07	0.36	0.96	1.38	...	...	...	...
H-1	96.69 a	0.08	0.37	0.86	2.00	...	...	...	...
H-2	Believed to be same material as H-1. Too small for analysis.								
H-3	Nil	...	...	...	0.71	...	...	...	0.130

# Distributing Channels Important Marketing Factors

Many independent jobbers can handle the work of distribution in a more efficient manner than can the branch house established by a manufacturer. Financial control does not effectuate a greater efficiency in the distribution of a product. The habits of buying must be considered.

By Harry Tipper

**D**ISTRIBUTION has been the subject of more discussion, perhaps, than any other part of marketing work. Channels, methods and values in distribution have been discussed from every angle, but the discussion has not always recognized the functions of distributing operations, the reasons for their growth and present status, the extent to which they can be altered, and the stable portion of their value in any line of work.

The channels of distribution have been used to describe the generally accepted methods for moving the product from the door of the factory to the user, and most of the discussion in connection with such channels has been in relation to the distributors of various kinds who are concerned with the movement of these products.

The functional value of an organization, buying in order to resell, lies in the benefit to the user of the material, in consideration of the following necessities:

1. The more orderly and efficient physical distribution because of the possibility of buying in larger quantities from a single manufacturer and rearranging in smaller quantities the products of a number of manufacturers.
2. The reduction in the cost of selling because of the distribution of the sale over a number of given items, the more intimate territorial contact with those who buy, and the possibility of more intensive work at less cost.
3. More orderly government of production because of the ability to obligate in advance of sale the stabilizing of credit and the distribution of the speculative features of future estimates.

These are functions pertaining to all concerns engaged in buying products from one group in order to resell them to another group. All of these functions enter into the consideration of the value of the present methods of distribution in connection with any line of business. Each individual function varies in its value in the consideration of any particular line, from any other line. The existence of these concerns continues, however, because of their economic value to the users of products in reducing the cost of distribution and increasing the convenience of buying, which in itself represents a reduction in cost.

In all newer lines of business, as they grow up, the methods of distribution and the channels through which the goods flow to the user arise partly out of the traditional necessities of business in the course of its growth. They are not justified or settled until the business has been absorbed into the fabric of social and industrial life for a sufficient length of time to permit the full sway of competition, to exercise its influence in eliminating the inefficiency.

For centuries the producer of commodities has been dependent upon the merchant for the distribution of those commodities, even when the distributing area was comparatively small and the larger portion of the business confined within narrow limits. As the manufacturing consolidated itself into larger and larger units, requiring a correspondingly larger area for the distribution of the products, the number of distributors grew and the business of merchandising subdivided itself into various lines of activities, the number of these subdivisions changing in accordance with the necessities of the different industrial requirements. This change is still going on. Methods that have no other value except through tradition are being abandoned gradually and methods which have established their value persist in spite of attempts to change them on the part of single organizations or industrial groups.

Habits of buying change very slowly—even where the economic advantage ceases to exist. Before the war, United States transactions with South America were paid through London, because the machinery for exchange had been established.

During the recent world war, the practice ceased to well worn channel was used by all concerns in this country and in others where direct communication could have been established. During the war, the practice ceased to a considerable extent, and it was felt in this country that a new channel could be developed for this work direct with South America. Banks have been established in South American countries, branches of banks in this country, and efforts have been made to create this direct communication. They have not been entirely successful and the creation of this new channel will take years to complete, because the habit of buying and the habit of conducting financial transactions is too deeply ingrained to be eliminated with ease, regardless of the economic advantage of doing so.

The same thing is true in regard to the channels of distribution connected with the movement of any product from the manufacturer to the user. As the industrial condition changes, some of these methods lose their economic value and, in the course of time, must be displaced. They persist, however, for a long time after the values have changed because the habit of buying is not easily transferred into a new channel, and it requires a considerable time to effectuate this change.

This persistence of the habit of buying must be reckoned with by all manufacturers who are considering the present methods of distribution and the advisability of introducing a change. It is possible to consume a great deal of time, effort and money in attempting a change



which will be apparently ineffectual because the strength of the habit has not been reckoned with properly, and the new channel of distribution does not groove itself into the fabric as the manufacturer expects it to do.

The discussion upon distribution has been further confused by the tendency to regard the function of the distributor in accordance with the ownership or the financial control, and not in accordance with the operations performed by him. Thus a manufacturer who has erected branch houses in various parts of the country in order to warehouse and job his own products, is apt to consider that he has eliminated the jobber, whereas he has simply assumed financial control of a number of jobbing houses and put his own men in to handle them. In other words, he has gone into the jobbing business with the idea that he is protecting his market thereby.

The only justification for these branch houses is their ability to perform the operations of buying from the factory and selling to the retailers more efficiently than the regular independent jobber.

Similarly, the jobber who goes into the manufacturing business to safeguard his source of supply, does not realize that he is simply assuming financial control of a producing unit, performing entirely separate functions in business and valuable only if the work of manufacturing can be done more efficiently, price and quality considered, than by those from whom he was accustomed to buy his products on the outside. This fact needs emphasis because the manufacturer has frequently confused the control of his market with the efficiency of distribution and has persisted in entering into the jobbing field or even the retailing field on the supposition that financial control would effectuate a greater efficiency in the distribution of his product. There is no greater fallacy than this and, particularly, in merchandising. Even in manufacturing, notice has been taken by industrial engineers of the dangers involved in the centralized system, too large in its dimensions to permit the proper flexibility and efficiency. Walter M. Polakov dwelt very definitely upon this subject in an address before the American Society of Mechanical Engineers at the last convention.

In the merchandising business and in all operations involved in the distribution of goods, this danger of inefficiency arising out of too highly centralized a system, operating over too large an area, is very apparent. So much of the work of merchandising is due to individual initia-

tive and judgment, individual enthusiasm and contact, and the permeation of a spirit of policy from those in charge, that an attempt to control a large area through branch establishments entering into the jobbing business, and even into the retail sales, is very apt to destroy the efficiency sufficiently to make these operations more costly than the distribution through independent concerns.

It is already admitted in the secret councils of some of the largest organizations dealing with general products that their branch jobbing establishments, owned directly by them, are less efficient than the average jobbing establishment independently conducted. It is not necessary, of course, that these establishments should be inefficient, but the tendency to excessive centralizing of control with the corresponding rigidity and lack of flexibility and contact is very marked; so that there is a direct tendency for these distributors to decrease the efficiency.

The purpose of the distribution channels in connection with any business is to merchandise and physically distribute the goods with the greatest convenience to the user, and with the least possible expense to the final buyer. Many of these systems of distribution have been growing for centuries and have been tried and tested during the course of many changes

in business. Their persistence indicates that they have a definite economic value in the scheme of things regardless of their apparent inefficiency, and their lack of enthusiasm in any one line of work. They have been successfully eliminated in very few instances, and there only where the changes in industry had altered the economic situation in that particular.

The manufacturer who considers establishing his branches must recognize the fact that he is going into the jobbing business or the distributing business in doing so, and he must arrange to separate these functional developments from the manufacturing developments so that they will indicate their own efficiency in each individual case by the cost and character of their work and they will not be dependent upon the factory to recuperate from the losses created by their own inefficiency in comparison with independent organizations performing the same work.

In the succeeding articles on this subject, fundamental considerations in the distribution of a product will be applied to the different branches of the automotive business and considered in relation to the specific requirements of these branches.

## A Lattice Tension Wheel

**T**HE Thompson lattice wheel has six component parts—rim, felloe, two perforated discs (1/16 in. thick), axially movable tension member splined on the hub and threaded draw ring at the outer end of the hub. The two perforated discs are riveted and clamped to the rim felloe and riveted to the inside of the hub flange and to the axially movable tension member, which is splined on the hub. The perforated disc is put under tension by taking up on the threaded draw ring at the outside of the wheel, or, in other words, expanding the two discs at the hub. The driving torque is said to be distributed equally between the inner and the outer

discs. The arrangement of the perforations is such that the integral lattice spokes are placed in tension by the driving torque both when moving forward and when backing. This wheel can be built so it can be quickly detached at the hub or it may be made with demountable rims. Claims are made for this wheel in respect to light weight, great lateral strength, attractiveness of appearance, ease of cleaning and retention of finish. If one spoke is broken in an accident, a neat repair job can be made by welding, but in case a considerable number of spokes are damaged a new disc must then be substituted.



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## Rebuilding in 1922

A GRADUAL, though definite, return to better business conditions heralds the coming of 1922. As business increases, production will grow and working forces will be rebuilt. The manufacturer has before him an unusual opportunity for production economy in the task of rebuilding his organization.

Efficiency in production depends largely upon the fitness of every man for his particular job; upon the opportunity for development which the work gives to the individual worker. In building up the working force again, the employer has a chance to build, not merely in numbers, but in goodwill and production efficiency. Goodwill between employer and employees means lower unit production costs. And goodwill can be generated rapidly by handling men according to the golden rule even though circumstances do not compel.

You feel a glow of pleasure when you receive a Christmas gift from a dear friend, because you know the gift is voluntary and that it carries with it a spirit of brotherhood. As a result your friendship is made

stronger. Contrast this with the feeling of the burglar who receives "gifts" at the point of a revolver. His friendship with the giver is scarcely improved through the transaction.

It is a far cry, to be sure, from the example given to employer and employee relationships. But there is much in the two cases that carries out the simile. The things which workers are able to force from employers when power is on the workers' side fail to promote goodwill to the same extent as those matters which are settled through co-operative effort.

In the period of organization rebuilding which lies ahead, the manufacturer has an excellent opportunity to lay a firm foundation for future industrial relationships in his plant.

## Making Use of Existing Data

THE Forest Products Laboratory is an organization operated by the Government which, as a result of patient research work, secures information of very great value to all users of wood, and the automotive industry is a very large user of wood. Much of the information collected at the laboratory mentioned is not used, however, for the simple reason that it is not widely disseminated, and even those who receive it do not, as a rule, appreciate its value or understand how to use it to advantage. In short, education is needed and education is best obtained by personal contact with those who know and can explain to those who are interested, many phases of subjects which would otherwise remain of little value.

The Department of Agriculture has long appreciated this fact and spends great sums annually, not only in research work, but in educating farmers in the use of knowledge obtained. Much such work is done by county agents of the department in every State in the Union. A similar force of field men representing the Forest Products Laboratory could do great good by visiting manufacturers of wood products and giving them information as to ways of using wood to the best advantage and with minimum waste.

The current appropriation for the Forest Products Laboratory work amounts to less than 25 cents to every \$1,000 of manufactured value, as against six times as much spent for similar work done by the Department of Agriculture for every \$1,000 of value of all agricultural and animal products. The current budget estimate for the laboratory does not carry the funds needed for this educational work. Those interested in availing themselves of it should see that the Sub-committee on Agriculture of the House Committee on Appropriations, and later the Senate Committee on Agriculture, provide the necessary funds.

## Planning Highway Development

THE recommendation of the N. A. C. C. Highways Committee that Congress immediately appropriate \$100,000,000 annually for highway improvement for a term of five years, warrants support from the industry since it would enable highway plans to be laid out on an efficient basis. The sum involved seems like a huge one, but its very size

makes for economy rather than for extravagance.

If this plan were carried into effect state highway departments would be able to plan their work efficiently and economically. When plans can be laid for only one year, with the possibility of radical revision at the end of that time, it is impossible for any business to function properly. Adoption of this recommendation would enable state highway departments to put their work on a sound basis similar to that of any going business enterprise.

## Fuel Vaporization

OF late distillation curves have been used a great deal to show the characteristics of the fuels marketed. Although these curves correctly represent the vaporization of the fuel under distillation conditions, they are often misunderstood or misinterpreted. For instance, if a fuel has an end point of 450 deg., that does not mean that in order to vaporize it its temperature must necessarily be raised to 450 deg. The whole of such fuel could be vaporized at atmospheric temperature if it were exposed in a shallow dish, and if comparatively dry air were blown over it. Water has a boiling temperature of 212 deg. Fahr., but there is surface evaporation at all atmospheric temperatures. Of course, the higher the temperature of the atmosphere the more rapid the evaporation; another factor affecting the rate of evaporation is the moisture content of the atmosphere. For any temperature and pressure there is a saturation point, that is, a limiting proportion of water vapor which the air will hold in suspension. If the temperature is increased the ability of the atmosphere to absorb moisture is increased.

The same laws apply to the vaporization of liquid fuel in air. The boiling point at atmospheric pressure is that temperature at which the fuel passes into the vapor state when in contact only with its own vapors. If the vapors immediately become mixed with air and the air is greatly in excess, as it is in the carbureter of an internal combustion engine, then liquid fuel will pass into the vapor state and remain in that state though the temperature of the mixture of air and fuel is far below the boiling point of the fuel. The minimum temperature at which fuel will remain in the vapor state when mixed with air in any given proportion is known as its dew point.

There is a very large temperature difference between the end point or maximum boiling point of our present day fuels with air in the proportions ensuring high engine output and high fuel economy. For instance, a 15 to 1 mixture of gasoline and air under atmospheric pressure has a dew point of about 95 deg. Fahr., whereas the end point of the fuel is close to 450 deg. Fahr.

As the vaporization of gasoline in fifteen times its weight of air causes a temperature drop of only about 40 deg. Fahr., there would be no difficulty in completely vaporizing even the present high end point gasoline if sufficient time were available. But in an engine running at 2400 r.p.m. the time for one inlet stroke is only 1/80 second and during this infinitesimal period of time the vaporizing action must com-

pletely penetrate to the centres of the globules sprayed from the carbureter nozzle. This penetrating action is the more rapid the higher the temperature of the mixture and it is this fact which calls for energetic heating of the air previous to entering and of the mixture after it leaves the carbureter. The time required for the complete vaporization of the fuel depends also upon the size of the globules delivered by the spray nozzle which increases as the speed decreases. This is the reason why engines can be operated at full speed without much external heat being supplied to the carbureter, whereas, when operated at low speed without heat supply the carbureter or inlet manifold loads up.

## Coordinated Research

THE importance of studying the relation of highways to the traffic they are called upon to bear has long been uppermost in the minds of highway engineers. The advent of the heavy motor truck as a factor in the transportation system of the country has brought forth new problems and in many States well defined efforts are being put forth to build roads designed for this type of vehicle.

There appears, however, to be a need for a more coordinated effort along this line. An instance was discovered recently in which three highway laboratories were working to determine the same result, and under practically the same conditions. This situation serves to emphasize the benefits that would be derived if some sort of a research information service could be put into effect. Such a service would keep departments in the various States advised as to what was being done in other States.

Insufficient data are at hand at present for the highway engineer to determine accurately the types of roads that will best serve the public. Research and more research is necessary if this all-important work is to be carried on to a successful conclusion. State Highway Departments must cooperate with universities in conducting tests and the results of these tests must be made known to all persons interested. Huge sums of money could often be saved in highway construction if accurate data were at hand as to the type of road best suited to the existing conditions. These savings would have a direct bearing upon the automotive industry, inasmuch as more money would be released for highway construction.

## Happy New Year

THE New Year holds different prospects for different individuals. 1922, like 1921, and every other year, will reward workers. The past year, though a period of business depression, did not turn out nearly so badly as pessimists predicted last January.

Broad vision, intelligent analysis, and a recognition of a moral obligation in industry should characterize 1922 in the automotive industry. For the organizations operating on these fundamentals there is steady progress in store during the new year.

AUTOMOTIVE INDUSTRIES wishes you a Happy and Prosperous New Year.

# Makers Confident as Year Closes

## All But One Quarter Will Be Ahead of 1921

### Truck Market Will Show Improvement with General Business Conditions

By James Dalton

NEW YORK, Dec. 27.—One of the most anxious years in the history of the automotive industry comes to a close with conditions vastly more stable than those which prevailed at the beginning of 1921. The essentiality and the popularity of the motor vehicle have been established beyond question in a period of depression. What the future holds for individual manufacturers and dealers is uncertain but there is no uncertainty about the future of the industry as a whole.

#### Few Failures During Year

It is expected that so far as passenger cars are concerned, the first quarter of 1922 will be materially better than the corresponding period last year, the second quarter a little better than in 1921, the third not quite so good, and the fourth considerably better. The truck market will improve with general business.

The most important achievement of the year, next to the production and sale of approximately 1,700,000 passenger cars and trucks, has been the whittling down and balancing of inventories, the writing off of losses and the payment of debts. There have been few failures of real importance. Only a few companies of consequence have been liquidated. Many have been forced to recapitalize and reorganize, but most of them will pull through.

One of the gratifying developments of the year has been the spirit of co-operation shown by the different branches of the industry in supporting the structure as a whole. Merchandise creditors of motor vehicle makers have consistently maintained a constructive policy. This has resulted in the gradual reduction of past due accounts, and collections from manufacturers now are virtually on a current basis.

#### Defaults in Payments Small

Releases on old commitments have come through steadily as the vehicle manufacturer could use them, and parts and accessory manufacturers have moved a large share of the materials they had on hand on Jan. 1 last. There have been few defaults in payments in comparison with the volume of business. Nearly all vehicle companies which were solidly es-

tablished will survive the depression, although it is to be expected that the number of failures in the next few months will be somewhat larger.

The industry will enter 1922 with a feeling of confidence which was lacking twelve months ago. It knows in a general way what it can expect and can trim its sails accordingly. With inventories down, buying in the future will not be on the hand-to-mouth basis which has prevailed for more than a year, although there will be no more piling up of huge supplies.

Passenger car manufacturers are confident that the coming year will be at least as good as the one just closing, and truck makers expect a steadily expanding volume of business as the year advances. Even if there is no expansion of vehicle production, parts manufacturers will have a better year than in 1921 because inventories have been reduced to a point where it is necessary to buy supplies for current needs.

## Stoughton Will Resume Production After Jan. 1

STOUGHTON, Dec. 27.—Pending the erection of an entirely new fireproof building to replace the motor truck factory destroyed by fire early in November, the Stoughton Wagon Co. is remodeling the manure spreader shop for assembling motor trucks. Work on the permanent truck factory probably will be undertaken about April 1.

The truck plant occupied one of the largest buildings of the Stoughton plant and the loss in the recent fire was well over \$375,000. The blanket insurance on the plant is \$1,230,000. Production of trucks has been seriously delayed for a month, but probably can be resumed immediately after Jan. 1. Orders are being booked at the rate of better than one a day.

## Resolution Asks Transfer of Tractors for Road Work

WASHINGTON, Dec. 24.—Congressman Woodruff of Michigan introduced a joint resolution in the House to-day to authorize and direct the Secretary of Agriculture to transfer 1350 5-ton Holt caterpillar tractors from stock now on hand in the war department, to the highway department of the several states. It is proposed that these tractors shall be used in the construction and maintenance of highways.

It is provided that the Secretary of Agriculture may reserve from such distribution not to exceed 10 per cent. of the tractors, for use in the construction and maintenance of national forest roads and other highways in the public land states.

## Truck Producers to Standardize Cabs

### S. A. E. to Discuss Question—Seating Comfort of Driver Considered

NEW YORK, Dec. 24.—At the suggestion of a truck manufacturer having a large distributor and dealer organization standardization of cabs will be taken up for discussion by the motor truck manufacturers' committee of the Society of Automotive Engineers' standards committee. Such a standardization, it is felt, would eliminate present expense and loss of time through making bodies and cabs interchangeable on different makes of truck of the same capacity.

#### Present Situation Uneconomical

Motor truck users and body and cab manufacturers appreciate the present uneconomical situation but as the quantity production of bodies and cabs is impossible owing to the variation in the mounting dimensions for the different types and makes of motor truck chassis they find it impossible to remedy the situation.

The fundamental dimensions which it is felt must be standardized to obtain the desired interchangeability of cabs are the distance from the windshield to the front of the driver's seat and the width of the seat. The latter dimension has been standardized at about 20 in. in practice but the former varies, depending principally upon the angle of the steering column.

It will probably be found necessary to establish two cab widths or seat lengths owing to the larger crew usually carried on the heavier trucks and also to appearance. Instruments will probably have to be attached to a dash furnished as a part of the chassis. This would save a large amount of time in equipping trucks with cabs as no instrument connections would have to be disturbed.

#### Will Eliminate Drivers' Criticism

The locations of the pedals and levers involve difficulties so far as standardization is concerned and a great deal of study will be required. The standardization of the pedals and levers, it is stated, is not absolutely necessary, however, from the standpoint of standardizing the principal cab mounting dimensions.

Standardization of cab dimensions will mean that the seating comfort of the driver will be assured in all cases. This is regarded as eliminating a great deal of criticism on the part of drivers who desire passenger-car comfort.

# Downward Price Movement Started

## Hudson, Cadillac, Buick Make Cuts

### Most Companies Planning Reductions Will Delay Until New York Show

DETROIT, Dec. 27—The first move toward what is expected to be a general reduction and readjustment of prices on passenger car models in connection with the national automobile shows, has been made a little earlier than anticipated.

The first company to announce lower prices was the Hudson Motor Car Co., which reduced all Hudson and Essex models. This was followed closely by the General Motors Corp., which has made very substantial reductions on the various Cadillac models and a cut running as high as \$270 on Buick cars. The Buick cut probably forecasts keen competition with Studebaker. Many other companies are preparing to follow suit but most of them propose to delay action until the opening of the New York show.

The Cadillac schedule, which shows reductions ranging from \$640 on the touring car to \$940 on the suburban sedan follows:

	Old Price	New Price
Roadster .....	\$3,790	\$3,100
Touring car.....	3,940	3,150
Phaeton .....	3,790	3,150
Sedan .....	4,950	4,100
2 passenger coupe....	5,440	3,875
5 passenger coupe....	4,690	3,925
Victoria .....	4,540	4,540
Limousine .....	5,290	4,550
Suburban .....	6,190	5,190
Imperial Limousine...	5,390	4,600

### New Buick Prices

The schedule of prices on the Buick four cylinder models follows:

	Old Price	New Price
Roadster .....	\$935	\$895
Touring car.....	975	935
Coupe .....	1,475	1,295
Sedan .....	1,650	1,395

The prices on the six cylinder line follow:

	Old Price	New Price
Roadster .....	\$1,495	\$1,365
5 passenger touring car	1,525	1,395
3 passenger coupe....	2,135	1,885
5 passenger sedan....	2,435	2,065
4 passenger coupe....	2,325	2,075
7 passenger touring car	1,735	1,585
7 passenger sedan....	2,635	2,375

### Hudson-Essex Schedule

The Hudson schedule follows:

	Old Price	New Price
4 passenger phaeton...	\$1,895	\$1,695
7 passenger phaeton...	1,895	1,745
2 passenger cabriolet..	2,495	2,295
4 passenger coupe....	2,770	2,570
7 passenger sedan....	3,495	3,250
5 passenger touring		
limousine .....	3,120	2,920

The Essex schedule follows:

	Old Price	New Price
Touring car.....	\$1,195	\$1,095
Coach .....	1,495	1,345
Sedan .....	1,995	1,895

Further Reductions on Page 1294

### PREST-O-LITE CUTS PRICES

NEW YORK, Dec. 23—Reductions ranging from 11 to 20 per cent. on all types of its storage batteries have been announced by the Prest-O-Lite Co. Increased production, it was stated, made possible this decrease. Prices on the line, according to the announcement, are now almost 50 per cent. lower than they were a year ago.

## British Tire Producers Defend Present Lists

LONDON, Dec. 20 (by mail)—A. Johnston, managing director of the North British Rubber Co., Castle Mills, Edinburgh, in discussing band tires, which he points out contain a large percentage of rubber, claims that even to the smallest buyer the prices are 12½ per cent. lower than before the war.

In the case of air tires, he replies to critics, who, noting the fall in raw rubber prices, urge that such tires are too dear, by pointing out that it is cotton and not rubber which figures most in such tires.

(Continued on page 1294)

## Bank Relations Department Will Aid Lexington Dealers

CONNERSVILLE, IND., Dec. 27—A new subsidiary to be known as the Bank Relations Department has been organized by the United States Automotive Corp., one of the units of which is the Lexington Motor Co. It has been established to make a study of improving relations between bankers and motor car dealers. Frank B. Ansted, president of the corporation, is a banker and several directors of the new company also are bank directors.

Through the bank relations department, Lexington dealers will be aided in their financial operations. In discussing this subject, Ansted said:

"Perhaps at no time in the history of the automobile industry has there been a greater need for business methods in the motor car industry."

### MUTUAL BUILDINGS SOLD

SULLIVAN, IND., Dec. 27—The Mutual Truck Co. buildings were sold to Sherman Osborne of Bloomfield, for \$9,750. C. D. Hunt, receiver, conducted the sale. Osborne says his plans are indefinite but that he anticipates reorganization of the company.

## Overland Reduces Parts Quotations

### Some Show Drop of 50 Per Cent —Apply to Current Models

TOLEDO, Dec. 29—Effective in January the list prices on Willys-Overland parts will be reduced an average of 20 per cent in line with the general reductions in the price of cars.

The new low prices available to the public follow the reorganization step taken recently in the sales department of the Willys-Overland through which several distributors were eliminated from the selling organization and the factory gained direct control over more than 80 per cent of its dealers through factory branches.

The new sales program went into effect on Nov. 1. The last two months have been particularly active ones for the Overland parts and sales departments throughout all the branches.

Along the line of better service and stimulus to selling, the company has advanced the discount to dealers from the customary 15 per cent to 25 per cent. Direct from factory sales of parts has enabled part of the middleman's profit to be eliminated.

Fifty important parts have been reduced 33 per cent while a dozen or more showed a drop of 50 per cent.

The new prices apply only to current models of Overland and Willys-Knight cars because quantity production is possible on them.

In making up the new lists of prices to go into effect this month the cost engineers built up several competitive cars from parts catalogs and figuring the lower prices on cars scaled down the Overland parts prices to meet all competition.

## Kroyer Motors Will Move Its Plant to Los Angeles

LOS ANGELES, Dec. 27—Reports that the Kroyer Motors Co., a \$5,000,000 company engaged in the manufacture of tractors at Stockton, would remove its plant to Los Angeles, are confirmed by J. M. Kroyer, president of the company. The present factory at Stockton covers thirty acres and is devoted entirely to the manufacture of tractors and tractor parts.

The Kroyer company was organized in 1917 after Kroyer and those associated with him had sold the Samson Tractor Co. to the General Motors Corp. Since then he has perfected the Wizard 4-pull tractor.



## Program Completed for Tractor Show

Educational Work Will Be Held  
on Four Days in Different  
Sections

MINNEAPOLIS, Dec. 23—The educational program for the seventh national tractor show, which will be held here from Feb. 6 to 11, has been worked out with the assistance of the faculty of the Agricultural College of the University of Minnesota. Members of the faculties of the educational institutions of the Middle West and Northwest will take active charge of the program. The program is designed to give practical, comprehensive short courses.

The proposed lecture program is as follows:

- Room 1  
**MECHANICS OF THE TRACTOR.**  
Tuesday, Feb. 7.
- 10—11 Valve Timing.  
11—12 Bearings.  
2—3 Carburetion.  
3—4 Ignition.
- Wednesday
- 10—11 Lubrication.  
11—12 Slippage lug equipment.  
2—3 Overhauling the Tractor.  
3—4 Tractor troubles.
- Thursday
- 10—11 Valve Timing.  
11—12 Bearings.  
2—3 Carburetion.  
3—4 Ignition.
- Friday
- 10—11 Lubrication.  
11—12 Slippage lug equipment.  
2—3 Overhauling the Tractor.  
3—4 Tractor troubles.
- Room 2  
**APPLICATION OF TRACTOR POWER.**  
Tuesday, Feb. 7.
- 10—11 Plow types, adaptation and use.  
11—12 Plow adjustment—tractor plowing.  
2—3 Seedbed preparation. Tillage tools.  
3—4 Seeding machinery.
- Wednesday
- 10—11 Belt Driven Machinery.  
11—12 Cultivators and Tractor cultivating.  
2—3 Harvesting machinery.  
Binder troubles.  
3—4 Tractor Harvesting.
- Thursday
- 10—11 Plow types, adaptation and use.  
11—12 Plow adjustment—tractor plowing.  
2—3 Seedbed preparation. Tillage tools.  
3—4 Seeding machinery.
- Friday
- 10—11 Belt Driven Machinery.  
11—12 Cultivators and Tractor cultivating.  
2—3 Harvesting machinery.  
Binder troubles.  
3—4 Tractor Harvesting.
- Room 3  
**POWER FARMING PROBLEMS.**  
Tuesday, Feb. 7.
- 10—11 Farm Power.  
11—12 Uses of a Tractor.  
2—3 Tractor farming.  
3—4 Laying out fields for tractor work.
- Wednesday
- 10—11 Belts and Pulleys.  
11—12 Commercial tractor work.  
2—3 Care of the Tractor.  
3—4 Depreciation and acre cost of farm machinery.
- Thursday
- 10—11 Farm Power.

- 11—12 Uses of a Tractor.  
2—3 Tractor farming.  
3—4 Laying out fields for tractor work.  
Friday
- 10—11 Belts and Pulleys.  
11—12 Commercial tractor work.  
2—3 Care of the Tractor.  
3—4 Depreciation and acre cost of farm machinery.

### TRACTOR FORUM. Tuesday, Feb. 7.

- 11—12 Cost records for a tractor.  
2—3 Round table on Tractor Farming led by practical tractor farmers.
- Wednesday
- 11—12 A motorized farm.  
2—3 Round table on Tractor Farming led by practical tractor farmers.
- Thursday
- 11—12 Relation of machinery investment to cost of production.  
Factors affecting cost of production.  
2—3 Round table on Tractor Farming led by practical tractor farmers.
- Friday
- 11—12 Motor trucks on the Farm.  
2—3 Round table on Tractor Farming led by practical tractor farmers.

## Ajax Stockholders to Vote on \$3,000,000 Bond Issue

NEW YORK, Dec. 23—Stockholders of the Ajax Rubber Co. will meet Jan. 11 to authorize the issuance of \$3,000,000 first mortgage, 15 year, 8 per cent. bonds and to ratify an increase in capital from 400,000 shares of \$50 par value to 500,000 shares of no par value. There are outstanding at present 200,000 shares of stock. An additional 200,000 shares will be offered to stockholders for subscription at \$12.50 a share on the share-for-share basis.

A letter sent to stockholders by Horace deLisser, chairman of the board, says that because of expanding business the company has been handicapped by lack of sufficient working capital. He adds that financing arranged through banks and the sale of notes was accomplished by contract which expired Dec. 1. Although for several months prior to that date it was expected the contract might be renewed, the management was notified a short time before the date of maturity that banks and other interests concerned would expect payment Dec. 1. This necessitated the new financing.

## \$191,734 Bid for Assets of American Motors Corp.

PLAINFIELD, N. J., Dec. 23—Receivers of the American Motors Corp. have received from C. B. Penney, representing the "American Motors reorganization syndicate", a bid of \$191,734 including a mortgage for \$55,000, on all the assets of the corporation. The bid provides for an immediate payment of \$10,000; a second payment of \$25,000 on Jan. 15; \$50,000 on Feb. 15 and \$51,734 on March 15.

Creditors of the corporation have been directed by Federal Judge Charles F. Lynch to show cause on Jan. 3 why an order should not be made authorizing the receivers to accept this bid and any other higher bid which may be made.

## Civilian Aviation Gained 20 Per Cent

1200 Aircraft During 1921 Carried  
Approximately 275,000  
Passengers

NEW YORK, Dec. 23—An increase of 20 per cent in civilian flying in the United States this year as compared with 1920 is reported in a review of aviation prepared by the Aeronautical Chamber of Commerce. Twelve hundred aircraft operated by civilians during the past year flew a total of more than 6,500,000 miles and carried approximately 275,000 passengers. The review says:

In the last 12 months aviation has outgrown romance and is now recognized as practical art. The year was crowded with important events, and government, state, municipal officials and transportation experts are agreed that civilian aeronautics must be developed for peaceful transport and as a reserve arm of the national defense.

The U. S. air mail service in 1921 made such a record for efficiency on the transcontinental route that it is recognized as a model for civilian aerial transport the world over. Letters have been delivered in New York two days after casual mailing on the Pacific Coast. The service has an average of 88.82 per cent efficiency, that is, completed trips on scheduled time since it was started in May 1918.

### Societies See Need of Code

Governments of states and heads of Federal bureaus, realizing that fast transport depends upon proper terminal facilities have started campaigns for the acquisition of municipal landing fields. Ordinances regulating aerial traffic have been passed and enforced in scores of municipalities. Almost all large cities have aerial traffic regulations.

State legislatures and municipalities in passing legislation have made it clear that local regulations are temporary and designed to be superseded by the national code when it is effected. The American Bar Association, Aero Club of America, Aeronautical Chamber of Commerce of America, Manufacturers Aircraft Association and the National Aircraft Underwriters Association, the Society of Automotive Engineers and the National Advisory Committee for Aeronautics have recognized the necessity for a national aerial code. Their views have found expression in the Wadsworth-Hicks Bill now before Congress providing for a Bureau of Civil Aviation in the Department of Commerce. This bureau, among other duties, will have supervision over the licensing and registration of all commercial aircraft and pilots and the enforcement of the laws.

### PROPOSE AIRCRAFT MEETING

LONDON, Dec. 20 (*By Mail*)—It is proposed to hold a conference early next spring to discuss the prospects and development of commercial aircraft. The Government and the Federation of British Industries are principally concerned but the personnel of the committee will be representative of both aircraft constructors and users and will include members of trades more particularly concerned with commercial aircraft supplies.

## Reject Interstate Control of Trucks

### Railroads Opposed to Plan Placing Common Carriers Under Commission

WASHINGTON, Dec. 24—Although admitting that motor truck competition had cut down the volume of their short-haul traffic, Bird M. Robertson, president of the American Short Line Railroad Association, told the Senate Committee on Interstate Commerce that railroad officials had rejected a plan submitted by a member of the House of Representatives to place motor trucks engaged as common carriers under the control of the Interstate Commerce Commission.

He declared that an investigation by railroad officials brought the conclusion that it would not be feasible to amend the interstate act in any way to place that class of carrier under Federal control, as it would probably necessitate an entirely new transportation act. This decision was rejected when statisticians showed that the percentage of interstate business handled by trucks was so small that it would probably not justify Congress at this time in dealing with the matter.

### Trucks Duplicate Service

It is significant to note that Robertson told the committee that motor truck lines were developing an extensive duplication of service, that is placing a much greater burden upon the public than the inconsequential duplication of railroad lines.

Referring to the efficiency of the motor truck as a competitor, railroad officials state:

Motor trucks are rapidly invading the transportation field and duplicating the service rendered by the railroads, under conditions that are most unfair and unjust, and are imposing a substantial burden upon the public. Trucks of that character in most of the States are permitted to compete as common carriers with existing railroads without paying anything for the road building or the upkeep, and they are rapidly destroying the roads. In most of the States they are wholly unregulated, being permitted to operate without schedule and without any regulation as to their charges.

### Can Be No Federal Regulation

In connection with the proposal for Federal regulation of motor truck lines, Robertson said:

We are of the opinion that there can not be any Federal regulation. We have investigated that matter and find that only 4 per cent of their business is interstate; something more than 90 per cent of their business is probably intrastate, and therefore it would be very difficult for the Government to meet that situation.

It is also interesting to note that Robertson referred to the interest which other railroad organizations are giving to this duplication of service. He said:

The railroads must not only build and maintain their own trucks but are taxed heavily to create and maintain the highways used by the trucks; operate upon schedule, and are governed rigidly as to the charges they may make. Under these conditions the motor trucks underbid the railroads on the cream of the local business, though they are under no obligation to operate during bad weather. In this way they not only duplicate existing lines and service, but by decreasing the volume of traffic of the railroads they increase the cost of the service of the rail carriers.

Some states have given their railroad commissions authority to regulate motor trucks, but in most of such states the commissions utterly fail to prevent the duplication of the service and fail to require them to compete upon a fair basis.

If there be any duplicated railroads that do not render a real public purpose, they should be abandoned, and the commission has power to accomplish that result.

### Questions Ability to Control

I doubt the ability of the Government to prevent a manufacturing enterprise from running its own motor trucks and rendering service. I refer exclusively, in my statement, to those doing business as common carriers.

Senator Cummins of Iowa, chairman of the committee, pointed out the difficulty in obtaining reliable data on truck movements. Senator Poindexter told the committee that complaint is beginning to arise at a few points throughout the country of State oppression, or State discrimination between certain rivals of common carriers of interstate business, and inquiry is being made as to why the Federal government does not protect them. The Senator said that he had never discovered that any Federal government had in any way ever endeavored to do anything at all about it.

## Spanish Inquiries Grow with Revision of Tariff

NEW YORK, Dec. 23—Inquiries in increasing number from Spain are reported by the automotive exporters here, in preparation for the revision downward of Spanish automotive tariffs, expected early in the New Year. One large company has received an inquiry from one of its Spanish distributors that in itself is larger than all the shipments of completed cars made from this country during the last few months.

In addition, a statement from the foreign office of the Ford Motor Co. is to the effect that the company's business in Spain in November showed a considerable improvement over previous months. It was also stated that an appreciable betterment had been noted in sales to Latin-America.

### MORE BRANCHES FOR PILOT

INDIANAPOLIS, Dec. 27—The Pilot Motor Car Co. of Richmond, according to information made known here to-day, is preparing for the opening of branches in Chicago, New York, Cleveland, Kansas City, Pittsburgh, San Francisco. These branches will be under the direct control and supervision of the main offices at Richmond.

## Blames Propaganda for Gasoline Rise

### Babson Tells of "Manipulation" —Predicts Lower Prices for Automobiles

MILWAUKEE, Dec. 27—Manipulation and false propaganda are responsible for the recent increase in the price of crude oils and gasoline, according to Roger W. Babson, who spoke at a mass meeting of Milwaukee business and professional men under the auspices of the Association of Commerce. Further, Babson said, 15 cent or 18 cent gasoline may be looked for in the not far distant future, although "ultimately the cost of gasoline will make it prohibitive for use in automobiles."

Discussing the outlook for 1922, Babson said:

Business travels in definite cycles. The first is the period of prosperity; the next, period of decline; the next, period of depression; the next, period of recovery. We are now emerging from the period of depression and getting into the period of definite recovery, headed toward "good times." We have been two years traveling the first periods and it probably will take two years on the return road.

Six of the twelve major industries have hit the bottom and turned the corner on the highway to prosperity. Building material, iron and steel, railroad equipment and the automotive industries have still to pass through the worst of the storm. Building materials, automobiles and iron and steel consequently will sell at lower figures in 1922.

Answering a query, Babson said a cut in freight rates would aid the long trunk lines more than the short lines, because of motor truck competition.

## Earl Soundly Financed, Announcement Says

CHICAGO, Dec. 23—In connection with announcements of production of its new line of cars by Earl Motors, Inc., successor to the Briscoe Motor Corp., it is stated that the company is soundly financed. Its financial affairs are in the hands of John Fletcher, vice-president of the Fort Dearborn National Bank.

A controlling interest is held by the Tilden Estate of Chicago in which is vested more than 50 per cent. of the present 200,000 common shares and which, with associates, is underwriting at \$10 a share a new issue of 200,000 shares and \$2,500,000 five year, 7½ per cent. debenture bonds.

### WICHITA MEETING, FEB. 21

WICHITA, Dec. 24—The Wichita Thresher and Tractor Club announces that the twenty-first annual threshermen's convention of Kansas, Oklahoma and Texas will be held in this city Feb. 21 to 24. Oil and steam tractors, trucks and accessories will be included in the exhibits. Arrangements, also, are in progress to put on a tractor parade.

## South Africa Won By Steam Trucks

### British Firms Making Them Have Captured Majority of Heavy Haulage

JOHANNESBURG, Nov. 8 (By Mail) —Steam trucks have taken a firm hold of Johannesburg. British manufacturers, specializing in them, have captured nearly all the heavy haulage in the city as well as in other parts of South Africa. Such trucks are ideal for this country. Coal is cheap and servicing for steam vehicles is not of such a specialized kind as is necessary for motor trucks.

The latest steam truck to arrive is the Leyland, made by the manufacturer of the Layland motor trucks and buses. Other steam trucks that are in use here in fair quantities are Foden, which has the largest number, Sentinel and Robey. A White truck is now on its way up from the coast and will be the first to come to Johannesburg. The local White representative, who is now in Rhodesia on a tour of inspection, is optimistic about motor truck possibilities in this country.

#### Reo Demonstrates

A feature of the last couple of months has been the sale of commercial vehicles and steam trucks. D. H. Saker & Co. has supplied a number of Reo speed-wagons to various large business houses and municipalities throughout the country. These vehicles are demonstrating their usefulness in town and country. Special bodies have been built for use in the northern Transvaal on mail coach service for carrying passengers and baggage.

Farmers are still complaining about the hard times. They have not managed to sell their wool and maize stands at a low figure, there having been over-production this year. But the farmer is showing more inclination to buy automobiles just lately than for the past eight or nine months. Car sales have been better in October than any time this year. The Standard Motor Co. of Africa announces the sale of an average of one Nash car daily and the General Garage has also put over about the same number of Dodge Brothers cars. A feature of these sales is the higher proportion of cash transactions.

#### Merger of Distributors

Hupp Garage, Ltd., has been taken over by the Johannesburg Motor Mart and this merger has cleared the air considerably. These two garages, with some of the largest facilities in South Africa, will now be operated as one concern. They are handling Hupp, Cadillac, Allen and Studebaker cars with the exception of the new light six Studebaker, which is being handled almost exclusively in the Transvaal, Orange Free State, and Natal by B. J. Penny & Co., who formerly were Ford dealers here. The Motor Corp. of Africa now handles Ford cars in the Transvaal.

Rains have made the roads nearly impassable in the Transvaal, Orange Free State, Natal and Rhodesia. With the exception of the town highways and one or two main roads around Johannesburg, Cape Town, Durban and the other larger towns the highways are mostly veld tracks that become inches deep in mud after the first rains.

Naturally the South African motorist wants a car that will take him over these roads in the best possible manner and without the help of a span of oxen or donkeys to pull him out of the mud. This is where the American car scores, being light with plenty of power. The three gear forward system is also better for this country, as the speed given by a fourth gear cannot be used. Pulling is wanted and high average speed.

### Wright Assets Exceed Liabilities, \$355,000

PHILADELPHIA, Dec. 27—Assets of the Wright Roller Bearing Co. for which receivers have been appointed in United States court, are estimated at \$884,000 and the liabilities at \$529,000. W. B. Stratton of New York, one of the receivers, represents the interests of John N. Willys who is the largest single stockholder.

The firm's difficulties began, it is stated when notes amounting to \$400,000 given to Willys when he advanced money for plant extensions were sold by him to interests which demanded payment.

The receivers had been given instructions to continue operations and it is expected the difficulties of the company will be straightened out.

### Sanford Supplements Line With New 1½ Ton Truck

SYRACUSE, N. Y., Dec. 24—The Sanford Motor Truck Co. is bringing out a 1½-ton model equipped with electric starting and lighting, pneumatic cord tires and capable of sustaining a speed of 25 m.p.h.

This will supplement its line of trucks which are made in capacities of 2½, 3½ and 5 tons. The truck is designed by J. E. Gramlich, who recently rejoined the company, after having acted as chief engineer for the Watson Wagon Works for two years.

#### WAYNE WHEEL BANKRUPT

BUFFALO, Dec. 29—A voluntary petition in bankruptcy has been filed in Federal Court here by the Wayne Wheel Co. of Newark, N. Y. Liabilities are placed at \$122,960 and assets at \$182,424. The company is one of the oldest manufacturers of wood wheels.

#### SPECIAL FORD DIVIDEND

DETROIT, Dec. 29—The Ford Motor Co. has declared a special dividend of 3 per cent, payable Dec. 31, to employee investment certificate holders, making a total of 12 per cent for this year.

## Lincoln Tax Claim Cut to \$500,000

### Government Makes \$4,000,000 Reduction—Receiver May Ap- peal from Compromise

DETROIT, Dec. 29—The Detroit Trust Co., receiver for the Lincoln Motor Co., has received word from Washington that the Government's claim for additional taxes will be reduced to about \$500,000 from the \$4,505,681.23 figure first filed. The exact amount of the additional tax is being calculated and will be known in two or three days, according to President Ralph Stone of the trust company. Awaits Definite Figure

News of the Government's reduction was received too late to be available at the meeting of creditors held earlier in the day. President Stone said the receiver was not in a position to determine what action will be taken now that the Government's decision is known, but that immediate consideration will be given to the new situation. Stone expressed his appreciation of the prompt action of the treasury officials. All of these officials realized, he said, that practically nothing could be done in the way of reorganization until the amount of the Government's claim should be fixed and known. May Appeal

Pending the receipt of the actual figure on the tax allowance, the receiver and attorneys for the receiver, will consider whether to accept the Government's compromise on the additional tax, or whether to take a new appeal designed to bring the figure considerably lower. Notice of the Government's action and the receiver's contemplated course has been sent to creditors and to Donald D. Davis, secretary of the stockholders' protective committee at the New York Trust Co., N. Y. This favorable action is expected to expedite greatly the plans of the parties at interest in bringing about a reorganization.

#### Creditors Hold Meeting

At the meeting of the creditors with the receivers to-day a committee was organized to consider future action. C. W. Dickerson of the Timken-Detroit Axle Co. was named chairman of the meeting and John Watson, Jr., Cleveland, secretary. Other members of the committee are W. P. King, president of the Aluminum Manufacturers, Inc., Cleveland, who is its chairman; George D. McCann of the Dayton Engineering Laboratories, O. W. Myers of the Goodyear Tire & Rubber Co. and M. S. Toulson of the Anderson Electric Co.

A sub-committee of the creditors' committee was named to meet representatives of the stockholders and other parties interested to consider plans for the rehabilitation of the company. Although manufacturing plans several months in advance have been laid out by the receiver, it is hoped to effect an early reorganization.

## Overland Contracts Call for 70,000 Cars

### Wilson Says Company Looks Forward to 1922 as Notable Year

TOLEDO, Dec. 24 — Vice-president Charles B. Wilson of the Willys-Overland Co. told members of the Toledo Chamber of Commerce here in franker terms than any Overland official ever used what the actual status of the company is and how it has come through the business of the last year or more.

The Overland is now working about 6000 men, will close a few days for inventory and is expecting to have 8000 men at work by Jan. 15.

In the course of his remarks, Wilson said:

We are looking forward in 1922 to one of our steadiest and most prosperous years. This statement is not based upon idle talk but upon contracts signed with dealers which call for delivery of 70,000 cars in 1922.

We are in shape to start Jan. 1 to build up our working organization so as to get into maximum production as soon as possible and will try to reach the peak production not later than March 1.

The machinery is in order, the department heads are working together and we believe we have nearly 100 per cent co-operation in the whole working force.

### Notes Payable \$18,250,000

In answering the question "What does the Overland plant mean to Toledo?" Wilson said that it had meant in 1920 the purchase of \$17,391,000 in materials from local business firms, and the payment of \$20,573,000 in wages to employees.

He declared there was investment in plant and machinery here of \$40,000,000 and in branches of \$7,000,000 and proceeded to give a view of what had happened to the affairs of the company within the last year and a half.

In March, 1920, the Willys-Overland Co. had notes payable of \$34,400,000 and to-day the notes payable have been reduced to \$18,250,000. On May 31, 1920, accounts payable amounted to \$13,500,000 and to-day they stand at \$2,150,000.

The inventory in the spring of 1920 stood at \$46,100,000 of which experts determined that less than \$5,000,000 worth was in obsolete or surplus materials. To-day the inventory is \$19,000,000 and the surplus and obsolete material is being consumed at a rate which will see its end by April, 1922.

### Commitments Reduced

In July, 1920, the company had material purchase commitments of \$63,000,000. They have been reduced to \$7,000,000 to-day without any lawsuits and with maintenance of goodwill of most of the vendors.

Stocks of cars on hand indicate that the factory will have to get busy in the early months of the new year. Branches had 8476 cars on hand Jan. 1, this year, and now they have 5467 cars. The 4000

dealers had on hand Jan. 1 13,807 cars and to-day they have only 8298 cars. These are all included in inventory figures for the company.

The company has recently revamped its sales organization so that it now directly controls more than 80 per cent of dealers.

"During the first nine months of 1922 we will attempt to run as near an even production schedule as possible," Wilson declared. "The hardest drain on our cash will come in the first three months, according to our estimates. But we will be amply able to take care of our business without outside or unfair financial help."

Wilson said the Overland car was a better product, a proven product, reflected a better working organization and closer inspection and more careful purchase of materials than ever before in its history. He said the company had reduced wages, enforced economies and were enabled to make profit despite the cuts in price on the cars.

"The automobile business is back to normal and is as stable as wool, steel, and other industries," Wilson said.

It has been reported that nearly 800 new dealers have been added in the last month.

## Some Recovery Made in Wisconsin Industry

MILWAUKEE, Dec. 27 — An official statement by the Industrial Commission of Wisconsin says that employment in this State decreased 5 per cent during November. The iron, steel and machinery automotive and motorcycle groups were largely responsible for the reduction. However, it has been apparent in December that some recovery was made, for business has begun to show signs of revival in machinery, machine tools and foundries.

Based on an analysis of reports from 211 establishments with 58,100 employees, or almost one-third of all factory workers in Wisconsin now employed, and a weekly payroll of \$1,245,000, the Industrial Commission gives these figures: Automotive and motorcycle shops: Number employed in November, 3.4 less than in October and 52.9 less than in July, 1920; total wages in November, 12.1 less than in October and 78.4 less than in July, 1920; average weekly earnings in November, \$15.58; in October, \$17.13; in July, 1920, \$32.66.

## Urges Congress to Supply Yearly Fund for Roads

NEW YORK, Dec. 23 — The Highways Committee of the National Automobile Chamber of Commerce has adopted a resolution urging Congress to appropriate immediately \$100,000 annually for highway improvement for a term of five years under the present law. It is believed that this action would result in greater efficiency of expenditure by State highway departments in helping them lay out their programs.

## Makers Outlining Schedules for 1922

### Dodge Anticipates 600 Daily Production—Earl Expects 2000 in January

DETROIT, Dec. 27 — Holiday week with many of the plants down for inventory finds the industry at its lowest production mark since 1920 but preparing to start off with a very decisive spurt immediately after Jan. 1. Many plants have been working during December preparing a stock of complete units in anticipation of a heavy early spring demand.

There has been no stocking of complete cars by dealers this year in anything like the usual proportion and this is expected to mean a heavy production pull at the factories. Dodge, assembling about 150 cars a day, has been building units for 450 cars and storing the surplus in anticipation of a 600 daily production schedule in January.

Earl Motors is rushing equipment for the new models to build upward of 2000 in January.

Ford Motors will resume its heavy production Jan. 3. Men have been ordered to report back on that day and at the offices orders are declared to be consistent with the usual seasonal demand.

### General Motors Program Completed

General Motors units have about outlined the schedules they will proceed upon for the early months.

Factories bringing out new show models are rushing work in preparation for orders on the new vehicles. This list will include probably a majority of companies in the industry, making it a very busy season in the Detroit district but a business of preparation rather than fulfillment.

Enclosed cars at prices not far above open models promise to be the feature of the national shows this year. Detroit will be represented by several manufacturers breaking into this class, the first being Essex Motors. The new enclosed car has a soft padded top with glass the principal constituent of the side structure. A strong bid for enclosed car business, particularly from persons in professional life, will be made with the new models and their appearance promises to create somewhat of a sensation.

## Approve Plan to Change Present Used Car Methods

BUFFALO, Dec. 27 — Resolutions to abolish present methods of dealing with used motor cars, and to establish a national company for their disposal, were approved at a meeting of the local association of automobile dealers at the Lafayette Hotel last night. Copies will be sent to the manufacturers by the dealers in charge of sales in the Buffalo territory and to the National Automobile Chamber of Commerce.

## Government to Have Association Policy

### Hoover Says Few Trade Bodies Come Within Supreme Court's Ruling

WASHINGTON, Dec. 24—With the decision of the Supreme Court in the *hardwood* case considered to be so sweeping that it prohibits numerous activities of trade associations, and does not confine itself merely to exchange of price information, as some believe, business interests of the country are anxiously awaiting the announcement of a definite policy by the Department of Justice on this question. Indications are that the Government will promulgate such a program within the near future. But even this, it is stated, may not be sufficiently assuring to some organizations which insist that their only safe refuge lies in the enactment of legislation which will clearly define their legal status.

#### Automotive Bodies Not Affected

No attempt has been made by Secretary Hoover to interpret the decision, inasmuch as this does not come within his province, but he does not consider the opinion to be so sweeping as do some attorneys who have closely followed the case, and thinks that it will not interfere with co-operation between his department and trade associations. He said that a survey conducted by the department showed that of the 1700 or 1800 trade associations of the country, less than 10 per cent were shown to be engaged in "trade recruiting" in violation of the law. So far as known, all the national associations connected with the automotive industry have a clear bill of health.

His view is not shared by those attorneys who consider that the decision has such a range that it destroys the very principles of trade associations as to the handling of trade information, other than that relating to prices. There is no doubt on the latter point, in the opinion of legal authorities, that exchange of price information is held to be clearly in violation of the Sherman anti-trust law. But some of them go much further and maintain that the opinion handed down through Justice Clarke is much more restrictive.

#### Broad Scope of Opinion Seen

They point to the following portion of the decision:

To call the activities of the defendants, as they are proved in this record, an "Open Competition Plan" of action is plainly a misleading misnomer. Genuine competitors do not make daily, weekly and monthly reports of the minutest details of their business to their rivals, as the defendants did; they do not contract, as was done here, to submit their books to the discretionary audit and their stocks to the discretionary inspection of their rivals for the purpose of successfully competing with them; and they do not submit the details of their business

to the analysis of an expert, jointly employed, and obtain from him a "harmonized" estimate of the market as it is and as, in his specially and confidentially informed judgment, it promises to be.

This is not the conduct of competitors, but is so clearly that of men united in an agreement, expressed or implied, to act together and pursue a common purpose under a common guide that, if it did not stand confessed a combination to restrict production and increase prices in interstate commerce and as, therefore, a direct restraint upon that commerce as we have seen that it is, that conclusion must inevitably have been inferred from the facts which have been proved.

#### Daugherty Favors Associations

It is the opinion of some attorneys that the foregoing reaches far beyond the question of price, although leading up to it, and that it implies violation of the law in handling data such as those bearing upon stocks, production, etc., where the figures are used to restrain trade and fix prices.

Attorney General Daugherty himself, in commenting on the decision, said he was unqualifiedly in favor of trade organizations which confined their operations to improving their service to the public, but he stated they would not be permitted to fix prices or apportion territory among themselves, resulting as it does, he asserted, in restricting competition. Mr. Daugherty proceeded to state that trade associations generally are showing a commendable willingness to confine their activities to the line broadly suggested by the Department of Justice as in conformity with the law. The majority opinion says in making a distinction between the exchange of information among sellers only and between sellers and buyers.

#### Reports Reached Seller Only

In the presence of this record it is futile to argue that the purpose of the "plan" was simply to furnish those engaged in this industry, with widely scattered units, the equivalent of such information as is contained in the newspaper and government publications with respect to the market for commodities sold on boards of trade or stock exchanges.

One distinguishing and sufficient difference is that the published reports go to both the seller and buyer but these reports go to the seller only; and another is that there is no skilled interpreter of the published reports, such as we have in this case, to insistently recommend harmony of action to prove profitable in proportion as it is unitedly pursued.

## Sees in Ship Subsidy Aid for Automobiles

MILWAUKEE, Wis., Dec. 27—Albert D. Lasker, chairman of the United States Shipping Board, in an address which he stated had passed the blue pencil of President Harding, told 700 Milwaukee business men at a testimonial luncheon given in his honor at the Milwaukee Athletic Club, that one of the big business development examples which is a sound argument for a merchant ship subsidy, lies in the automobile and tire field.

## Keen Competition Sighted for 1922

### M. A. M. A. Members See Greater Emphasis Laid on Quality Products

NEW YORK, Dec. 24—A year of keen competition, with good business for the strong companies and greater emphasis than ever before on quality products and service to the ultimate consumer is the outlook for 1922 in the automotive industry, according to a survey of financial executives and general managers of the principal parts and equipment manufacturers.

Prediction concerning the 1922 automobile passenger car and truck production and the consequent unit and accessory business show a considerable divergence, according to the results of a symposium conducted by the Motor and Accessory Manufacturers Association among its members. Many companies report that indications in their own business point to a substantial upward trend during 1922.

#### 30 Per Cent Increase Expected

The figures generally give a range between 20 and 30 per cent as the expected increase, although some manufacturers look for a more profitable year without an increased volume. This attitude is based on the general reduction in overhead and increase in productive and distributing efficiency which characterized 1921 business.

Three large and representative unit manufacturers in Detroit, making respectively automobile bodies, radiators and springs, were the first to answer the association's questionnaire, and without exception they predicted a marked improvement in 1922. The body manufacturer stated flatly that he was figuring on an increase of about 33 1/3 per cent over 1921 sales.

One radiator manufacturer forecasts a reasonable increase in output for those companies well established and giving good value in their product, and predicts that "truck companies should do a considerably greater volume." A spring maker feels that business will be slightly better than 1921 "with credit conditions crystallizing."

#### Sounds Note of Prudence

A note of prudence and conservative judgment is sounded by one of the leading piston-ring manufacturers in America, a company close in touch with many of the "key" automobile companies. He says:

The outlook for next year in the automotive industry, while brighter, does not by any means indicate a return to the unusual sales and marketing conditions which prevailed during the war, which, incidentally, must be recognized by all as abnormal, and a return to normal conditions does not by any means mean a return of the conditions prevailing during or just following the recent war.

(Continued on next page)



## Price Cuts Needed for British Trade

Cost of Bodies, Dealers Assert,  
Is Factor Retarding Car  
Reduction

LONDON, Dec. 20 (*By Mail*)—Information of a reliable nature in relation to production and price prospects must be awaited until the turn of the new year. Automotive factories, generally speaking, are practically closed. Very few firms with the notable exception of Morris Motors are working.

It is a general belief that prices must be lowered before sales can be expected to increase materially. Makers must accept their losses on material purchased before the slump. Daimler has again reduced the price of its "20" model but only by £50. The three categories of cars most desired in this market would be:

1. Not exceeding £350.
2. Not exceeding £700.
3. Not exceeding £1,500.

This estimate is based on a 25 per cent advance over pre-war prices to cover increased taxation and overhead expense. When these costs exceed that mark readjustment must be brought about by economies in management and production costs and by making wider use of specials for gear boxes, axles and engines. It is felt that British factories must come to this method of production.

Dealers generally are agreed that body prices are far too high and are the chief obstacle to bringing car prices down. They range from 200 per cent to 300 per cent above pre-war level notwithstanding the fact that all information points to just as much of a fall in the costs in this branch as in the chassis trade. A cut of £75 would have been the best trade stimulus for the recent show, but instead body builders have evolved another type which they call the "all weather" body and the prices remain where they were.

In connection with bodies it can be stated that Ford is having a slump in the sale of completed cars. Dealers buy the chassis and put other makers' bodies on them. The price averages about £140 for an interior drive, four to seven seater with rattle proof drop glasses and good upholstery.

## Keen Competition Sighted for 1922

(Continued from preceding page)

A representative sheet metal and stamping company in the Detroit district finds distinct promise of a good market in the new year, because of the low stocks now in manufacturers' hands, and changing models which will require a brand new set of parts.

Particularly significant is the following analysis, for it comes from a Michigan company, one of the largest wheel manufacturers in the country:

## NOVEMBER TRADE OF M. A. M. A. MEMBERS EXCEEDS IN VOLUME EARLIER EXPECTATIONS

NEW YORK, Dec. 27—Sales by members of the Motor and Accessory Manufacturers Association for November were only approximately \$3,000,000 less than for October and about \$4,150,000 less than for September. This volume of business was considerably larger than was expected at the beginning of the month. Present indications are that sales for December will equal those for November and may exceed them. November marked the ninth consecutive month with comparatively little variation in the volume of sales.

November brought a slight decrease in the total of past due accounts but a small increase in the total of notes outstanding. It was the first month since August to show a decrease in the total of past due accounts. The total of notes outstanding at the end of November was virtually the same as at the end of September. The figures for each month this year follow:—

Month	Total Purchases	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	\$6,264,587	.....	\$8,099,727	.....	\$4,359,871	.....
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,063,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.66 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	00.22 Inc.	3,677,600	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,382,000	3.56 Dec.	3,661,900	5.73 Inc.

The outlook for 1922 is even better than the outlook was two years ago today for the year 1920. Our business has averaged 70 per cent, each month of this year as compared with 1920, and we have every reason to believe that 1922 will be considerably better than 1921 or 1920.

One automobile engine manufacturer predicts that the year will be 30 per cent better than 1921, while another feels that there will be "a gradual but slight improvement in general business conditions so that by July, 1922, we may hope for what may be a 50 per cent of normal production." We doubt very much whether the production as a whole at the time mentioned will exceed the percentage stated.

A Cleveland manufacturer of various automobile units makes this statement:

The outlook for 1922 is almost as vague as it was for 1921, at this time a year ago. There is, however, a healthier and more optimistic feeling abroad. We have learned to know who are the strong companies in the industry and who are the weak ones. Some of those we thought weak have proved to be exceptionally strong, and vice versa.

The outlook for strong companies for 1922 is good.

The public is not saturated with automobiles; it is merely saturated with second choice and third choice weak automobiles but the demand for strong ones is good.

We do not think, however, that 1922 is going to show much more automobile business than 1921, and we are trimming our sails accordingly. Our reasons for this are many: chiefly, that there has been no increase in business that would place new money in the hands of the wage earners or that would place dividend money in the hands of investors, and until this is done, there will be no buying to speak of, of automobiles.

We believe 1922 will not be worse than 1921. We believe it will be somewhat better and gradually become more so.

## Columbia Motors Presents Bright View of Conditions

DETROIT, Dec. 27—An encouraging picture of the condition of the Columbia Motors Co. is presented in a letter sent to the president of the Detroit Stock Exchange by A. P. O'Connor, secretary and treasurer of the Columbia company. He states that more than 350 cars were shipped in August and more than 300 in September. Thirty new dealer connections have been made in the past two months and trade on the Pacific Coast has improved materially. Dealers in the southeast section have started ordering cars, stating that business is beginning to improve.

In reference to finances, the letter says:

Directors of this company feel confident that we have ample capital to carry us through any reasonable depression that may re-occur during the winter. We have reduced our loans at the banks during the summer approximately \$200,000, and at the present time, or, in fact, ever since we have been purchasing material on the new schedule, we have discounted all of our bills for material.

Our bankers assure us that they have no difficulty in re-discounting our paper at the Federal Reserve Bank, and that our statement makes all of our paper eligible for re-discount for some time to come.

## ASK TRUST FUND ACCOUNTING

FORT WAYNE, IND., Dec. 24 — Stockholders of the Huntington Automotive Co., organized to manufacture articles on which J. Archie Borland has patents, have adopted a resolution to seek an accounting for a trust fund gathered from stockholders of the defunct Rapid Rim Co. of Huntington, Ind.

## British Tire Makers Defend Quotations

Stearns, Oldsmobile and G. M. Truck Make Reductions from Present Prices

(Continued from page 1287)

Egyptian canvas which averaged 22d. per square yard before the war, costs now 52d. Wages are up by 150 to 200 per cent and manufacturing costs are approximately threefold higher.

Cotton, he adds, rose to 16 and 17 shillings per square yard during the war, and apparently this has been the most serious factor in bringing about the present unsatisfactory position of the tire industry.

## Stearns Lowers Prices; Cars Have Cord Tires

CLEVELAND, Dec. 28—The F. B. Stearns Co. has announced reductions on its models for 1922. The prices are as follows:

	Old Price	New Price
Roadster .....	\$2,450	\$2,250
5 passenger touring car .....	2,450	2,250
4 passenger Millitairé .....	2,475	2,275
7 passenger touring car .....	2,675	2,450
Coupe .....	3,400	3,150
Coupe Brougham .....	3,600	3,450
Sedan .....	3,700	3,450
Limousine .....	4,400	4,150
Town car .....	4,400	4,150
Landalet Brougham .....	4,400	4,150

The company provided fabric tires for the prices quoted in 1921 while in the new year it will equip the cars with cord tires at the lower prices.

### SLIGHT REDUCTION IN OLDS

DETROIT, Dec 28—Slight price reductions effective Jan. 1 are announced on part of the Oldsmobile line by the Olds Motor Works. The changes are:

	Old Price	New Price
4 cylinder sedan .....	\$1,845	\$1,795
Small 8 coupe .....	2,185	2,145
Small 8 sedan .....	2,425	2,295
Small 8 touring car .....	1,625	1,595

No change of price has been made on the large eight line.

### G. M. TRUCK LOWER

PONTIAC, Dec. 28—General Motors Truck Co. has announced a reduction in the prices of its chassis effective Jan. 1 as follows:

	Old Price	New Price
Model K 41-2 ton .....	\$3,000	\$2,775
Model K 71-3½ ton .....	4,250	3,950
Model K 101-5 ton .....	4,650	4,350

Model K 16, which completes the line, remains at its former price \$1,495, to which it was recently reduced.

Improved manufacturing facilities and readjusted inventory are stated to be contributing factors to the reduction.

### MAKE USED CAR SUGGESTIONS

NEW YORK, Dec. 28—A wide diversity of opinion on the best means to solve the used car problem is shown in the large

## COBB'S DINNER TALK TO BE ON GASOLINE

NEW YORK, Dec. 28—Irvine S. Cobb, who will be one of the speakers at the annual dinner of the National Automobile Chamber of Commerce on the evening of Jan. 10, has informed Alfred Reeves that his subject will be, "Gasoline, the New National Drink." The other speaker at the dinner will be Secretary of the Navy Denby, who has not yet announced his subject.

number of suggestions received from dealers by the National Automobile Chamber of Commerce in reply to the request for views on the subject.

It is held to be significant that many dealers declare they are opposed to an increase in discounts on the ground that they would be given away in trade. Many dealers endorse the slogan, "Buy Them Right." A further statement of the results of the survey will be made public as soon as an analysis of the suggestions received can be completed.

## Petition Filed in Willys Receivership Proceedings

TOLEDO, Dec. 28—Lloyd T. Williams of the firm of Brown, Geddes, Schmettau & Williams, attorneys here, filed an intervening petition in the Willys Corp. proceedings in Federal court here Tuesday on behalf of the United States Light & Heat Corp., Niagara Falls, N. Y. In the petition the battery company asks that the receivers be required to accept payment of \$802,153 in preferred stock of the United States Light & Heat Co. to cancel a note.

D. H. Kelly, vice-president, was here last week in conference with attorneys. Hearing has been set for Jan. 9.

John N. Willys is chairman of the board of the United States Light & Heat Corp. and C. O. Miniger, who is one of the receivers for the Willys Corp., is president and general manager.

## Bechtel Succeeds Bowser as Pump Company Head

FORT WAYNE, IND., Dec. 29—S. F. Bowser, founder and president of S. F. Bowser & Co., Inc., of this city, manufacturer of gasoline pumps and tanks, has retired from the presidency of the concern to become chairman of the board of directors and S. B. Bechtel, vice-president and general manager, has been named to the presidency.

### FLETCHER LEAVES EARL

DETROIT, Dec. 29—John Fletcher, vice-president of the Fort Dearborn National Bank, Chicago, has resigned as treasurer of Earl Motors, Inc., to devote all his attention to his banking duties. Leon S. Westcoat has been appointed his successor by Clarence A. Earl.

## G. W. Mixter Resigns From Pierce-Arrow

Will Be Succeeded as President  
of Company by M. E. Forbes

BUFFALO, Dec. 29—George W. Mixter, who became president of the Pierce-Arrow Motor Car Co. last May when G. W. Goethals & Co. retired from the management, has resigned. He will be succeeded as president by M. E. Forbes, who has been vice-president and treasurer of the company for some time.

Mixter took active charge of the Pierce-Arrow plant when the Goethals company was employed to assist in bringing the factory to a peace time basis and also to aid in revising its line of cars and trucks.

Colonel Charles Clifton, chairman of the board, in announcing the resignation of Mixter, said he consented last May to remain as president "until certain special work he had inaugurated was completed." This work has not been finished but the president asked to be relieved.

It would not be surprising if the retirement of Mixter might result in a return of some of the former executives of the Pierce-Arrow company. It has been persistently reported for several months that Henry May, who formerly was vice-president in charge of manufacturing, would return.

Colonel Clifton said the plant now is employing about 3200 men as compared with 1800 when the low point of production was reached several months ago. He added that operations in the last few months indicate that the company "has a product which can be manufactured with satisfactory results both to the public and to stockholders."

## Rutherford Will Head M. A. M. A. Committee

NEW YORK, Dec. 28—W. O. Rutherford, vice-president of the B. F. Goodrich Co., has accepted the chairmanship of the foreign trade committee which directors of the Motor and Accessory Manufacturers' Association decided at their last meeting to appoint. He is deeply interested in the export field.

Rutherford will appoint his own associates on the committee and it will work in cooperation with the automotive division of the Bureau of Foreign and Domestic Commerce in developing plans for the expansion of foreign sales by parts and accessory makers.

### FORD WILL NOT CUT

DETROIT, Dec. 28—The Ford Motor Co. in a telegram to dealers denies that prices of its cars will be cut around Jan. 1 as widely rumored. The company says: "As there is no foundation for these reports and we are not contemplating any price changes, we have no hesitancy in making a denial of this report."

# G. M. Starts Year with Clean Slate

## Losses Written Off; Has No Commitments

### Inventory Position Vastly Better Than Year Ago—Market Value May Exceed Book

NEW YORK, Dec. 28—Virtually all the units of the General Motors Corp. will start the new year with their books practically clear of commitments. Large sums have been spent in the past year in the cancellation of contracts on a basis entirely satisfactory to the persons supplying material and the equitable policy adopted by the corporation in this respect has made it many friends.

The inventory position of the corporation is vastly better than at the beginning of the year, as the result of heroic treatment. The new regime has written off its losses and all of them are behind it. It may be found when the inventories are completed that their market value is greater than the present book value, but if this is not the case they will be written down to meet the market so that 1922 can be started with a clean slate.

This policy of General Motors will permit it to turn out its products on the basis of present market costs for materials. It has made possible the sharp reduction in Cadillac prices and a further scaling down of the Buick and Oldsmobile sales prices. The corporation believes the prices of materials are as low as they will go for some time to come and that as a consequence no further price concessions in these lines are in prospect.

General Motors is determined, however, to sell its products at a price which will allow only a reasonable margin of profit. With this purpose in view it is constantly scanning its costs so that purchasers can be given the best values possible. This policy holds good in the export as well as the domestic field. There is no talk within the organization of a possible increase of prices in the coming year.

So far as production for 1922 is concerned, the corporation makes no predictions, but it can be stated that it expects to sell more cars than it did in 1921. It is believed that at the present prices the Cadillac and Buick factories will be kept running at capacity. Chevrolet is expected to continue on the satisfactory basis which has prevailed for months and the output of Oaklands has been steadily increasing of late. The past

## LOS ANGELES GETS LARGEST DELIVERY

NEW YORK, Dec. 28—What is said to be the largest single delivery of automobiles ever made to a retail dealer will be sent this week to Earl C. Anthony, Inc., of Los Angeles, by the Durant Motor Car Co. of New York. The shipment will consist of 500 Durant fours carried in a single train of 100 steel freight cars. The freight charges will amount to \$66,000 and the Durant company has received a draft for \$335,550 from Anthony to cover the transaction. Production at the Long Island City plant of the Durant company is now 75 cars a day.

year has brought many minor improvements in the Chevrolet and Oakland.

Tentative schedules call for a considerably larger output than in 1921. They are based partly on the belief that domestic sales will be somewhat larger and partly on the expectation, which amounts almost to a certainty, that the export business will be substantially larger.

Taking all factors into consideration, General Motors will start the year in a highly enviable position. Really remarkable progress has been made in 1921 in getting the big corporation back to normal and working on a co-operative basis which has strengthened each individual unit.

## Marsh Will Make Chief Address at S. A. E. Dinner

NEW YORK, Dec. 29—Arthur Richmond Marsh, president and editor of the *Economic World*, a former president of the Cotton Exchange and prominent in cotton activities, will be the principal speaker at the annual dinner of the Society of Automotive Engineers to be held at the Hotel Astor on Thursday evening, Jan. 12. His talk will be along economic lines and will deal particularly with the automotive industry.

C. F. Kettering, past president of the society, will serve as toastmaster. Addresses will be made by David Beecroft, retiring president, and B. B. Bachman, president-elect.

Reservations are now being made.

## TEST AIRCRAFT DEVICES

LONDON, Dec. 20 (*By Mail*)—Tests of the devices entered in the competition of the British Air Ministry for safety-fuel tanks for aircraft have commenced at the Royal aircraft establishment, Farnborough.

## Dort to Build Low Priced Closed Cars

### Sedan Will Sell for \$1195, Compared with \$985 for Touring Car

DETROIT, Dec. 28—Dort has added two lower priced enclosed models to its present line, a coupe, selling for \$1165 and a sedan selling for \$1195, as against \$985 for the touring car and roadster. The new models are upholstered in leather and equipped with heater, visor, etc. The older coupe, selling at \$1495 and the sedan at \$1545, both upholstered in brown cloth, are continued.

The refinements in chassis construction include lighter rods and pistons, use of multiple disc clutch in place of the cone type, use of slightly wider face gears in the transmission, adoption of spiral bevel gears in final drive, use of split spring seats with shims between halves, and increased stiffness in fenders, running board aprons, splash pan and some other pressed metal parts. A Connecticut ignition coil, and Alemite chassis lubricating system are now employed.

## Compiles Motorization Facts for Chicago's Use

INDIANAPOLIS, Dec. 27—Figures compiled for the information of Chicago officials show that the garbage collection department of Indianapolis has been able to save \$2.14 a ton by the use of motor equipment.

Before the motorization of the department here the cost of collection ran to \$5.76 a ton for the first five months of 1921. Late in the summer the new motor equipment was bought. In the six months from June to the end of November the department, which had been transferred to the control of the sanitary board, by the use of motor equipment brought the cost down to \$3.62 per ton.

## COLLINS PRODUCTION POSTPONED

DETROIT, Dec. 29—R. H. Collins has postponed indefinitely, it is learned, the bringing out of the Collins automobile and will exhibit at the shows this year only the Peerless line with minor refinements and no change of price. After Collins left the General Motors organization he incorporated a company in Michigan to manufacture a high grade car and so far as can be learned he has not abandoned his plan of building one eventually.

## Aircraft Commerce Chamber Formed

**Will Take Over Some Duties Formerly Assumed by Manufacturers Association**

NEW YORK, Dec. 28—The aircraft industry has formed a national organization under the name of the Aeronautical Chamber of Commerce and has taken over the offices and equipment of the Manufacturers Aircraft Association at 501 Fifth Avenue, this city, which it partly succeeds.

The latter organization will continue to serve its members in handling the administration of the cross license agreement covering airplane patents but the Chamber will assume and greatly extend all of the functions formerly handled by the older organization, including the collection and the dissemination of information regarding aeronautical activities in this and other countries, the publication of the Aircraft Year Book and the furnishing of special services to its members through its various departments and committees.

### Has 100 Charter Members

The new organization, which has been chartered under the laws of the state of New York with approximately 100 members represents virtually every section of the country in the field of designing, construction, operation and kindred activities. Among other things it will endeavor to do will be the development of the market and the increase of the use of flying machines among civilians, corporations and transportation companies.

Its aims and purposes are set forth in the charter as follows:

To foster, advance, promulgate and promote trade and commerce, throughout the United States, its territories, possessions, and in foreign countries, in the interests of those persons, firms or corporations engaged in the business of manufacturing, buying, selling and dealing in aircraft, aircraft motors, and aircraft parts and accessories of every kind and nature.

To diffuse among its members accurate and reliable information as to the standing of its members and those persons, firms or corporations engaged in similar lines of business.

To procure uniformity and certainty in the customs and usages of trade and commerce among its members and those persons, firms or corporations having a common trade, business or professional interest in all matters pertaining to aeronautics.

To aid and assist in mapping out air roads and lanes; the location of landing fields, air-dromes, hangars, or such other structures as may be necessary for the advancement of aeronautics.

To advocate and promote in every lawful way the enactment of just and equitable laws . . . pertaining to aeronautics.

To settle, adjust and arbitrate any and all differences which may arise between its members, and persons, firms or corporations dealing with them.

To promote a more enlarged and friendly intercourse between its members and persons, firms and corporations engaged in the

business of, or dealing in aircraft, aircraft motors and aircraft parts and accessories, and generally to do every act and thing which may be necessary and proper for the advancement of the aeronautical art and industry and the accomplishment of the objects and purposes hereinbefore set forth; provided, however, that nothing herein contained shall authorize this corporation to engage in any business for pecuniary profit.

## Detroit Company May Buy Plant of Maibohm Motors

TOLEDO, Dec. 28—The public sale of Maibohm Motors Co. plant at Sandusky has been postponed indefinitely but negotiations for a private sale are expected to be consummated this week. Approval of the court will be asked for such a plan.

The general reorganization plan will be adhered to, it is asserted, except that a Detroit concern now operating there will bring in new money and organization and continue the Maibohm production along with their other manufacturing at Sandusky. The Detroit company desires to take advantage of economies of manufacture offered by the smaller city.

Chairman E. G. Kirby of the creditors committee said the new plan was looked upon very favorably. Creditors would be given preferred stock in the Detroit company to the amount of their claims. He said most creditors would prefer to have a new management take over operations. Details are being rushed so that announcement may be made at the New York show.

## Expect Export Call for Farm Machinery

ATLANTA, GA., Dec. 24—A general rejuvenation of agricultural activities in all European countries with the use of modern power machinery, and materially better business for the power farming industry in this country during the next two years, is anticipated by American manufacturers of tractors and power farming machinery, according to statements by executive officials of the International Harvester Co., at a southern conference in Chattanooga.

The International, which has large plants in Chattanooga, has reopened three of its large European plants the past year, officials stated, and anticipates capacity production within the next twelve months. The industry has suffered considerable in this country during the long period of agricultural and business depression, but much better times are in prospect for 1922, dealers attending the conference were told.

### BARS ROADS TO TESTS

DETROIT, Dec. 28—A decision by the State Supreme Court withholds the use of State highways for testing motor vehicles, the specific case being a suit by Gratiot County against the Republic Motor Truck Co., Alma. The court held that trucks undergoing tests were not engaged in legitimate traffic and therefore the expense of repairing damage should not be borne by taxpayers.

## Test Road Holds Up Under Heavy Traffic

**Impact Not as Serious in Highway Destruction as Generally Believed**

SAN FRANCISCO, Dec. 27—Traffic alone is not to blame for concrete road failures, according to a report of A. G. Gowans, highway engineer representing the California State Automobile Association, who has been watching results at the circular highway which is being tested to destruction at Pittsburgh, near this city. From Nov. 9 to Dec. 17 a fleet of forty trucks have driven 2,257,450 tons over the highway and on the latter date the road, taken as a whole, does not show any evidence of this enormous traffic.

A number of cracks have appeared but more than half developed before any traffic was put on the pavement. The traffic itself did not seem able to enlarge the cracks with any speed. The evidence of traffic wearing away concrete surfacing, according to Gowans, has also been lacking. "In fact," he says, "on the straight sections of the road no appreciable evidence of wear can be seen."

### Pneumatics Make Little Difference

Gowans further states:

In the opinion of the various engineers who have observed the traffic over the road it is impossible to draw any comparison of it with any thoroughfare in this country. In other words there does not exist any highway to date that begins to carry the traffic that has been put over the Pittsburgh test road. This has therefore shown more than ever that traffic alone is not to blame for concrete road failures.

A few points have now become evident, such as the fact that in a majority of observations a moving load does not produce as great a deflection in the concrete slab as one standing still. Impact has been studied sufficiently to show already that it takes a high rate of speed and a fall of at least one inch to produce deflections in a slab that are at all serious. This must also be done by a vehicle using hard tires that reach any good speed, and the larger the truck the slower its speed. Furthermore, a highway as built to-day and maintained does not offer much in the way of a real rough surface. Impact, therefore, does not appear to be quite as serious a factor as has formerly been the idea.

It is also interesting to know that the experiments made with vehicles using pneumatic tires prove that the impact with air tires produces little if any different deflection than produced by the vehicle merely moving straight along.

### PROTESTS POWER RATES

DETROIT, Dec. 28—General Motors Corp. has filed an application with the Michigan Public Utilities Commission asking for a reduction in the power rates of the Consumers Power Co. A hearing has been set for Jan. 18. General Motors holds that rates filed under the Miller law of 1921 are much higher than formerly.

## G. M. Zones World for Export Trade

### Changes from Plan of Grouping Its Various Products into Divisions

NEW YORK, Dec. 28—Reorganization of the General Motors Export Co., which handles the foreign sales of all G. M. C. cars and trucks, has rapidly followed the appointment of J. D. Mooney, formally of the Remy electric division, as vice-president in charge of operation of the export company. Changes in the personnel already have been made, the most important of which returns Peter Steenstrup, former export chief, to the domestic corporation and names D. A. Laing as sales manager of the export organization. Laing has been in the export organization for several years and has already taken over his new duties.

The export company has given up a former plan of grouping the various products into divisions, with a chief in charge of each, such as Buick, Cadillac, etc. The present plan and the one that Mooney is putting into effect zones the world in various territorial divisions, such as the Pan-American, European, Oriental, Australasian, etc. Each zone will have a chief who will be responsible, with his field men, for the merchandising of all General Motors products in his territory. This system, it is believed, offers better opportunities for intensive merchandising effort.

#### Expects Bigger Year

Another important change elevates S. W. Dorman to the position of vice-president and general manager of the Overseas Motor Service Corp., which handles the export sales of accessories and equipment. Dorman has been nominally in charge of the Overseas company for some time but his position is greatly strengthened by the change.

The export company is preparing for the new year with the expectation that it will be materially larger than 1921. New inquiries and orders contingent upon the price reductions just announced indicate that its position will be much stronger. Working more closely with its foreign distributors, the company expects to gain more intensive sales of its products.

### Tire Companies Start Year in Better Position

AKRON, Dec. 28—The tire companies here will start 1922 in a much stronger position than they were 12 months ago and all of them are looking forward to increased production early in the year. Inventories have been worked down and commitments still held by fabric and rubber producers have been adjusted on a satisfactory basis.

A year ago the Goodyear Tire & Rubber Co. was in the midst of financial difficulties which resulted in a reorganization

but it now has been brought to a strong financial position.

The Firestone Tire & Rubber Co. has taken all its losses as shown by the last balance sheet when assets were reduced from \$107,000,000 to \$75,000,000.

It is reported that the entire indebtedness of the Miller Rubber Co. has been wiped out and the floating indebtedness of the General Rubber Co. has been liquidated.

## FINANCIAL NOTES

Bates Machine & Tractor Co., through Straus Brothers Co., is offering at 100 and interest \$300,000 8 per cent notes due April 1, 1923 to 1927, for the purpose of funding the floating debt and augmenting the working capital.

Miami Cycle & Manufacturing Co., Middletown, Ohio, has increased its capitalization from \$1,371,900 to \$2,500,000, and an outstanding issue of preferred shares amounting to \$2,064,500 has been replaced by an issue of \$1,371,900.

Spicer Mfg. Corp. has declared the regular quarterly dividend of 2 per cent on its preferred stock, payable Jan. 1, 1922, to stock of record Dec. 20, 1921.

Reo Motor Car Co. directors were all re-elected for another year at the annual stockholders' meeting.

F. B. Stearns Co. declared the regular quarterly dividend of \$1, payable to stock of record Dec. 31.

### Offer Awards for Designs at Body Builders Exhibit

NEW YORK, Dec. 27—In addition to the display of passenger car bodies which will be seen at the Body Builders' Exposition which will be held in the 12th Regiment Armory Jan. 9 to 14, there will be a full line for commercial vehicles including dumping bodies, light and heavy panel bodies and omnibus bodies. The management of the show has appropriated \$500 for cash prizes for the best body design. It is stated that more than 40 of the leading designers already have entered the contest.

The contest is open only to individuals. The design must illustrate a complete car with a body which will accommodate four or more passengers. The awards will be based on the merit of the design itself, its fitness for the chassis and its practicability. The body must fit some one of the chassis used in substantial quantities by any automobile manufacturer. The chairman of the committee on awards is William Brewster.

#### DURANT STARTS AT LANSING

DETROIT, Dec. 28—Durant Motors of Michigan has started production at Lansing, although no set schedule will be entered upon until after Jan. 3. Two hundred and fifty men are employed at the start, this number to be augmented steadily as production grows. Until the completion of the Oakland, Cal., plant all far western territory will be supplied from Lansing.

## BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

As the year draws to a close money rates have been showing a tendency toward firmness, but the markets have been dull and inactive. Call loans which opened last week at 6 per cent closed the week from 5 to 5½ per cent secured by both mixed and all industrial collateral. For the time loans 5 to 5½ per cent for all periods from 60 days to 6 months' ruled last week as in the week previous. Choice name mercantile paper for all maturities likewise ruled at this rate, money loaning on less well known names at ¼ per cent above the rate for prime mercantile paper. There was but light demand for bankers' acceptances, most of the large institutions being out of the market for the time being. The American Acceptance Council posted rate for such acceptances advanced from 4¼ to 5½ per cent.

The Federal Reserve System in its statement for December 21 reflected considerably larger borrowings by the member banks, bills discounted having increased during the week by \$71,870,000 to \$1,224,703,000. Bills bought in the open market likewise increased materially so that the total bills on hand December 21 of \$1,351,228,000, marked an increase of nearly \$100,000,000 in bill holdings. A feature of the week, however, was the entire disappearance of inter-bank rediscounting of bills, which has been for so long a time the resource of the weaker banks in the South and Southwest.

The holiday demand for currency increased the amount of Federal Reserve notes in actual circulation \$53,783,000 during the week, the total of such notes in circulation being \$2,447,560,000 on December 21, 1921, compared with \$3,404,931,000 of notes in circulation on December 23, 1920, which was the largest amount of such circulation on record.

Deposits of the Federal Reserve System on Dec. 21 of \$1,784,750,000 were \$41,990,000 larger than the week before, the increase being entirely due to a growth in the member bank reserve account, government and other deposits having fallen off. Although gold holdings were enlarged by \$1,821,000, the paying out by the banks of \$10,347,000 in silver and local tenders caused a decline in total reserves which were \$2,993,060,000 on Dec. 21.

#### PURDUE GIVES COURSES

LAFAYETTE, IND., Dec. 27—Starting Jan. 23, Feb. 6 and Feb. 20, three courses in the use of tractors, etc., will be given by Purdue University for the benefit of Indiana farmers or tractor men who are interested in the more efficient operation of gasoline tractors and engines. Those taking any of the three courses will also do a large amount of laboratory work. The lectures will be delivered in the shops or in rooms adjoining them so that all the tractors and parts may be easily demonstrated.



## MEN OF THE INDUSTRY

**L. D. Sasscer** and **W. C. Middleton** have joined the factory sales organization of the Peerless Motor Car Co. to assist in expanding the company's distributing organization. Sasscer has been assistant general manager of the Detroit branch of the Cadillac Motor Car Co. and previously had acted as a specification manager for Cadillac with the Chicago branch and the Philadelphia distributor. Middleton was also engaged in sales work with the Chicago branch of the Cadillac company and the Philadelphia distributor.

**Earl B. Stone**, who for two and a half years has been connected with the Cleveland Tractor Co., as sales representative, district sales manager, and assistant advertising manager, has succeeded **George B. Sharpe** as advertising manager. Sharpe who has been with the Cleveland company for several years, resigned to become associated with the Burroughs Adding Machine Co. Stone has had advertising experience for many years with the General Fire Proofing Co., and the National Acme Co. Sharpe began his association in the advertising field with the Studebaker company many years ago and has been one of the aggressive men in the tractor advertising field for several years.

**Frank K. Bull**, chairman of the board of directors of the J. I. Case Threshing Machine Co., Racine, has resigned, effective Dec. 31, and will retire from active affairs, although retaining extensive holdings in the corporation. Bull, eldest son of the late Stephen Bull, one of the founders of the Case company with the late Jerome I. Case, was born in Racine in 1858. At nineteen he entered the Case works as an apprentice in the repair department. In 1881 he was elected secretary and in 1897 he became president, retiring in 1916 to become chairman of the board. Since that time he has spent much of his time at the country estate at Camden, N. C., with his family.

**F. J. Leyerle** has been appointed service manager of the Franklin Automobile Co., Syracuse, succeeding **Paul Williams**. Leyerle has been acting as assistant to President **H. H. Franklin** since April 1. Before coming to the Franklin organization, Leyerle was associated with the G. W. Goethals Co., industrial engineers, and was assigned by them to the plant of the Splittdorf Electric Co. at Newark, where he acted as assistant factory manager in charge of factory administration.

**Glenn A. Tisdale**, president of the Franklin Motor Car Co. of New York, has been appointed commander of the automobile accessories division in the mobilization of New York business men in the "budget guard," which is being organized by the National Budget Committee. He already is at the head of the motor car dealers division. Tisdale contends that burdensome Federal taxation has seriously impeded motor car sales.

**R. S. Townsend**, general sales manager for the Chevrolet assembly plant in Texas and Oklahoma, with headquarters at Fort Worth has been transferred to Tarrytown, N. Y., where he will be director of sales through the New England and Atlantic seaboard states. He will be succeeded by **L. S. Costly**, now his assistant, while Costly's assistant will be **George G. Beakley**, at present special territorial representative.

**Walter E. Flanders**, chairman of the board of directors of the Rickenbacker Motor Co., will distribute the new car in Maryland, Vir-

ginia and the District of Columbia under the name of Flanders-Rickenbacker Motor Co. Headquarters will be in Baltimore, with branches in Washington, Norfolk and Richmond. **A. J. Jarvis** of Detroit will be general manager. **George Flanders** will be associated with his father.

**J. J. Hunt**, long associated with the distribution of the Reo car in New York, has been given a franchise for the Metropolitan district by the Rickenbacker Motor Co. He will operate under the name of the Hunt Motor Car Co., Inc. Hunt took charge of Cadillac affairs in New York in 1905 and then joined Reo as eastern territory representative, later taking charge of the New York Reo branch.

**George W. Cushing**, advertising manager of the Hudson Motor Car Co. and Essex Motors, has resigned to become associated with the advertising agency of Barton, Dursline & Osborne, Inc., New York City. Cushing will work in the Buffalo office of the company. Before joining Hudson he was advertising director of Federal Motor Truck Co.

**W. H. Girdlestone**, formerly sales manager of the eastern district of Splittdorf Electrical Co., has joined forces with **H. B. Shontz Co., Inc.**, New York distributor of USL storage batteries, as sales manager in charge of battery and electrical service station equipment. Girdlestone has been connected with the automotive industry for nearly twenty years.

**J. J. Cole**, president of the Cole Motor Car Co., and his family have arrived at Cherbourg, France. While ostensibly the trip is taken for recreation, Cole will make a thorough study of economic conditions abroad and of motor car development in European countries. He will visit France and Egypt before returning home, some time in April.

**H. E. Keller**, long identified with the rubber industry as a sales executive, has been appointed director of sales of the Diamond Rubber Co., Inc., Akron. For more than nineteen years Keller was associated with the B. F. Goodrich Rubber Co. and previous to his present appointment served with the Diamond company as district manager.

**Ralph E. Brown**, Buffalo, has resigned as sales manager of the A. W. Haile Motor Co., distributor for western New York, to become president and general manager of the Packard Buffalo Motor Car Co. Before establishing Buffalo connections, in 1909, Brown was assistant manager of the retail division of the Winton Motor Car Co. at Cleveland.

**J. B. Bartholomew**, president of the Avery Co., has been elected an honorary member of the American Society of Mechanical Engineers in recognition of "outstanding service to agriculture particularly in the application of engineering agriculture" through his activities in the farm equipment industry.

**O. H. McCornack** has been elected vice-president of the Hudson Motor Car Co. McCornack, who has been general sales manager of the Hudson company for the last five years, will continue in charge of sales, advertising and service activities in connection with both Hudson and Essex cars.

**Charles H. Domville**, who joined the staff of the Commonwealth Motors Co., Chicago, several months ago in the capacity of district sales manager, has been appointed assistant sales manager. Domville was formerly associated with the Yellow Mfg. Co. as assistant sales manager.

**Peter S. Steenstrup**, vice-president and general manager of General Motors Export

Corp., has been transferred to General Motors Corp. as an assistant to **Albert P. Sloan, Jr.**, vice-president in charge of operations, to undertake special duties.

**Selberling Rubber Co.'s** acquisition of the Lehigh and Portage rubber companies means the discontinuance of the Lehigh and Huskie tires. The plants will be used exclusively for the production of Selberling and Portage tires and tubes.

**J. J. Ritter** has been appointed Michigan distributor of the Visible Pump Co. of Fort Wayne, Ind., of which he has been production engineer for the last year and a half. His headquarters will be in Detroit.

## Some Louisville Dealers Equalled Record of 1920

LOUISVILLE, KY., Dec. 27—A canvass of representative passenger car dealers in Louisville reveals the fact that in 1921 many firms did a volume of business equal to that of 1920. Profits were not so great because of the reduced list price on all makes of cars, but the number of sales held up remarkably well for those dealers who kept hard at work.

On one make, the local sales of new passenger cars increased 45 per cent in 1921 over 1920. There was a marked tendency in December toward rush business. This followed a rather quiet fall. December, with the added impetus given it by Christmas gift suggestions and advertising, tried by local dealers on a wide scale for the first time, offset the loss of quiet business in the preceding month.

## Former Chevrolet Head and Buick Founder Dies

FLINT, MICH., Dec. 27—**C. C. Begole**, formerly president of the Chevrolet Motor Co. of Michigan, died in St. Petersburg, Fla., Thursday, according to advices received here. Besides his association with the Chevrolet company, Begole was one of the founders of the Buick Motor Co., of which he was the first president, and was also one of the leaders of the Flint Wagon Works, the pioneer vehicle industry of Flint.

He was a son of **Josiah Begole**, who was formerly governor of Michigan and one of the founders of the Flint Wagon Works.

## BRITISH ENGINE LOSS

LONDON, Dec. 20 (By Mail)—The **W. H. Dorman Co., Inc.**, at Stafford, manufacturer of engines for cars, trucks and tractors, report a loss of £223,292, after crediting £196,582 taxes since recovered. For the trading year 1919-1920 the company showed a profit of £72,980 and carried forward £43,947. It paid 10 per cent dividend on common stock and 9 per cent on preferred.

## NEW ROAD FROM LIMA

LIMA, PERU, Dec. 4 (By Mail)—The construction of a concrete toll road between this city and Callao, its port on the Pacific Ocean, has been authorized in a concession recently granted. The new road will be 10,250 meters in length. Its width will be seven meters. The work must be started within six to eight months and completed within 18 months.

## INDUSTRIAL NOTES

Edmund S. Wolf, Bridgeport, Conn., has been appointed temporary receiver for the Coe-Stapley Mfg. Co., West Haven, Conn., maker of automobile and bicycle pumps and sheet metal products, upon application of creditors who filed a petition in bankruptcy against the company. The company was organized in 1918 and has a capitalization of \$950,000. R. E. Carpenter, Boston, is president and Robert R. Adams, Bridgeport, treasurer.

American Motors Service, Pittsburgh, Pa., has been formed by G. E. Burroughs, I. V. Conneely and associates for the purpose of leasing a chain of service stations and distributing parts and equipment direct from factory, private garage equipment and tools complete. Sales offices forming in Pittsburgh, Cleveland and Toledo will open May 1, 1922.

Edward G. Kirby has been appointed receiver for the Zenith Tire & Rubber Co., Cleveland by the Federal court at Toledo. Kirby is trust officer of the Commerce Guardian Bank, Toledo. His bond has been fixed at \$10,000.

Cutler-Hammer Mfg. Co., Milwaukee, has moved its Boston office from the Columbian Life Building to the Harvety Building, Chauncy Street. C. W. Yerger is manager of the Boston office.

Giant Tire & Rubber Co. has moved its operations to the plant formerly owned by the Grant Motor Car Corp. at Findlay, Ohio, and is adding \$300,000 new capital for the purpose of business expansion.

Republic Rubber Co. is reorganizing its sales department and re-establishing agencies preparatory to a nation-wide campaign. No move will be made toward reorganization until after Jan. 1, 1922.

Percival Wilds has been appointed receiver for the Manhattan Motors Corp., New York City, under \$5,000 bond. The liabilities are stated to be \$100,000 and the assets about \$25,000.

## Dallas Sold 30,000 New Cars During Year

DALLAS, TEX., Dec. 27—Dallas automobile dealers have sold 35,000 cars this year despite the fact that times have been called dull and money tight. Of that number 30,000 were new cars valued at more than \$30,000,000. Five thousand used cars were sold at \$2,500,000.

This is the estimate made by half a dozen dealers as the year was closing, and some of the dealers assert the sales might run a thousand cars more. Of the total number, 12,000 were sold by retailers in Dallas and the remainder by the wholesale houses here.

The last two weeks of the year are proving banner ones, according to retailers. This was due to the large number of cars sold as "Christmas" presents and general cleaning up of stocks for the first of the year.

### BETHLEHEM REFUSES OFFER

ALLENTOWN, PA., Dec. 23—Local creditors of the Bethlehem Motors Corp. have been informed by Clinton E. Woods,

the receiver, that an offer of \$400,000. had been made for the plant, but that creditors' committees had decided not to sell for less than \$750,000, although the plant has deteriorated rapidly since operations were discontinued. Claims than \$3,000,000 and creditors will not realize more than 20 cents on the dollar. against the company aggregate more

## Philippines Resist Prohibitive Taxation

LOS ANGELES, Dec. 27—Automobile dealers and motorists in Manila, Philippine Islands, have successfully resisted, at least for the present, the efforts made to impose a prohibitive tax on all cars in use in that city. The new motor vehicle tax that was recently placed in effect was the one largely sponsored by the dealers as reasonable.

The tax rates are as follows:

(a) passenger motor vehicles, Pesos .25 per horse power (Peso 50 cents U. S. money) and one centavo (1 centavo equals \$0.005) additional for each vehicle with pneumatic tires and two centavos for those with metal tires; (b) for trucks, passenger or freight or both, 40 pesos per ton capacity and one centavo additional for each additional kilo of capacity; (c) trailers, 10 pesos for those of less than two tons capacity and 20 pesos for two or more than two tons capacity; (d) motorcycles with no side cars, 3 to 5 pesos.

The ordinance will only be in effect until the Legislature of the Philippines, now in session, passes legislation to cover the entire islands.

## Transport Has New Line of Specialized Trucks

MT. PLEASANT, MICH., Dec. 27—The Transport Truck Co. will begin the year with a new line of specialized trucks at reduced prices based on present costs. The company will feature six models, or two more than it had previously. The line includes: Model 15, "Rapid Transport," 1-ton, equipped with pneumatic tires, at \$1,295; Model 25, 1½-ton, \$1,495; model 35, 2-ton, \$1,885; Model 55, 3-ton, \$2,385; Model 60, 3½-ton, \$2,585; Model 75, 5-ton, \$3,485.

The old prices on transport models have been: 1-ton, \$1,395; 1½-ton, \$1,995; 2½-ton, \$2,785; 3½-ton, \$3,885.

The models 35, 55, 60 and 75 are all equipped with drive shaft brake, 4 speed transmission and electric lights, bumper, hubodometer and Moto-Meter.

## Delaware to Enforce Law Covering Motor Lenses

WILMINGTON, DEL., Dec. 27—Following a motor lens test held here under the direction of State officials, announcement was made by the Secretary of State's office that an official list of lenses permissible in this State, will be published about Feb. 1. It was said, also, that rigid enforcement of the law regarding lenses will be started at that time. The law was enacted three years ago, but has not been rigidly enforced.

## METAL MARKETS

NEVER productive of anything very startling in the way of market activity or developments, the last week of the year ran true to form. An auspicious omen, however, is the large amount of preliminary correspondence with reference to 1922 deliveries of automotive steels. Some automotive interests are sounding the market not only regarding first but also second quarter shipments, especially of sheets. The firmness of the sheet market which is laid special stress on in steel circles is undoubtedly due to the anticipation of a heavy automotive demand over the next few months.

The usual end-of-the-year report that the Ford Motor Co. had entered actively upon covering its first quarter 1922 sheet requirements was in circulation last week. Undoubtedly all automotive manufacturers have provided themselves with the steel tonnages necessary for their initial operating schedules of 1922, and the orders which are looked for to be placed in the next few weeks pertain to February and March shipments.

It will probably be the middle of January before a general resumption of activity in the steel industry takes place. From that time on steel producers look for a steady rise in the demand upon their output, the prevailing impression in the trade being that by April or May the industry will have re-established itself on a satisfactory basis of operations.

The explanation for this condition is that, because of its moderation in the matter of prices during the 1920 flurry, many consumers give corporation subsidiaries the preference at even prices while others will go so far as to pay them \$1 or \$2 a ton more than the lowest price quoted by "Independents." Conclusive evidence of this sort that a conservative price policy proves most remunerative in the long run is likely to have a salutary effect upon the market. The iron and steel industry awaits with much concern the result of hearings to be held Jan. 21-23, 1922, when the Interstate Commerce Commission will inquire into the equity of rates on ore, furnace materials and iron and steel articles.

Pig Iron.—Although the market generally rules quiet, pig iron sellers report better interest in foundry and malleable on the part of automotive foundries. The tone of the market continues easy.

Steel.—Some of the non-integrated sheet mills are reported to have been able to place contracts for 1922 deliveries of sheet bars at as low as \$28.50 a ton. A few weeks ago the market was considered to be between \$30 and \$32. It is claimed for the sheet market itself that not in a long time has it been as steady as it is now and that orders offered at below the prevailing quotations of 2.25c. for blue annealed and 3c. for black have been turned down. In spite of this, one encounters here and there rumors of slight price shading by small independents. Activity in strip steel and screw stock is apparently held in abeyance until after the New Year holiday.

Aluminum.—No change has come over the market and, while some tonnages of imported metal are reported to be the subject of negotiations between brokers and consumers, price levels have undergone no revision.

Copper.—The usual end-of-the-year calm prevails in the market for the red metal. Sentiment, however, is very cheerful. The trade looks upon the absorption of the American Brass Co. by the Anaconda Copper Mining Co. as an accomplished fact.

# Calendar

## SHOWS

- Jan. 7-12—New York, National Automobile Show, Grand Central Palace. Auspices of N.A.C.C.
- Jan. 9-14—New York, Motor Car Body Exposition, Automobile Body Builders Association. Twelfth Regiment Armory.
- Jan. 28-Feb. 4—Chicago, Automobile Salon, Hotel Drake.
- Jan. 28-Feb. 4—Chicago, National Automobile Show, Coliseum. Auspices of N.A.C.C.
- Feb. 6 to 11—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.
- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment

Show, Western Canadian Automotive Association.

## FOREIGN SHOWS

- March, 1922—Santiago, Chili, Annual Automobile Show.
- April 16—Mexico City, Annual Automobile Show, Auspices of the Automotive Division of the American Chamber of Commerce.
- April 22-May 1—Prague, Czechoslovakia, Fourteenth International Automobile Exhibit.
- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.
- Sept. 1922—Rio de Janeiro, Brazil, Automobile exhibit in connection with the Brazilian Centenary Association Automobilista Brasileira.

## CONVENTIONS

- Dec. 20—Philadelphia, American Society of Mechanical Engineers.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.
- Jan. 17-20, 1922—Chicago, American Road Builders Association.
- Jan. 30-31—Chicago, Fifth Annual Convention, N. A. D. A., La Salle Hotel.
- Jan. 30-Feb. 2—Boston, Sixth Annual Conference of the International Delivery Association, Copley Plaza Hotel.
- May 10-12—Philadelphia, Ninth National Foreign Trade Convention of the National Foreign Trade Council.

- June 11-15—Milwaukee, Annual International Convention of the Associated Advertising Clubs of the World.
- Sept. 18-22, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

## S. A. E. MEETINGS

- Detroit, Feb. 24, Mar. 24, April 28, May 26.
- New York, Jan. 10-13, 1922—Annual Meeting.
- New York, Jan. 16, First Annual Meeting of Advisory Board on Highway Research, Engineering Societies Building.
- Chicago, Feb. 1
- Minneapolis, Feb. 8-9—Annual Tractor Meeting.

## November Exports Total \$5,000,000

Declined from October, But Reach Business Transacted in September

WASHINGTON, Dec. 27—Automotive exports in November, not including tires, totaled almost \$5,000,000, according to figures announced by the Bureau of Foreign and Domestic Commerce, thus reaching a total somewhat smaller than the foreign business done in October but practically on a par with that in September and larger than that of August and July. Total exports in November covering cars, trucks, parts, motorcycles and airplanes were \$4,921,887, according to the Bureau statement.

The total represented slight recessions from those recorded in October, which in their turn were the largest in the present upswing of our overseas trade in automotive equipment. Motorcycles alone in November represented higher figures than in the preceding month. Passenger car exports for November were one-tenth smaller in number than in October and motor trucks declined about one-fourth.

The figures for the November sales follow:

	No.	Value	Unit Value
Passenger cars			
Completed vehicles.	1,616	\$1,509,143	\$934
Chassis	459	338,047	736
Total	2,075	\$1,847,190	890
Motor trucks			
Completed vehicles.	226	\$192,094	850
Chassis	201	172,300	857
Total	427	\$364,394	853
Parts		\$2,546,424	
Motorcycles	500	144,696	286
Airplane parts		19,173	

The largest importer of American passenger cars, as in the previous month, was Mexico, followed by Australia, Canada and the United Kingdom. Mexico likewise leads the list in the purchase by

number of motor trucks, followed by Japan, British Oceania, Canada and The Netherlands. By value, the truck purchases went to Mexico, Canada, British Oceania, Japan and the Philippines. Details covering the shipments of parts were not announced.

## McQuay-Norris Acquires Business of Wainwright

ST. LOUIS, Dec. 27—The McQuay-Norris Mfg. Co. of this city, manufacturer of piston rings, announces that it has acquired the plant and business of the Wainwright Engineering Corp. of Connersville, Ind., which manufactures Wainwright pistons and pins. The business will be continued in Connersville under the name of the McQuay-Norris Mfg. Co. of Indiana. Plans are already under way for plant changes and additions to increase the output.

Harry A. Wainwright, who has been the active head of the Wainwright Corp., will become treasurer and general manager of the new Indiana company and will continue as general manager of the Connersville plant. Paul J. Barnard, vice-president and sales manager of the Wainwright company, will be secretary of the new company. Sales will be taken over by the McQuay-Norris Mfg. Co., which has 15 branch offices and thirty-five field representatives.

## Benz Works, Mannheim, Buy Rumpler Patents

BERLIN, Dec. 12 (*By Mail*)—The Benz works at Mannheim, producer of high quality cars and the "Blitzen Benz," have decided, after exhaustive tests of the Rumpler car, to buy the sole license for Germany of the Rumpler patents. The tests lasted for about six weeks, during which the 30 hp. Rumpler car was compared with 50 to 60 hp. Benz and other cars of similar quality in speed, hill climbing, fuel consumption, tire consumption, comfort of passengers, etc.

## Registrations Show Increase in Oregon

Cars Gain 14 Per Cent During Year; Growth Greater in Trucks

PORTLAND, ORE., Dec. 17—Latest registration figures for automobiles and motor trucks in the State of Oregon show a gain of 14 per cent in the number of automobiles since the first of the year and a gain of 15 per cent in trucks. On Jan. 1, 1921, there were 103,414 automobiles, while at the present time there are 118,169, a gain of 14,755. Trucks at the beginning of this year numbered 12,856, while they now number 14,747, an increase of 1889.

The figures show a steady and substantial sale of motor vehicles throughout the year, and the fact that trucks showed a percentage gain slightly greater than automobiles came as a surprise.

## Agricultural Districts Decline

Analysis of the figures shows that the larger towns and cities and industrial areas of the State showed practically all the gain in automobiles, the agricultural communities presenting little increase and in some instances loss in vehicles registered. Forty per cent of the gain was in Multnomah County (Portland). Eastern Oregon, the agricultural section of the State, showed a loss of 1 per cent in registrations.

Sales of new cars throughout the State showed a considerable slackening up in November as compared with October, while December is not expected to run ahead but possibly may fall a little behind November. During November 25½ cars per day on the average, or a total of 777 new cars, were sold, as compared with 49½ per day, or 1485 for October. This is for the entire State, but the same ratio holds true in Portland, where approximately one-half of the new cars are sold.



Reg. U. S. Pat. Office

## *The Mark of Permanence and Elegance in Automotive Painting*

**DITZLER FINE COLORS** are used by more than 60% of the manufacturers of high grade cars in the United States and Canada.

*Based on Experience and Results  
the Engineer specifies them  
the Painter asks for them*

**DITZLER UNDERCOATINGS** — Metal Primer, Body Lead and Rough Stuff, afford the most secure foundation on which to build with Ditzler Color and Varnish and final finish coats.

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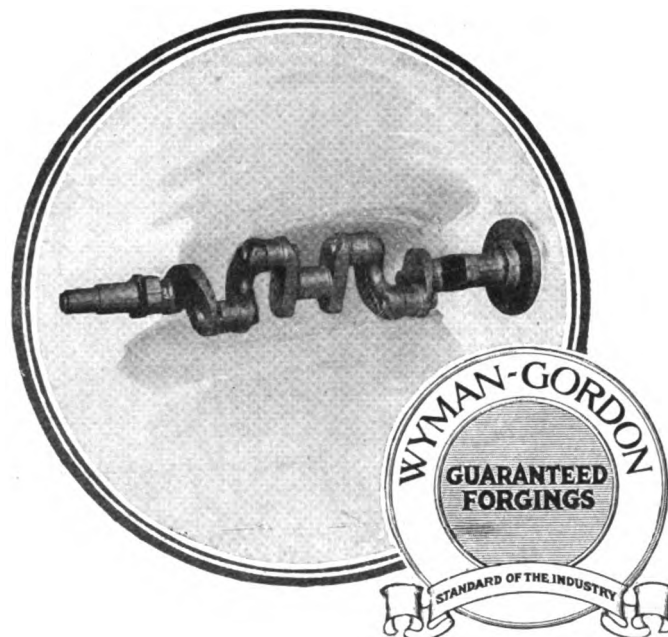
SPECIFICATIONS WITH COMPLETE DETAIL FOR USE OF  
DITZLER SYSTEM OF PAINTING FURNISHED UPON REQUEST

---

### **DITZLER COLOR COMPANY**

MANUFACTURERS EXCLUSIVELY OF  
AUTOMOTIVE PAINTING MATERIALS

DETROIT, U. S. A.



## At the New York Show

We shall exhibit a complete line of Crankshaft Forgings showing the improvements and developments made in this important automotive part.

*Space D-221*

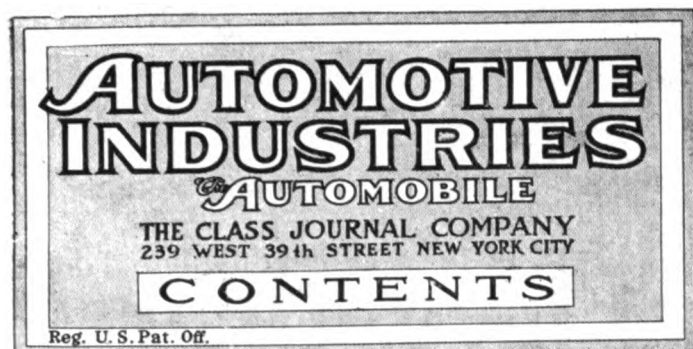
*There is no substitute for  
Wyman-Gordon Quality & Service*

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**WYMAN - GORDON**  
**THE CRANKSHAFT MAKERS**  
WORCESTER, MASS. CHICAGO, ILL. CLEVELAND, OHIO

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# "NORMA"

## PRECISION BALL BEARINGS

(PATENTED)

The useful life of a "cheap" car, or truck, or tractor, or power boat, is usually so short that its first cost is still a vivid memory. On the other hand, with automotive units of the better class, the term of useful service is so long that first cost is forgotten. It is in cars, trucks, tractors and power boats of the latter class that "NORMA" equipped ignition apparatus and lighting generators are found. Their performance helps to put price—first cost—so far behind as seldom to be recalled.

See that your electrical apparatus is "NORMA" equipped.

## THE NORMA COMPANY OF AMERICA

Anable Avenue  
Long Island City  
New York



Ball, Roller, Thrust and Combination Bearings

# Interstate

## Refined Basic Open Hearth Alloy Steels

THE acceptance of Interstate Basic Open Hearth Alloy Steel, by an increasing number of Automobile, Motor Truck and Tractor Manufacturers, because of fully meeting their exacting specifications is a matter of pride with us. We ascribe this enviable record to the following causes:

1. Skill of our metallurgists in developing and conducting refining processes in the furnaces, during the melting period.
2. Use of carefully selected raw materials, properly combined in each heat, with special reference to the analysis sought.
3. Specialized design and equipment of our Basic Open Hearth Alloy Steel plant at South Chicago—a well-balanced, scientifically-correlated UNIT for the production of one class of product—REFINED ALLOY STEEL.
4. The definite purpose of the whole Interstate organization to make QUALITY paramount; and thus to earn a reputation for INTERSTATE PRODUCTS that shall insure a demand for our maximum tonnage.



### Interstate

#### Refined

#### ALLOY STEELS

are furnished in the following forms:

Bars, Billets, Slabs, Blooms, Spring Sections, Cold Drawn Bars, Annealed and Heat Treated Bars, Wire Rods, Wire, Wire Products.

♦ ♦ ♦

In Chrome, Chrome-Vanadium, Chrome-Nickel, Chrome-Molybdenum, ½%, 1%, 3½% and 5% Nickel and Silico-Manganese.



**Interstate Iron and Steel Co.**  
104 South Michigan Avenue, Chicago



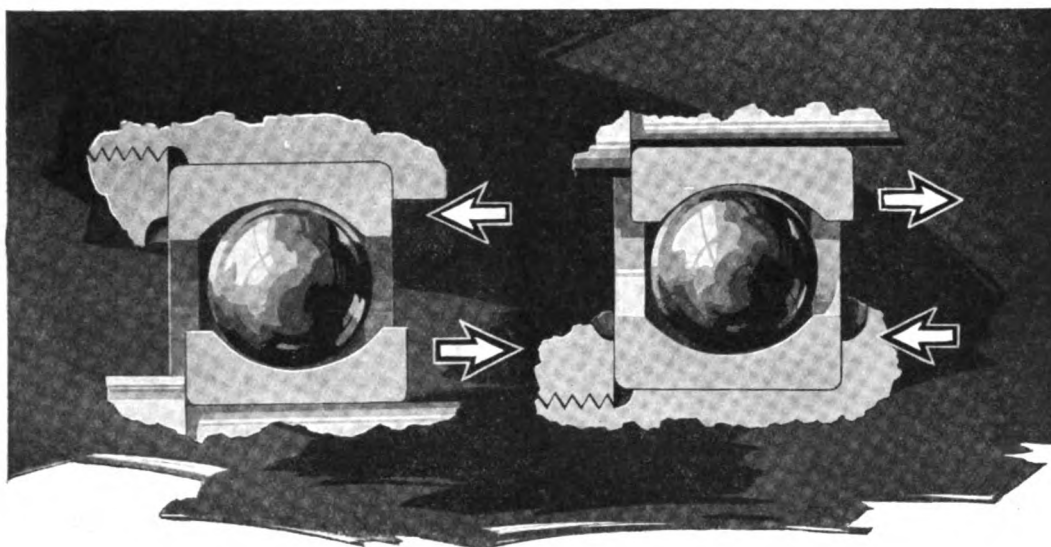
## For 1922 Here's Wishing That

**W**E may be as powerful as a clean motor, well made, and fitted for the job; running smoothly regardless of any outside conditions, with much reserve as an accelerator capable of all emergencies, but wasting nothing.

Lubricated with good will and cooperation, moving freely, without stop or interruption.

Governed by the spark of intelligence, at the full heat of initiation, timed for the right work at the right place.

HARRY TIPPER



## The Deep Groove Radial Bearing as a Heavy Thrust Carrier

**W**HEREVER radial and thrust loads are carried in combination, the deep groove bearing is the logical as well as the practical choice. The exaggerated view above shows how such combined loads are transmitted.

The thrust capacity of the deep groove bearing is at least as high as its radial capacity and for average speeds may exceed the radial rating of the bearing. Moreover the deep groove bearing is a reversible thrust carrier—it will successfully operate when mounted either way.

The deep groove bearing is especially adapt-

able to locations where the radial and thrust components are subject to continual variations. All parts of the bearings are designed to withstand these varying conditions. This means adequate bearing service and consequently increased life for your machine.

The deep groove bearing is a product of The Hess-Bright Mfg. Co. and is sponsored by the **SKF** Industries, Inc. Its manufacture embodies all the minute care, precision and quality for which the mark **SKF** stands. The world-wide experience of this organization is put at your disposal, free of any obligation on your part.

## THE HESS-BRIGHT MANUFACTURING CO.

Supervised by **SKF** INDUSTRIES, INC., 165 Broadway, New York City

705



# *This Year at the Shows*



*In New York  
January 7 to 14  
at the  
Commodore  
Hotel  
Suite 1200 1-2*

the Ternstedt exhibit will be of particular interest to everyone connected with the building of better bodies.

It is the finest and most comprehensive line of body hardware that it has ever been our privilege to display.

The many new and improved items of hardware equipment, new methods of application, new thoughts in modern body construction, will claim the attention of every progressive body builder.

Mr. Seiler, Mr. Humphrey, Mr. Archer, Mr. McPhail, Mr. Braffett—Ternstedt men, you all know well—will be there to extend to you a cordial welcome.

It's a splendid opportunity to renew old friendships and absorb some new ideas.

Don't forget the locations—the Commodore in New York, the Congress in Chicago. Make it a point to see this new line of



*In Chicago  
January 28 to  
February 4  
at the  
Congress Hotel*

## TERNSTEDT *Automobile Body Hardware*

... BUILT · BETTER · FOR · BETTER BODIES ...



REG. U. S. PAT. OFF.

*Largest Manufacturers of Automobile Body Hardware in the World*



# EATON

CHARLES GUERNSEY, CHIEF ENGINEER, SERVICE MOTOR TRUCK CO.,  
WRITES UNDER DATE OF OCTOBER 6, 1921:

Gentlemen:

Your Model 1000 axle has come through *with an absolutely clean score* on all of the many severe tests to which our Model 15 truck has been subjected.

*High Speed  
One-Ton Truck  
Makes Record*

Among these tests may be mentioned a 1200 mile trip through the Alleghany Mountains and back to Wabash; a trip of 369½ miles from Wabash to Lima, Ohio; thence to Dayton, Richmond, and back to Wabash, on which trip the average speed (exclusive of time and mileage within the cities) was 35½ miles per hour. About one-half of this trip was made in the rain.

*Model 1000 Axle  
Comes Clean*

The sample axle under the experimental truck has been driven some 15,000 miles. During this time the bearings have been once adjusted and the brakes once relined. During these tests the experimental truck has carried anywhere from 1500 to 4000 pounds net load. The engine used ahead of this axle develops 39 H.P. and 1800 R.P.M. and, consequently, is capable of inflicting *considerable punishment on the rear axle*.

The truck has been in production some seven months, and we have yet to have any serious difficulties from the field.

As a result of the above you can well appreciate that *I am thoroughly sold* on your Model 1000 axle.

Yours very truly,

CHARLES GUERNSEY,  
Chief Engineer,  
The Service Motor Truck Co.

THE EATON AXLE COMPANY, CLEVELAND, OHIO  
DIVISION OF THE STANDARD PARTS COMPANY

OTHER DIVISIONS ARE: THE PERFECTION SPRING COMPANY, THE  
BOCK BEARING COMPANY, THE STANDARD WELDING COMPANY

# AXLES



# Fitted as Finely as a Tappet

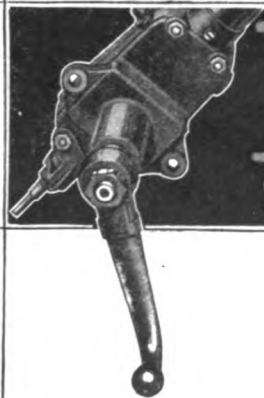
Like a valve tappet in its guide, a Lavine "Pilot" trunnion block must be an *oil fit* in its slot.

The block itself is a typical bit of Lavine workmanship. It is made of chrome alloy steel, hardened and ground all over. Through five distinct operations it is held to limits of .001" plus or minus.

This precision workmanship assures smooth travel of the trunnion block in its slot in the sliding head—plays a big part in the silky action and great durability of the Lavine "Pilot"—*the new standard of steering gear value.*

To discriminating car manufacturers this gear is offered as the masterpiece of a "hand picked" organization of gear specialists. The more carefully you compare the Lavine "Pilot" with other good steering gears the more you will appreciate the "Pilot's" greater durability, simplicity, smoothness of action, ease of adjustment and freedom from rattling. We invite competitive tests on these points.

**LAVINE GEAR CO.**  
MILWAUKEE, WIS.



# LAVINE

## "PILOT"

### STEERING GEAR

Manufacturers, let us exchange specifications. Send us your blue prints, without obligation. Know the Lavine "Pilot" better—probably you over-estimate its price!



THE high carbon chrome alloy steel of which New Departure Ball Bearings are made is fundamental of New Departure guaranteed QUALITY.

The New Departure Manufacturing Company  
Detroit Bristol, Conn. Chicago

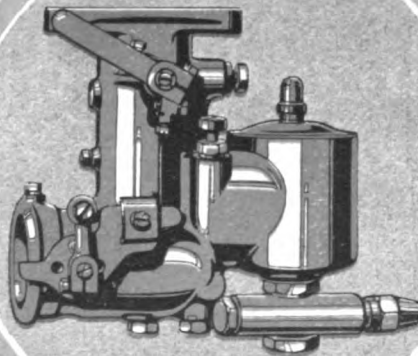
CONRAD PATENT LICENSEE

**New Departure  
Ball Bearings**

**Engineers care little about words, but they do care about works. That's why we urge tests rather than tales for the new Holley Carburetor.**

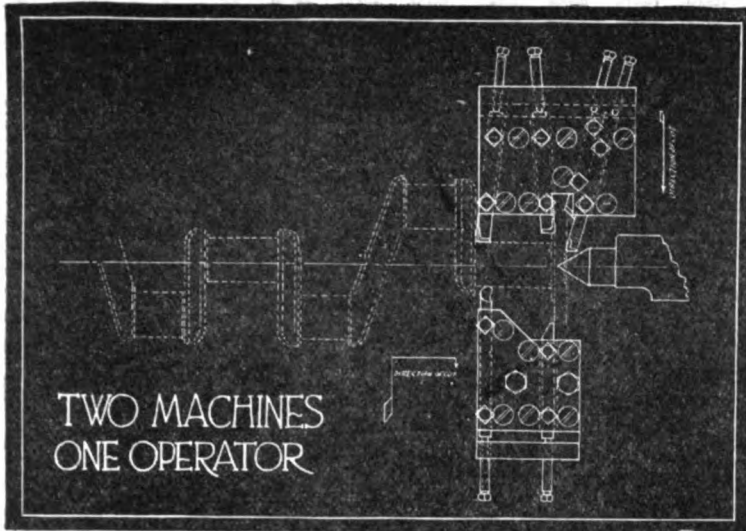
HOLLEY CARBURETOR COMPANY, DETROIT

*The new* **HOLLEY**  
CARBURETOR



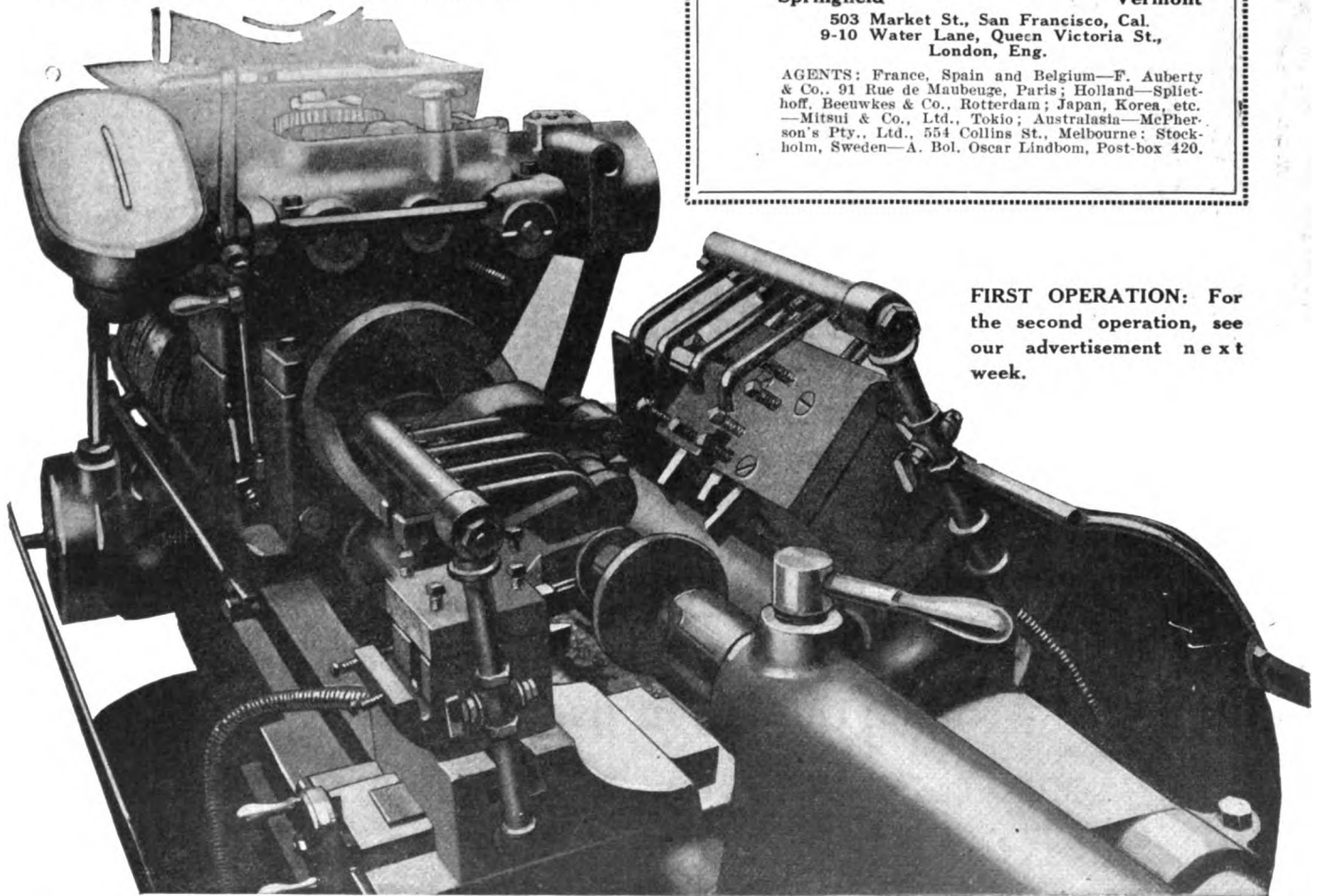






### The FAY-WAY of Machining CRANK SHAFT ENDS

is outlined here. The Fay Way is equally as efficient in machining a great variety of automotive parts. Our engineers will be glad to co-operate with you in devising better methods in production of your standardized parts. Send sample piece or blueprints to us for estimate.



Fourteen tools, cutting simultaneously, finish both ends in time of longest cut—

#### Two machines—one operator

The crankshaft is held between centers in a special fixture and supported by a pot chuck. The carriage rocks in and moves toward the tailstock, turning outside diameter of flange and end bearing. The back arm rocks in and faces, as shown.

This completes the cuts on one end, after which the shaft goes to another Fay Automatic and the other end is finished. One operator handles the two machines and as the machines are both cutting at the same time, the crankshaft ends are finished in the time of the longest single cut, which gives a production, from floor to floor, of twenty shafts per hour.

#### JONES & LAMSON MACHINE CO.

Springfield Vermont  
503 Market St., San Francisco, Cal.  
9-10 Water Lane, Queen Victoria St.,  
London, Eng.

AGENTS: France, Spain and Belgium—F. Aubert & Co., 91 Rue de Maubeuge, Paris; Holland—Splet-hoff, Beeuwkes & Co., Rotterdam; Japan, Korea, etc.—Mitsui & Co., Ltd., Tokio; Australasia—McPherson's Pty., Ltd., 554 Collins St., Melbourne; Stockholm, Sweden—A. Bol. Oscar Lindbom, Post-box 420.

FIRST OPERATION: For the second operation, see our advertisement next week.

# FAY AUTOMATIC LATHE

# **MUELLER**

## **Forges Brass!!**

Made under 400,000 pounds pressure, **MUELLER** Brass Forgings are as fine grained as tool steel are 80% stronger than sand castings and cost less. You should try them.

## **MUELLER Forges Brass!!**

## **You can profit by sixty years of *MUELLER* experience**

All the knowledge of Brass which **MUELLER** has gained is yours for the asking and without obligation. Write **MUELLER** for prices on anything you use in Brass.

**MUELLER METALS CO., PORT HURON, MICH.**

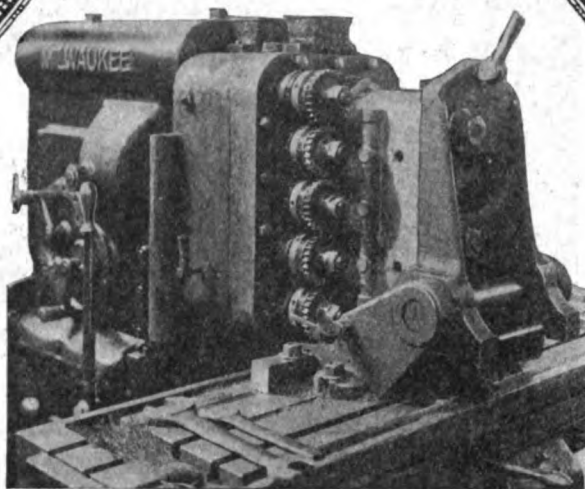
Sales Offices: New York, Philadelphia, Buffalo, Pittsburgh, Cleveland, Dayton, Detroit, Indianapolis, Chicago, Minneapolis, New Orleans, San Francisco.

Makers of "Red Tip" Brass Rod; Brass and Copper Tubing; Forgings and Castings in Brass, Bronze and Aluminum; Die Castings in White Metal and Aluminum; also Screw Machined Products.

H. Mueller Manufacturing Co., Decatur, Ill., and Sarnia, Ont.  
Makers of Water, Plumbing and Gas Brass Goods and Tools.

# On the Oldsmobile Eight

*There are probably  
no plants in the  
country surpassing  
in equipment the  
new plants of the  
Olds Motor Works*



Economy, accuracy and record results feature production on the new Model 47 Oldsmobile in the new plant of the Olds Motor Works, Lansing, Mich.

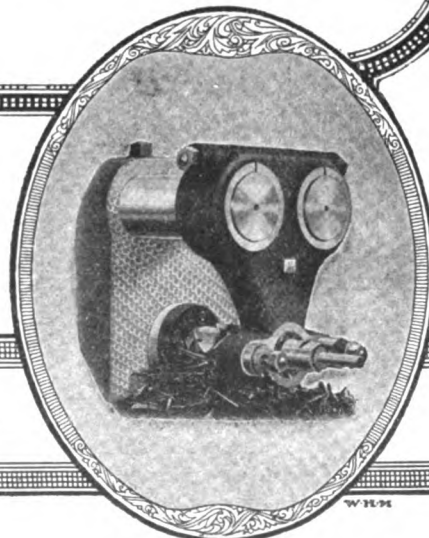
171 blocks per day are being produced in the cylinder block department with an average of 16 pounds of metal removed from each block.

The picture is of a Milwaukee 3B Milling Machine provided with five cutters, milling the intake manifold flange. This Milwaukee takes both the rough and finish cuts on all the blocks. It is capable of handling from 20 to 25 blocks per hour. Another Milwaukee, with a single cutter, mills eight bolt hole faces and spot faces two bolt holes.

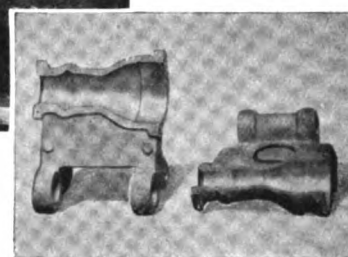
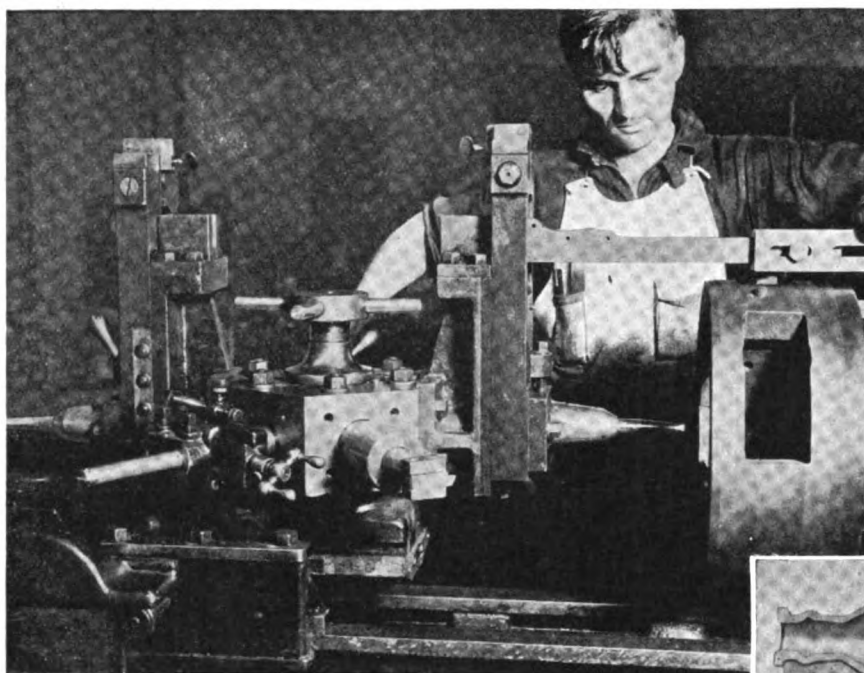
The wide use of Milwaukee Milling Machines in the automotive industry compels the belief that they "make good." For information on your next installation of milling equipment, dictate a request for Catalog 22.

Branch offices in Chicago, Cleveland, New York.

KEARNEY & TRECKER  
CORPORATION  
MILWAUKEE, WIS., U.S.A.



**The Double Overarm maintains  
permanent alignment of the arbor.**



## Consult Our Production Engineers

A production man from a large factory, which has a reputation for its up-to-date production methods, put the problem to us this way:

"We must reduce the cost of finishing these moulds for electric light bulbs. It is not customary to finish them on turret lathes, but we think *your* turret lathes can do the work as well and in less time."

(They have Warner & Swasey turret lathes in their shop doing other work.)

The turret lathe and tools we furnished do the work in one-fifth the previous time. And their operator expects to do better than that when he becomes accustomed to the job.

You have jobs that should cost less. Send us blue prints of them. You'll be surprised at the saving we can show you.

# The Warner & Swasey Company

Cleveland, U. S. A.

BRANCH SALES OFFICES

NEW YORK: Singer Building BUFFALO: Iroquois Building BOSTON: Oliver Building DETROIT: 5928 Second Boulevard  
CHICAGO: 618-622 Washington Boulevard MILWAUKEE: 209 Sycamore Building  
DAYTON: 518 Mutual Home Building INDIANAPOLIS: 940 Lemcke Annex



# Begin Now to Sell Automobiles to Farmer-Oklahomans in 1922



## Here Is Proof

—that Oklahoma is one of the very best farm markets, *right now*:

For three consecutive years Oklahoma has led the country in composite condition of all crops.

The two chief crops, wheat and cotton, were marketed at peak prices together with a big "carryover" from last year.

The bulk of the wheat crop was marketed at \$1.15 to \$1.20 a bushel. Wheat is lower now, but farmers have none to sell.

Feed and food crops are abundant. Thus, livestock raisers are able to carry their animals through the winter cheaply. Dairy farmers are particularly favored.

Oklahoma's cotton acreage was only one-third as large as in 1920, yet the growers received two-thirds as much money for the crop. Moreover, the entire crop was economically produced with an expectancy of ten-cent cotton. Imagine the change in the farmers' buying attitude when the crop brought 20 to 22 cents.

Nineteen twenty-two will witness a return to full farm prosperity in Oklahoma.

May we send you other convincing facts regarding the Oklahoma farm market for automotive equipment?

THE dawn of 1922 finds Oklahoma one of the best farm markets in the entire country. Farmers of few other states received as near a normal income from their 1921 crops. And the farmers of Oklahoma expect an even closer approach to normal in 1922.

They are optimistic, they have come through the depression successfully. Now they are making plans for purchases and improvements to make 1922 a year of undisputed prosperity.

Farmer-Oklahomans have the money to buy the things they need to make farm life livable and profitable, although they are conservative in their tastes and cautious in making purchases.

To stand the inspection of the farmers of Oklahoma, an automobile must be of known quality, backed by a reliable manufacturer and adapted to the heavy service imposed by farm use. The way to secure their interest in your car is to make known its past performance through the Oklahoma Farmer-Stockman, the farm paper trusted and respected by Oklahomans.

Only after gaining their confidence can *you* be the manufacturer who will sell them the automobiles they need and will buy this spring.

To interested manufacturers we will gladly furnish a complete analysis of the Oklahoma farm market, evidence of conditions, and an authoritative forecast of what 1922 holds for the automotive manufacturer.

## The OKLAHOMA FARMER-STOCKMAN

CARL WILLIAMS, *Editor*

EDGAR T. BELL, *Adv. Mgr.*, Oklahoma City

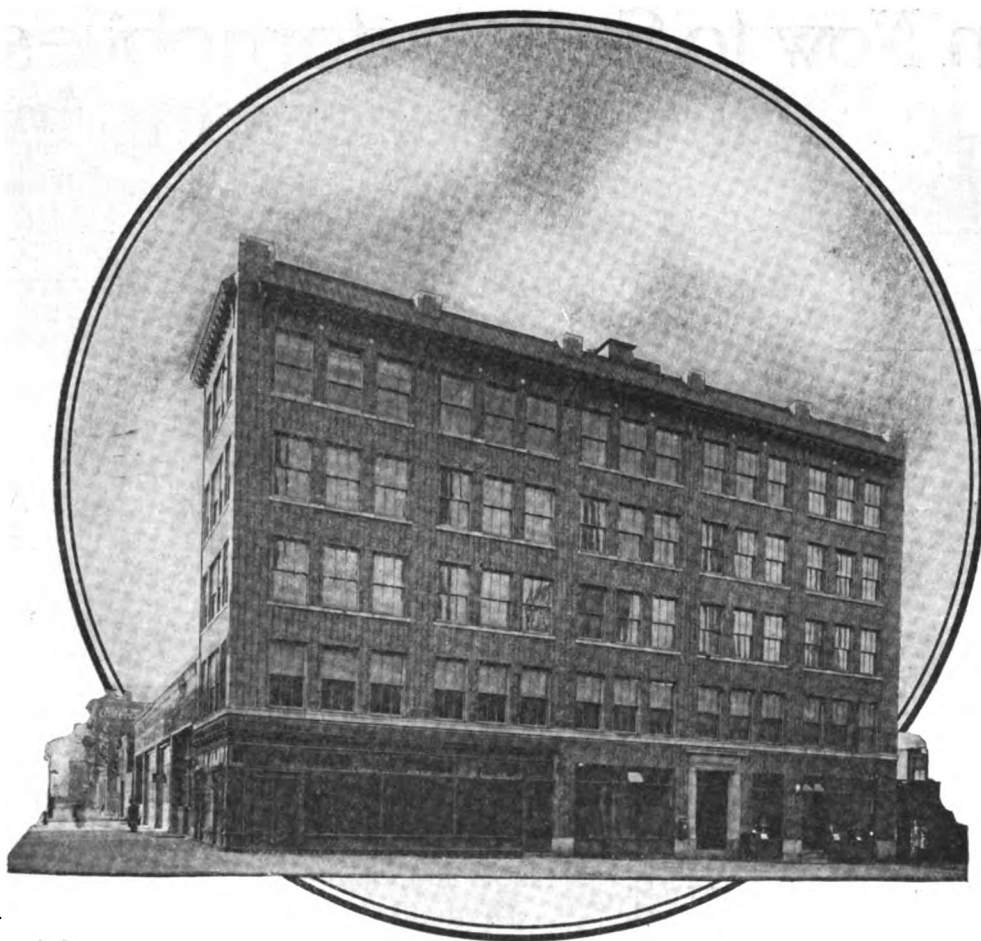
*Member A. B. C.*

*National Representatives:*

**E. KATZ SPECIAL ADVERTISING AGENCY**

New York Chicago Atlanta Kansas City San Francisco

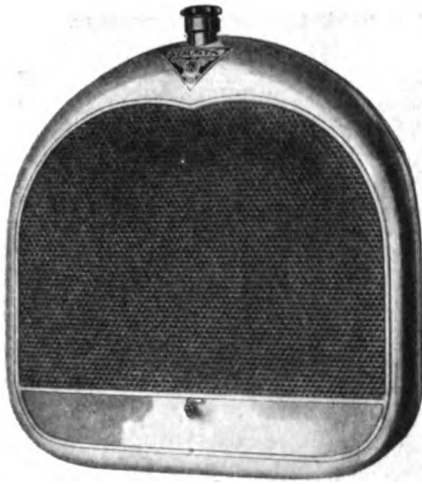




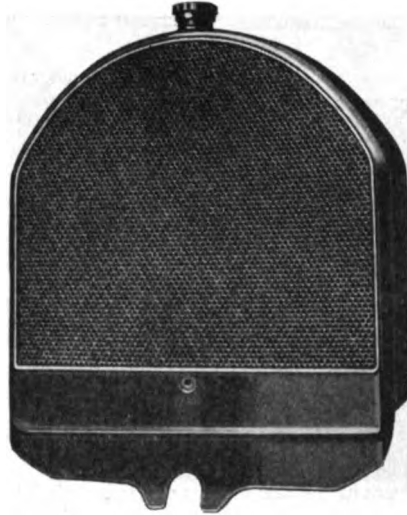
## *Announcing the Opening of a New York Branch and Service Station*

**T**HE U. S. Cartridge Company is now operating a New York branch and service station at 600 West 57th Street.

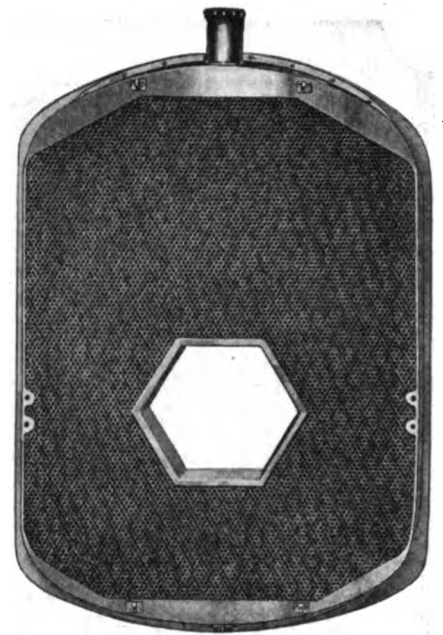
The company has acquired the premises and equipment which for the past several years have been operated by the Ansted Company of New York in the production of radiators for finely appointed motor cars and airplanes.



*Cartridge-Core Equipped  
Simplex.*



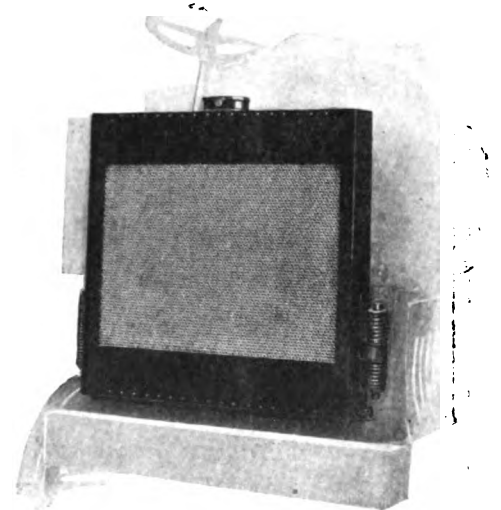
*Cadillac Equipped With Rushmore Steam  
Cooling System, Using U. S.  
Cartridge Cores.*



*Cartridge-Core Airplane  
Radiator.*

The business will be continued and expanded by the U. S. Cartridge Company, with its activities divided into four functional groups.

- (1) The manufacture of complete radiators for the highest type of passenger cars, the plant being especially well organized for this class of work.
- (2) As a service station for the building and installation of radiator cores for truck fleet owners, garages and repair shops, as well as for individual car and truck owners.
- (3) The building of special complete radiators for body makers and car owners.
- (4) Production of radiators for all types of aircraft.



*One of the principal reasons for opening  
the New York Branch was to provide prompt  
and efficient service to fleet owners.*

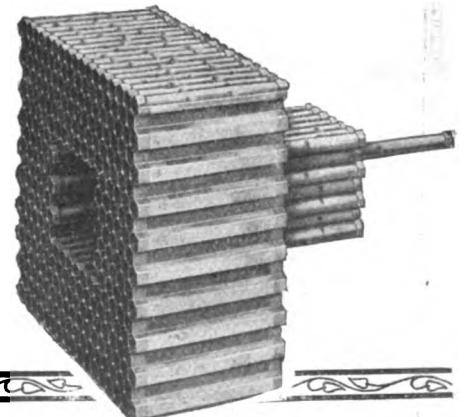
UNITED STATES  CARTRIDGE CO.  
Lowell Mass.

*New York Branch and Service Station*

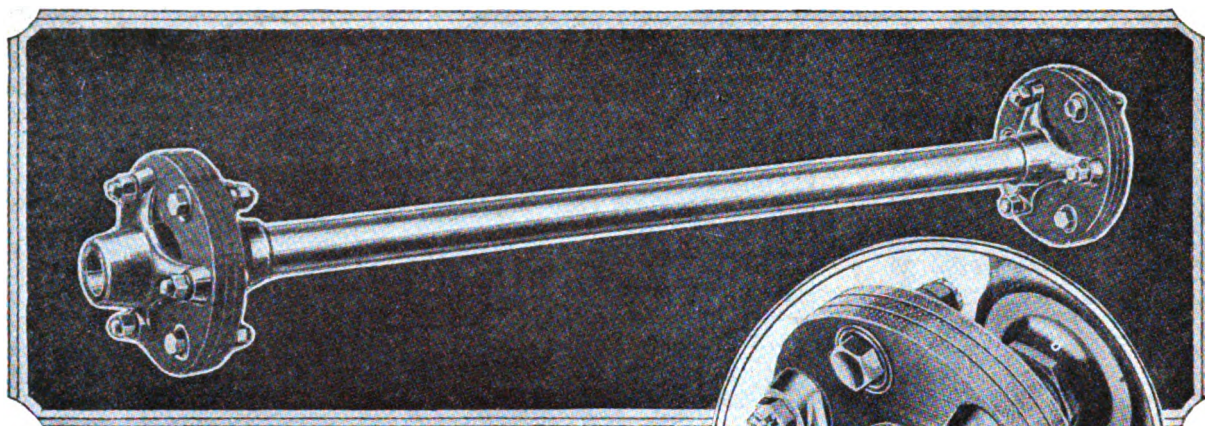
*600 West 57th Street*

*Telephone Circle 7610*

**Cartridge  
CORES**

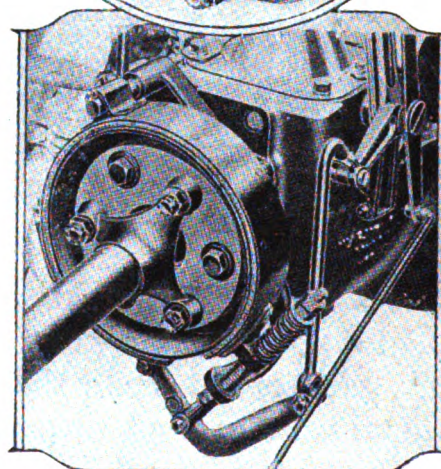
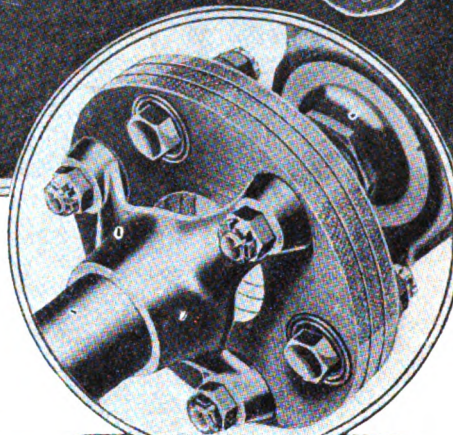






## Why Snead Cushion Drives are the best universal joint assemblies—

They are half the ordinary weight;  
They require no lubrication;  
They are noiseless;  
They absorb shock and power impulses;  
And increase life of gears and bearings.



*Attractive prices and prompt deliveries  
Write for recommendations*

*Illustrations showing  
Universal Joint at Trans-  
mission and at axle end.*

### SNEAD & COMPANY

*Founded 1849*

JERSEY CITY - - NEW JERSEY

# SNEAD

## CUSHION DRIVE

*Takes the Self-destruction Out of Your Car.*

# TIMKEN

## *Tapered*

# ROLLER BEARINGS



## F r i c t i o n

Friction, from the beginning of time, has controlled man's progress, either as a friend or as an enemy.

Earliest evidence of the friendly use of friction was the rubbing of the hands and body to keep warm and finally the rubbing of a pointed stick to start a fire. But friction, like the fire which it starts, is, in many ways, man's formidable enemy.

In the operation of machinery and in the development of all automotive vehicles, friction must be held absolutely under man's control; or else, the mechanical power which has carried man from savagery to his present high estate, would be so wasted as to hold progress and development at a standstill.

Without anti-friction bearings (as they are called) machinery in general would have remained as in great-grandfather's day. No railroads would streak across the land—no motor cars—no trucks—not even power-driven boats could ply.

In this battle, against "enemy" friction, human inventive genius has progressed rapidly from the early cumbersome types of soft, slippery metal collars which encircled axles and shafts—through various applications of balls and rollers—to the tapered roller bearing of today, as typified in the product of the Timken Roller Bearing Company;—

It has progressed from those early nuisances that required greasing or oiling every few hours to the Timken Tapered Roller Bearing of today that requires attention as infrequently as every year or two.

Here we have a light, compact and self-contained device that is friction's absolute master. For not only do Timken Tapered Roller Bearings hold friction to a negligible minimum—

But in so enabling wheels and shafts to revolve at frightful speeds with ease and safety—

Timken Tapered Roller Bearings, at the same time, carry all the loads that may be thrust upon them regardless of the direction from which these loads may come. No matter how, nor where, nor when that shock or load is applied—

Your Timken Tapered Roller Bearings rest snugly in their various housings, absorbing or deflecting those blows—

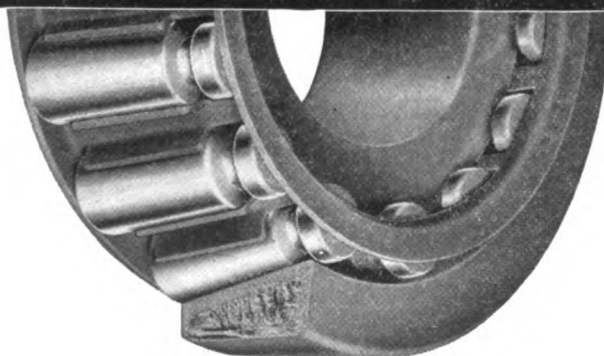
The while your motive power is being delivered through these bearings, without interruption, to the driving wheels—

And finally, when that wear which *must* follow all motion becomes apparent,—a simple adjustment and your Timkens function as when new.

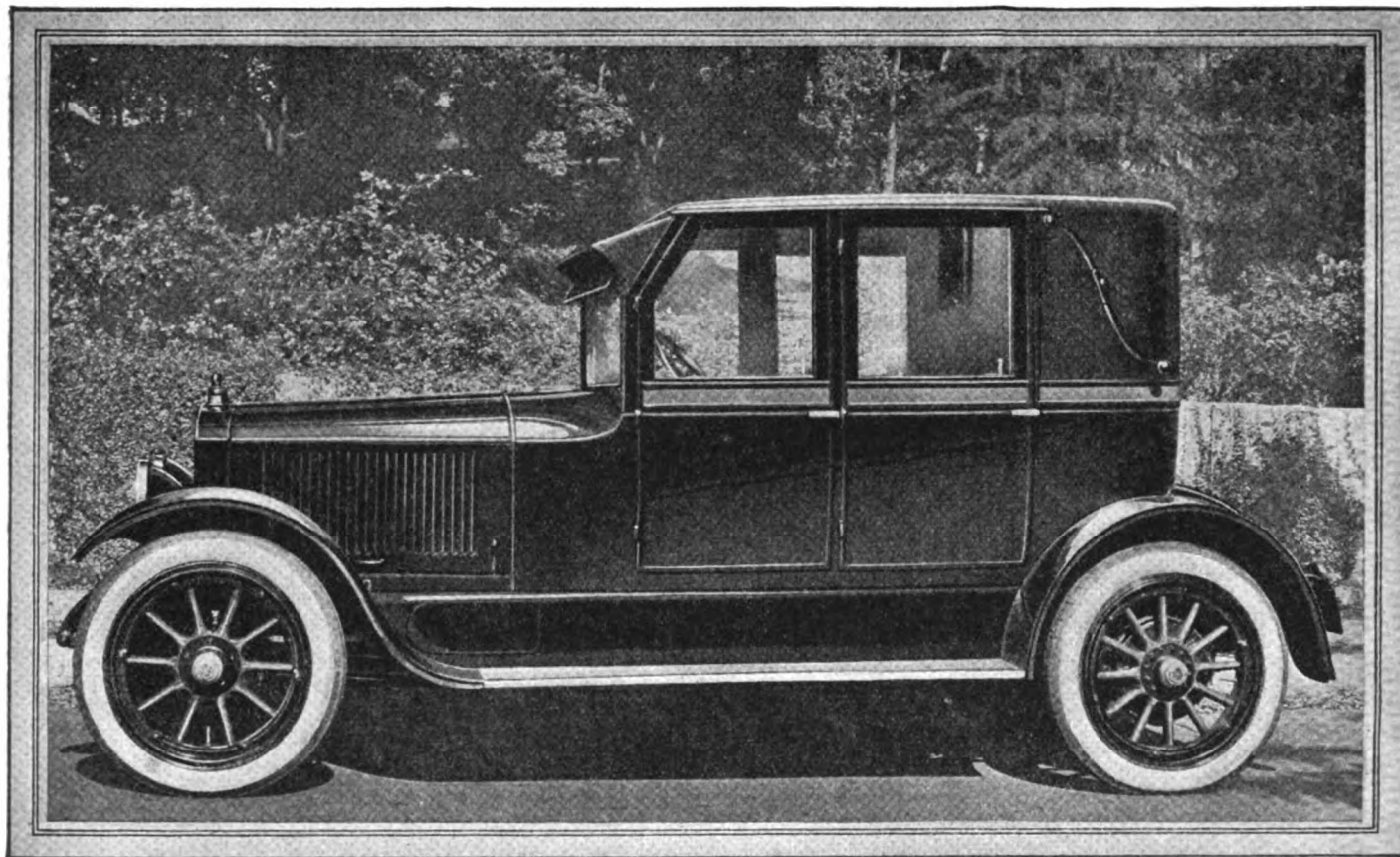
**THE TIMKEN ROLLER BEARING CO., CANTON, OHIO**

*Timken Tapered Roller Bearings for Passenger Cars, Trucks, Tractors, Trailers, Farm Implements, Machinery, and Industrial Appliances*

SEND FOR TRUTH-TESTED FACT #2, "FRICTION"







## *The Body That Sells the Car*

***Raulang***  
TRADE MARK  
AUTOMOBILE  
BODIES

*Raulang Bodies are now  
available in these models:*

REO COUPE  
REO SEDAN  
LEXINGTON "S" SEDAN  
RAUCH & LANG BROUGHAM  
RAUCH & LANG COACH  
STANLEY SPORT SEDAN  
BIDDLE SEDAN  
BIDDLE TOWN CAR

In the closed car market of today the body is of paramount importance in the appeal to the customer.

Raulang Closed Bodies have a national prestige which cannot be denied. They are quantity-built coach bodies—and, through the permanent satisfaction they ensure the owners, promote retail sales for car builders.

Distinctive in design and appointments, built to outlast the chassis, and marketed at prices little if any in excess of those for ordinary bodies.

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Raulang Body Division of THE BAKER R & L COMPANY, Cleveland, Ohio, U. S. A.

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# Nichrome

TRADE MARK REG. U. S. PAT. OFF.

## Heat Treating Containers

*Endure in High Temperatures*

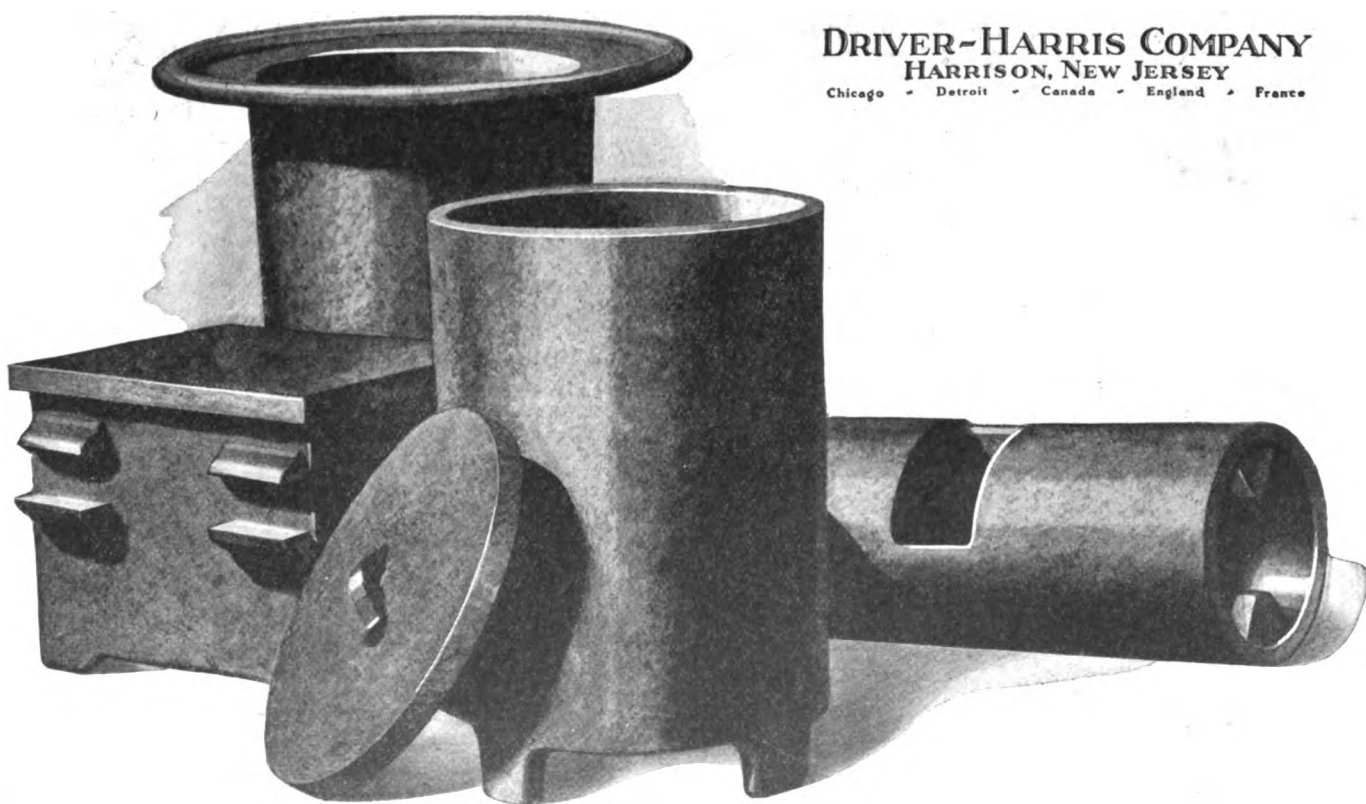
**Q**UALITY or ECONOMY—which is of greater importance to you? Pretty hard to say, isn't it? In the final analysis quality and economy are mighty close to twin brothers, and both must be measured in terms of service.

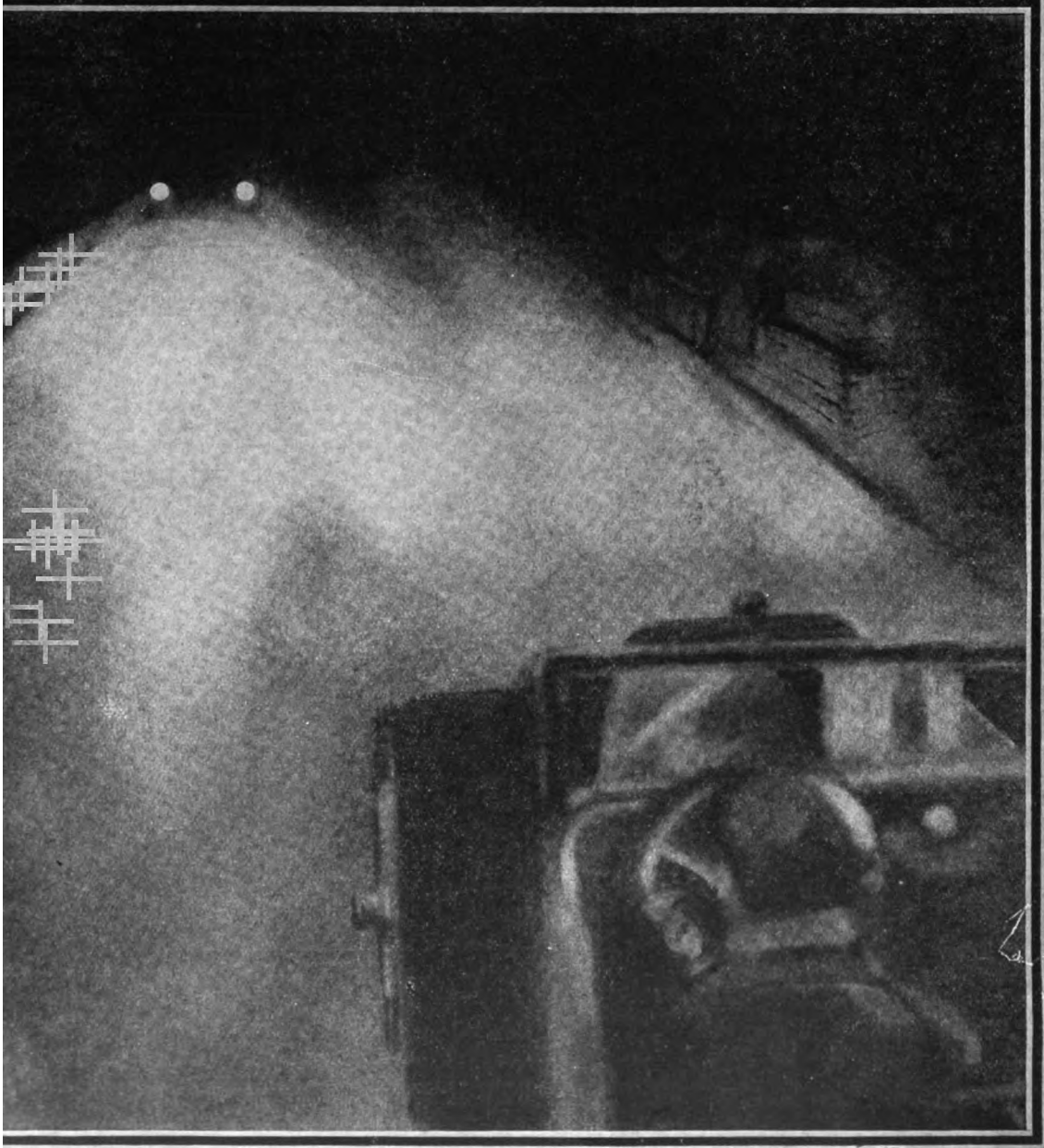
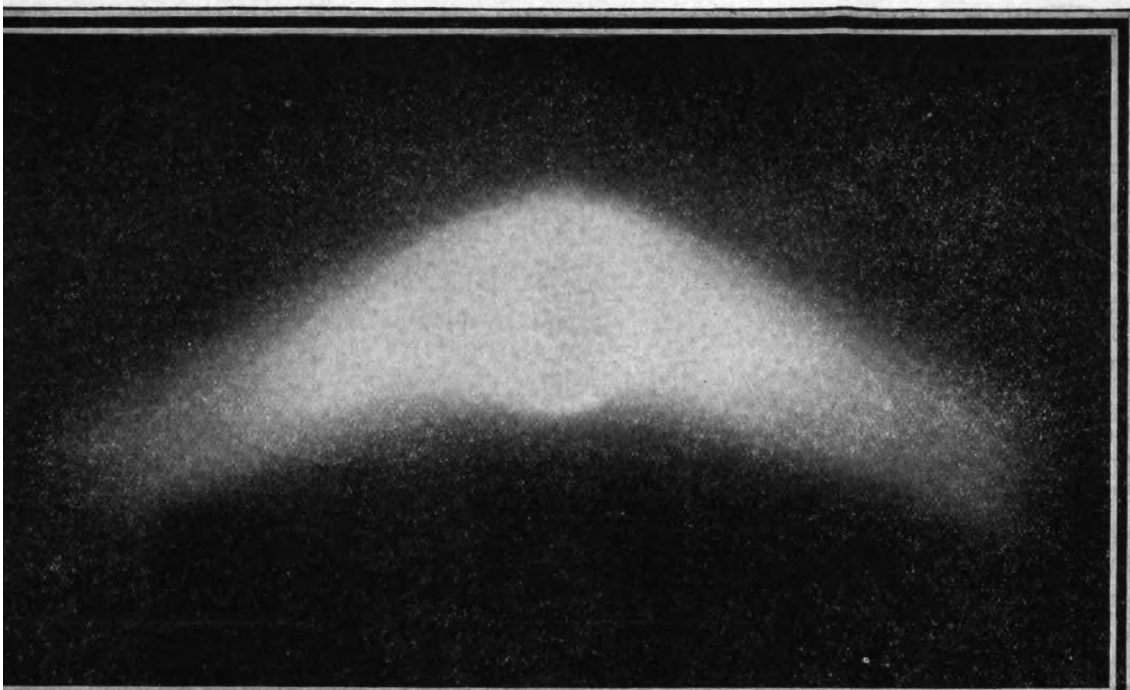
How well the case-hardened part performs its function, on an average, depends on how the various elements in the carbonizing process "average up." Keeping down spoilage and maintaining a fairly accurate uniformity of case, heat after heat, calls for containers that not only give long service but behave in a uniform way throughout their entire usefulness.

From every angle that affects either quality or economy, Cast Nichrome Containers average up to the highest satisfaction point. The proof exists in hundreds of modern plants.

*All Cast Nichrome Containers are  
Manufactured under HENDERSON Patents by*

**DRIVER-HARRIS COMPANY**  
HARRISON, NEW JERSEY  
Chicago • Detroit • Canada • England • France





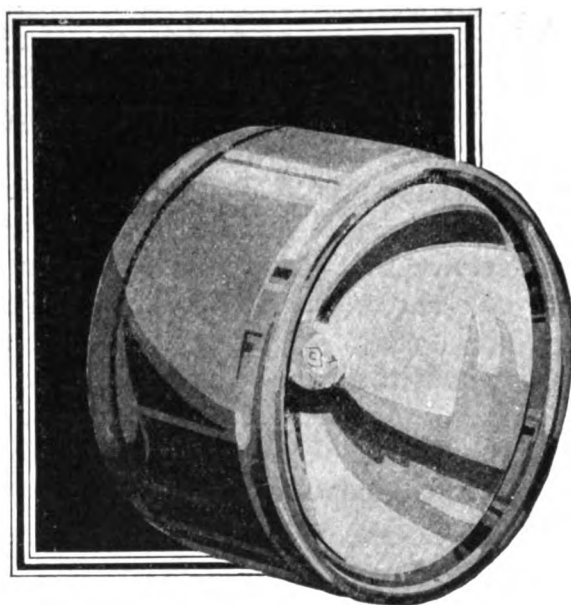
# Nolenz Headlight at the New York Show

**A**T our booths every courtesy will be extended to car and truck engineers, designers and factory heads in general. For their information every detail of reflector design, and other patented features will be thoroughly discussed. All matters relating to special forms of lamp design and finish will also be brought to the attention of those interested.

*See This Exhibit in  
Spaces D-84 and  
D-114*

Nolenz is the final scientific development in road lighting.

It gives even, wide-spread and ample light volume for driving, side and ditch illumination.



It is equipped with a plain cover glass front for reflector and lamp protection only.

It can be aimed at any angle and then securely locked. No bolt breaking wrench is necessary.

Focus adjustment is made by hand screws back of the reflector. This device also locks the precision socket and lamp.

The reflector is made under the Bart patented process and is guaranteed for three years against tarnish and rust.

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*Be Sure to See the  
Demonstration at  
Show Spaces Noted  
Above*

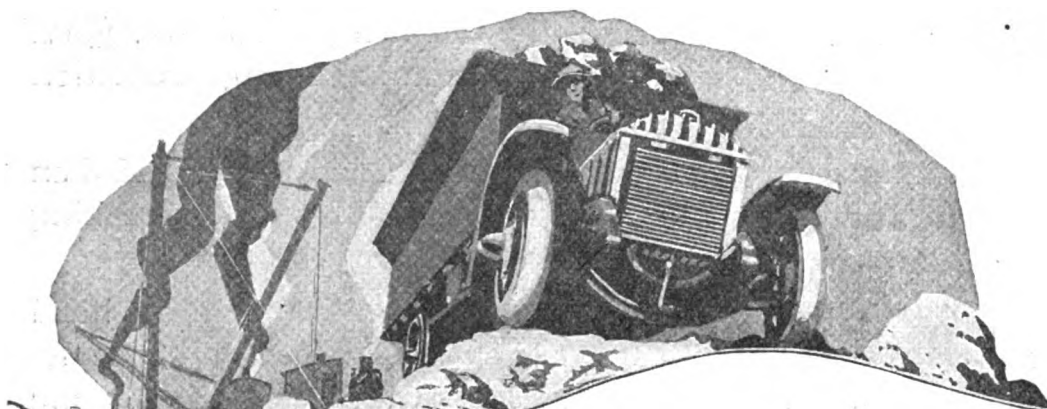
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**AUTOMOTIVE UTILITIES MFG. CORPORATION**  
GOTHAM BANK BLDG.  
COLUMBUS CIRCLE  
NEW YORK

# NOLENZ

## The Eventual Head Light

# SHARON FRAMES



Built by men who know that their continued success rests upon the continued satisfaction of their customers, Sharon Frames never represent a compromise between quality and price. They are built as soundly and honestly as frames can be made—built to give the sort of service that helps make the reputation of a car or truck. Meeting the buyer's specifications in letter and in spirit, and delivered to him on schedule as ordered, they add a distinct and tangible value to the car or truck of which they are a part. Our engineers are ready to co-operate with yours. May they have the opportunity?

Axle Housings

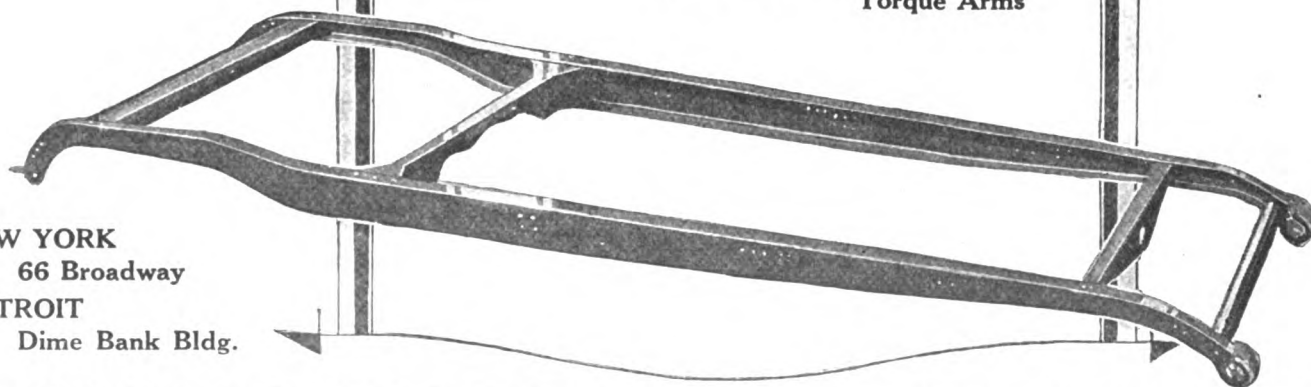
Brake Drums

Axle Housing Covers

Running Boards

Step Hangers

Torque Arms



NEW YORK

66 Broadway

DETROIT

Dime Bank Bldg.

## SHARON PRESSED STEEL CO.

**MAIN OFFICE AND WORKS, SHARON, PENNA.**





## Motor Wheel Products

Millions of motor cars and trucks make their way everywhere on wheels manufactured by the Motor Wheel Corporation.

The very forests that grow the wood for these wheels are owned by the Motor Wheel Corporation. This specially selected timber is cut in the Motor Wheel Corporation's own sawmills; and seasoned as can only be done with facilities as modern and extensive as those of this virtually self-contained institution

Even the metal parts of these wheels come from the noted Gier Stamping plant of the Motor Wheel Corporation

—where Gier Tuarc Steel Wheels also are made

—and where are made the metal stampings

which improve, strengthen and lighten millions of cars and trucks.

These immense facilities, controlled at first hand, plus wheel and stamping experience which began with the industry itself, are responsible for the *high character* of the wheels made by the Motor Wheel Corporation.

These things mean wheels with rugged strength and ability to serve year after year with hardly any care or thought from the owner or driver

—wheels which despite their strenuous task, commonly outlive the car or truck on which they were first installed.

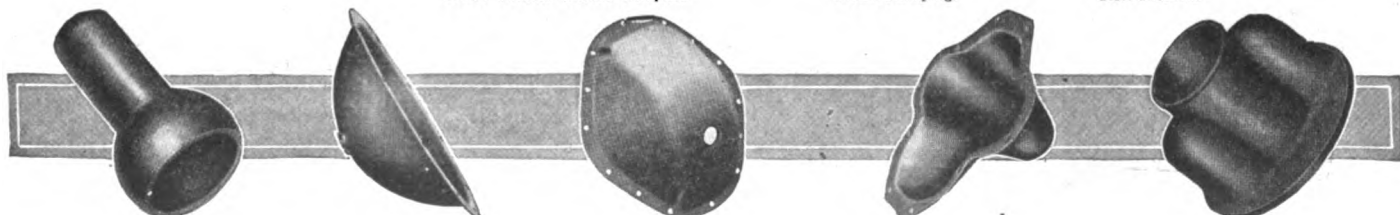
Wheels of such supreme excellence are a credit to the car or truck on which you find them—an asset worth looking for.

**MOTOR WHEEL CORPORATION, LANSING, MICHIGAN**

Motor Vehicle Wheels Complete

— Metal Stampings

— Steel Products



Organizations and individuals capable of handling whole-sale distribution of Gier Tuarc Wheels are invited to make application for exclusive territory assignment



# PASSENGER CAR "SIX" Beaver

## Quality Power Plants

The most important unit in an automobile is its motor.

It is the index to the car's character. It determines, more than anything else, the reputation the car will have with the buying public.

A fine automobile must have a fine motor.

Beaver Engines are built to be fitting power plants for the finest motor cars. They give the smooth-flowing tremendous power that is so necessary. They are of the valve-in-head type with the faults found in less carefully built motors of this type eliminated.

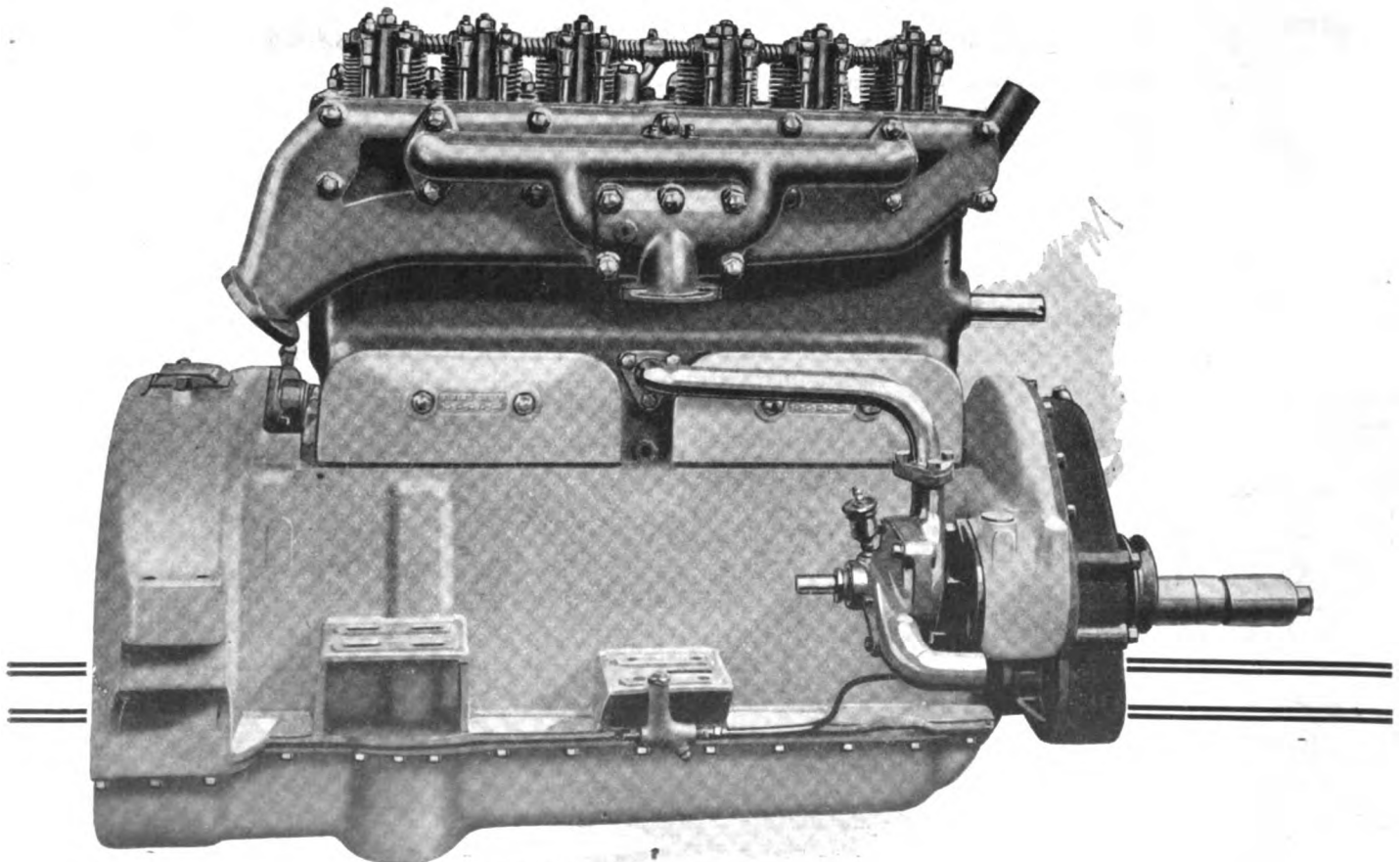
The Beaver model C.L.  $3\frac{1}{2} \times 5\frac{1}{4}$  shown below is especially adapted to cars of 3500 pounds or over. It develops 60 hp. at 2000 r.p.m.

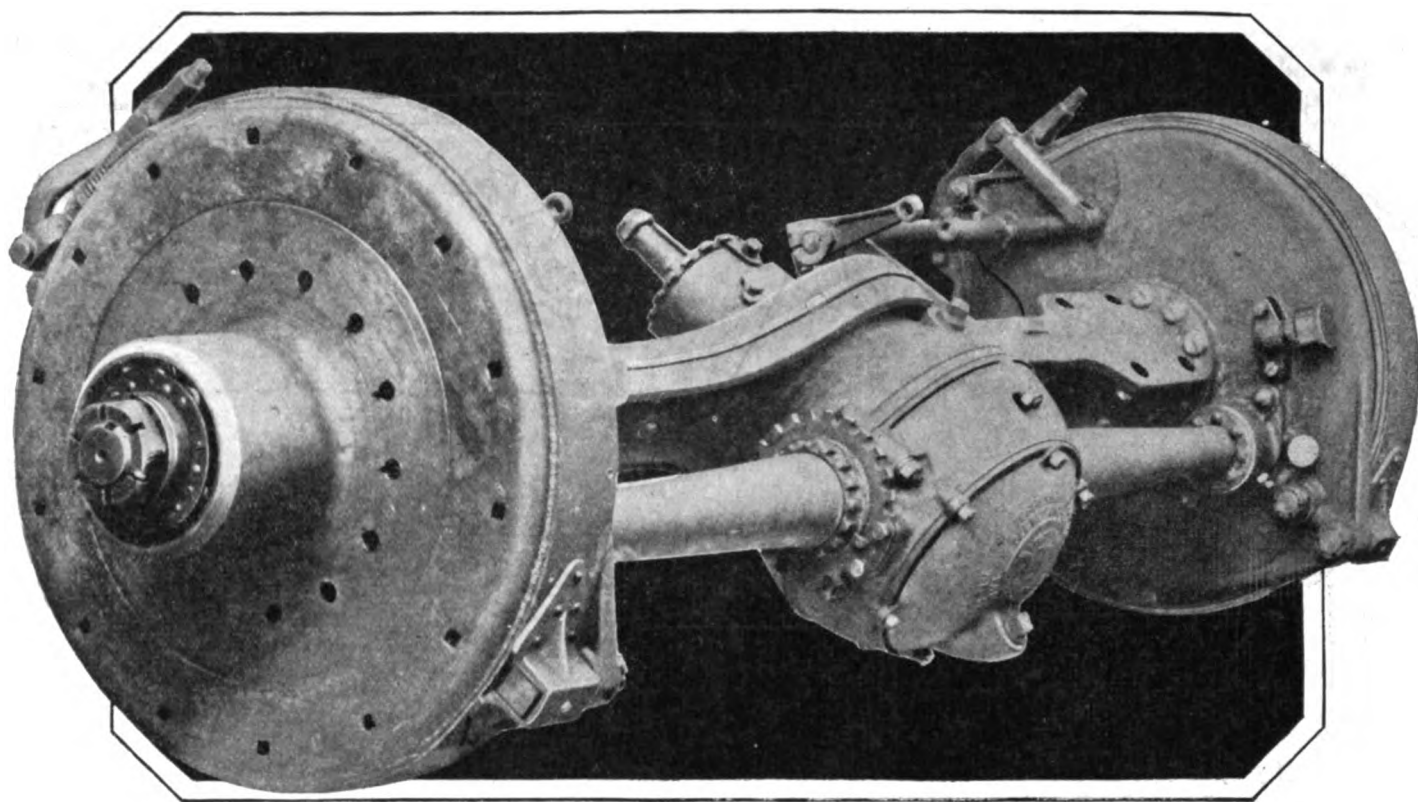
We shall be happy to send you detailed technical description.

### BEAVER MANUFACTURING CO.

First and Oklahoma Avenues

Milwaukee, Wis.

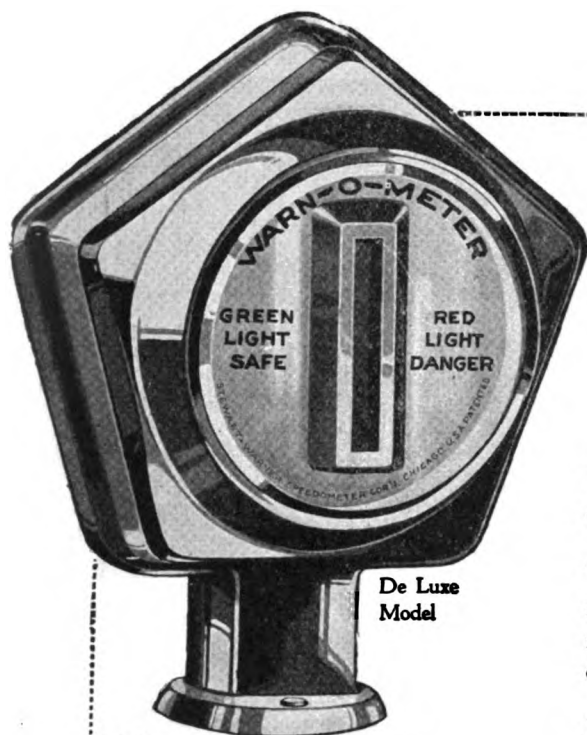




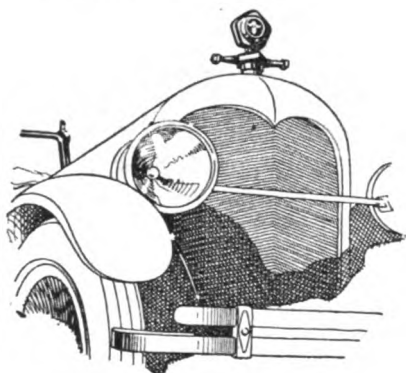
*Truck owners throughout America are proving, over and over again, that the Torbensen Axle improves truck performance, lengthens truck life, and lowers truck costs. By making the final gear reductions at the wheels, the Torbensen Axle increases driving power, and thus lightens the load on the motor. It is the lightest weight, yet the strongest axle for a given capacity. This means an important saving in the dead weight that must be carried beneath the springs, and makes for longer truck life, and greater tire mileage.*

# TORBENSEN AXLES

CLEVELAND, OHIO

De Luxe  
Model

The Stewart Warn-O-Meter  
"It Warns in Time"

Installed on  
RadiatorSpecial Monogram  
Design in side  
Facing On-coming  
Cars

# The Warn-O-Meter

**Warns of an overheating motor. Operated directly from motor.**

The Warn-O-Meter can be installed on radiator, fender or hood. It is not a mercurial device. Has nothing to do with the water in radiator. Is not directly effected by weather conditions.

It warns the driver when the motor's heat is nearing a danger point. In order to do this accurately it is operated *directly from the motor*.

When the motor is cold no light shows in the Warn-O-Meter. At normal, efficient temperature a green light appears. If the motor begins to overheat the green gradually changes to a brilliant red.

Overheating will do serious damage to a motor if not checked. The Warn-O-Meter will save the motorist many repair bills.

It is not only practical but very attractive. In the side of the instrument, facing oncoming cars, there is a colored design which may be replaced if desired by a car nameplate, trade-mark, owner's monogram, etc. Illuminated by the light within the Warn-O-Meter.

The De Luxe Model, beautifully finished in nickel—\$12.50.

The Standard Model, with standard finish of black enamel and nickel,—\$10.00.

The Ford Model, given standard finish and furnished complete with radiator cap—\$10.00.

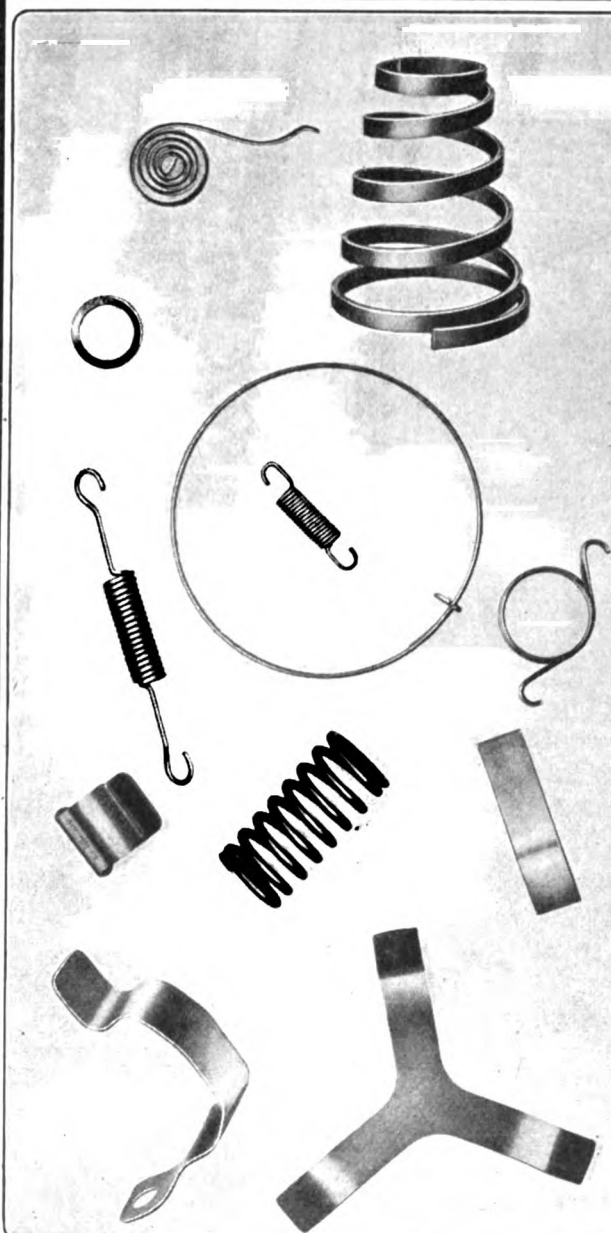
Write for free attractive booklet giving complete information on operation.

**Stewart-Warner  
Speedometer Corporation  
CHICAGO, U. S. A.**

*16 years' experience in car accessory building.  
86 Service Stations all over the world.*

## **Meet Us at Booth C 99 (THIRD FLOOR)**

**22nd NEW YORK AUTOMOBILE SHOW,  
Grand Central Palace, January 7th-14th, 1922**



**A**T the Auto Show you are naturally watching keenly for possible new refinements in important operating parts and manufacturing methods. Some of these will very probably concern that indispensable part of every car or accessory—Springs.

Best results will follow if you'll talk them over while they're still fresh in mind with Wallace Barnes Company representatives, who will be at the show the entire week, ready to render any service or information.

Booth C99, third floor, is Barnes' Spring Headquarters, at the Grand Central Palace, January 7th to the 14th. Let us make you welcome.

## **The Wallace Barnes Company**

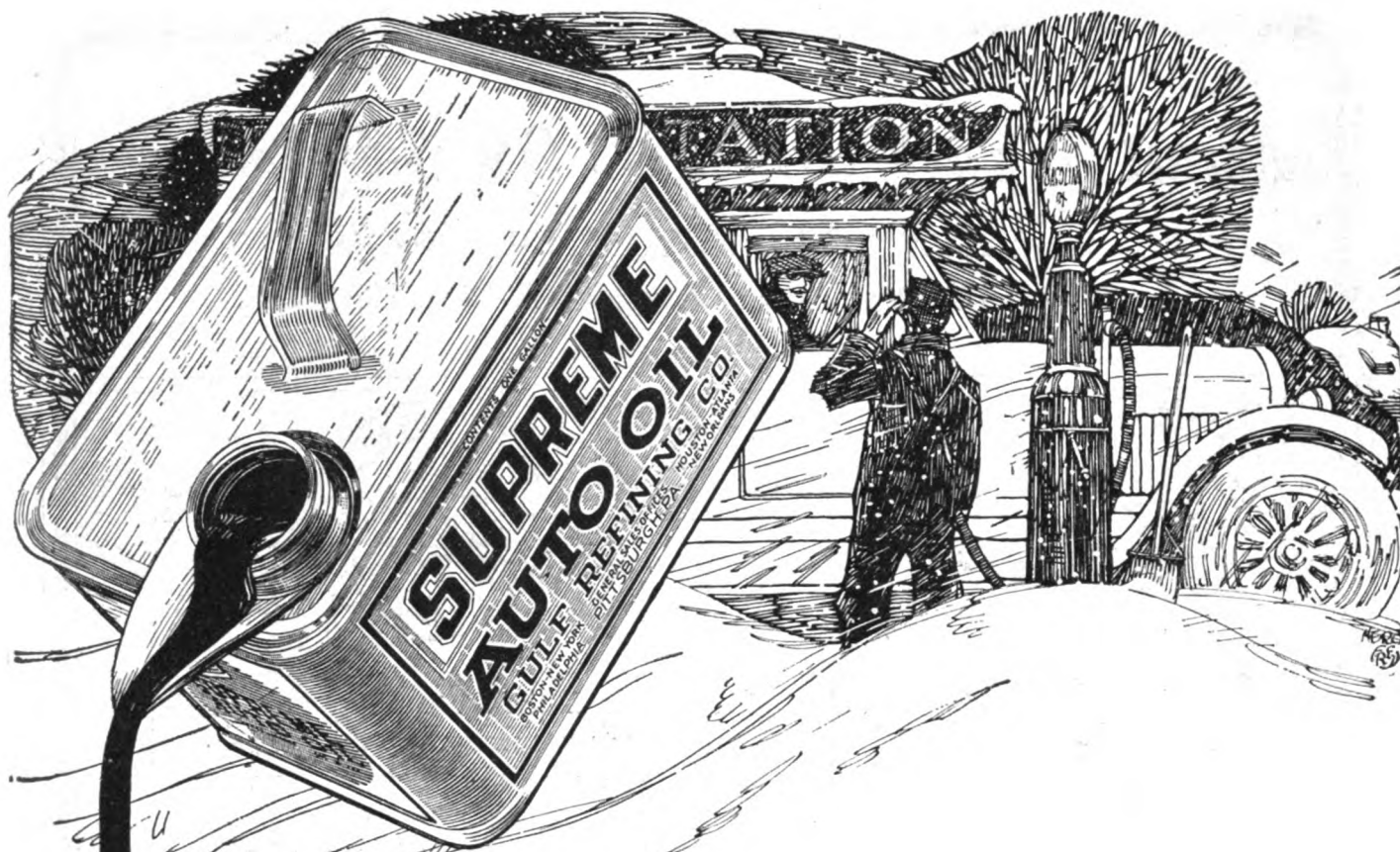
*"Spring Makers for Three Generations"*

**Main Office and Works—Bristol, Conn.**

Spring Steel Rolling Mills: Forestville, Conn.

Western Office: Book Bldg., Detroit





EVERY dealer should be interested in supplying seasonal oil to his customer.

Winter motoring demands the use of an oil possessing a very low cold test—else much damage to bearings and cylinder walls is sure to result.

SUPREME AUTO OIL—*Flows Freely at Zero*—starts with the engine—lubricates thoroughly and continuously.

The dealer who stocks SUPREME AUTO OIL is sure of a steady flow of customers.

For particulars address our nearest office.

# GULF REFINING COMPANY

General Sales Offices: Pittsburgh, Pa.

## DISTRICT SALES OFFICES:

New York  
Atlanta

Philadelphia  
New Orleans

Boston  
Houston

flows freely at zero.



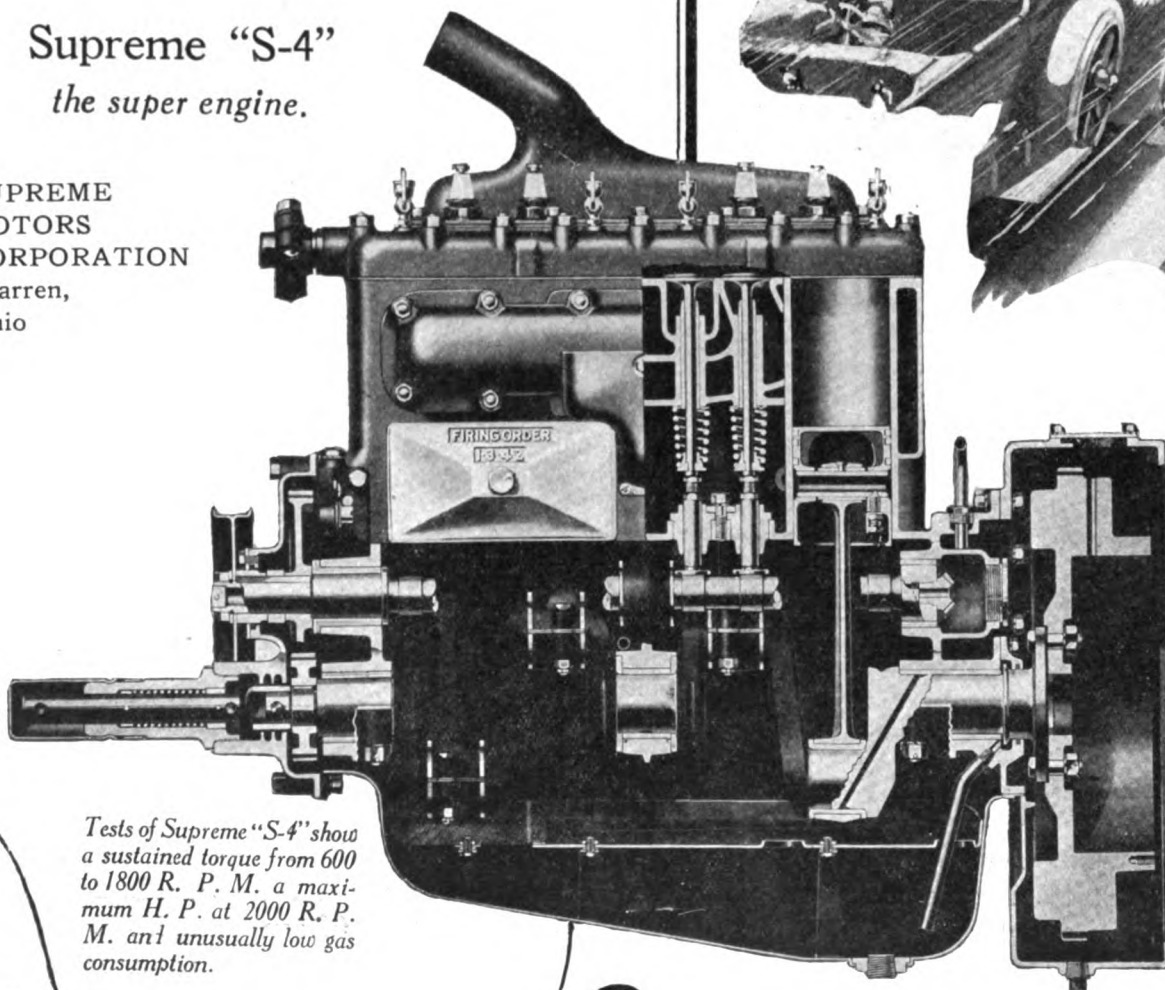
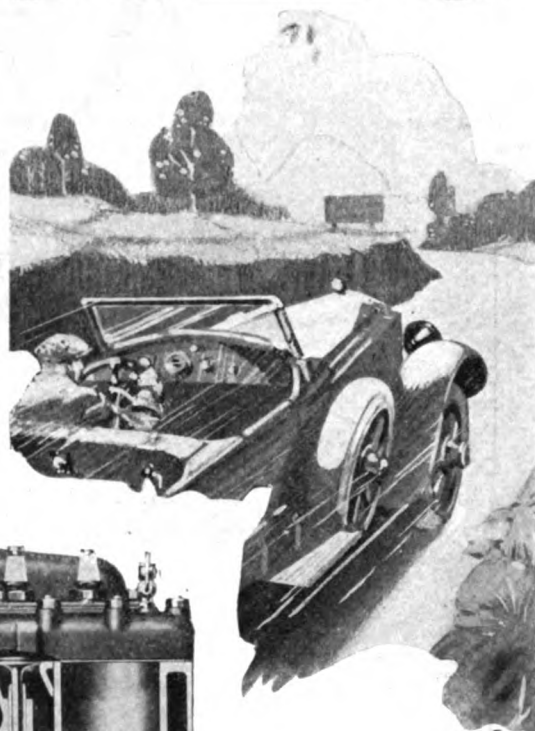


# Supreme

FOR light cars and speed trucks no other power plant—ever produced—so completely meets the needs as the

Supreme "S-4"  
*the super engine.*

SUPREME  
MOTORS  
CORPORATION  
Warren,  
Ohio

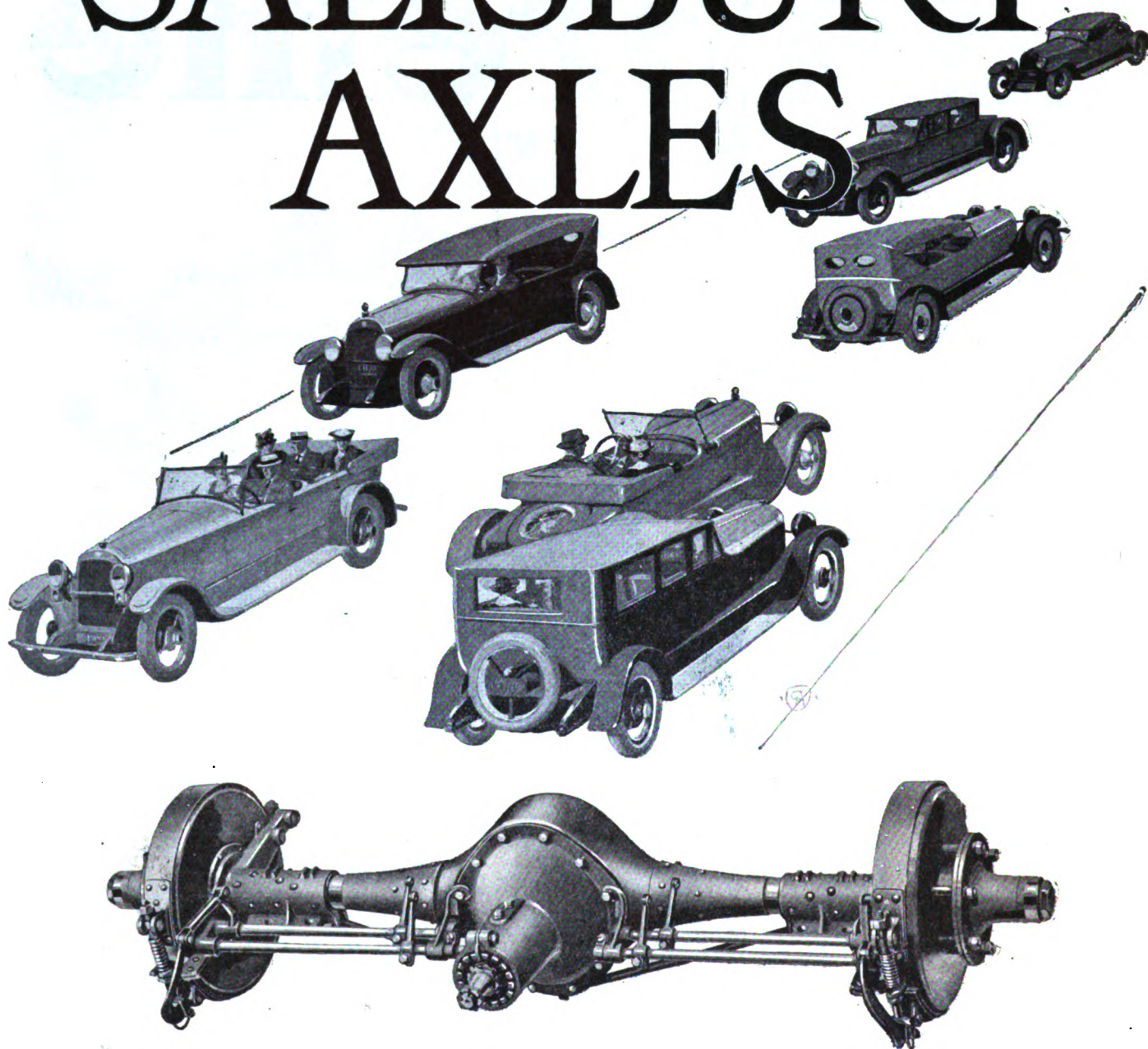


*Tests of Supreme "S-4" show a sustained torque from 600 to 1800 R. P. M. a maximum H. P. at 2000 R. P. M. and unusually low gas consumption.*

# Engines

PEAK OF POWER

# SALISBURY AXLES

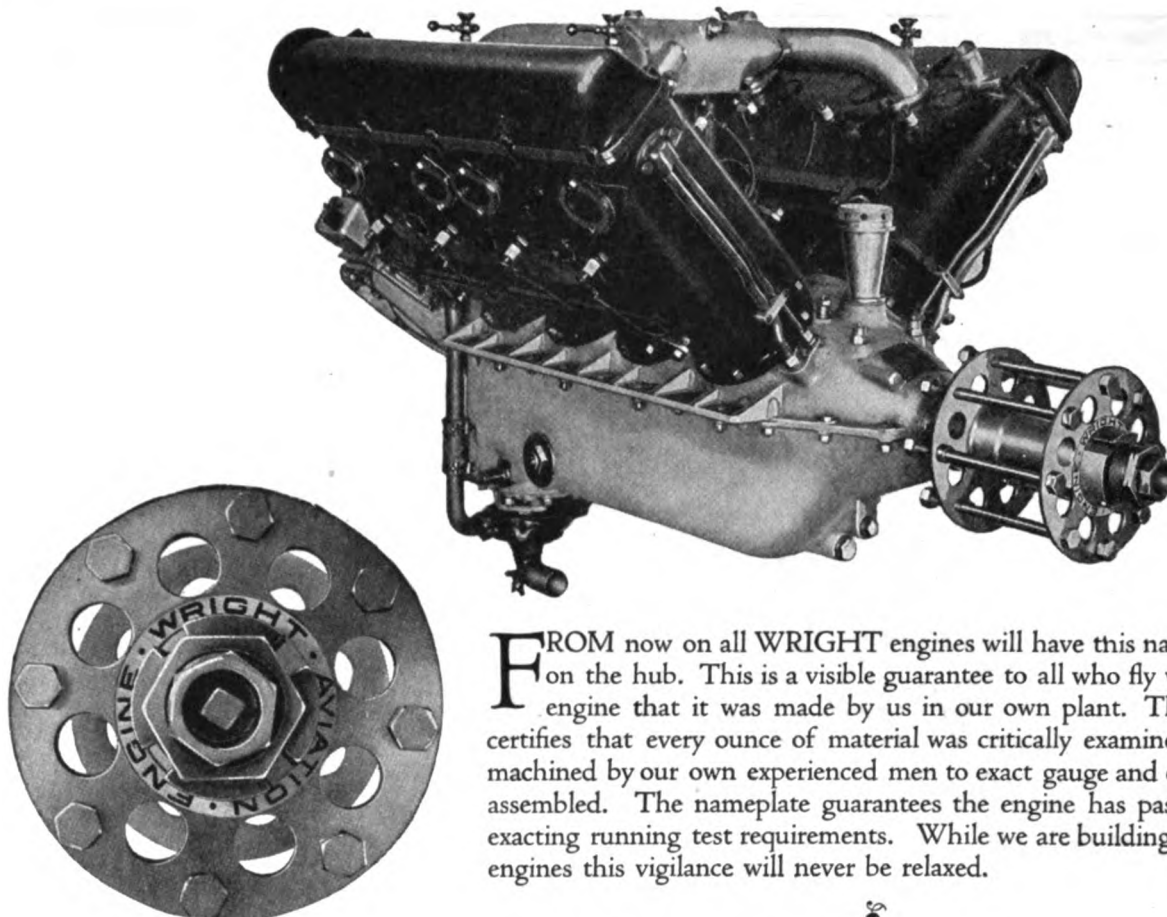


Salisbury Axles are making a genuine contribution to the satisfaction of motorists through the trustworthy service which they are rendering in thousands of American Motor cars. By their uniform dependability they are proving their worth not only to the makers of automobiles but to the motoring public as well.

We prize very highly the respect in which the name Salisbury has always been held. For more than fifteen years it has stood as the symbol of Quality in automobile axles—the symbol of an institution, the integrity and good standing of which have never been questioned. Salisbury is a name on which you can absolutely rely.

---

SALISBURY AXLE COMPANY, JAMESTOWN, N. Y., U. S. A.



*The identification of  
Incomparable Service*

#### MINIMIZING REPAIRS

The new models of WRIGHT engines have thicker cylinder sleeve heads and increased cooling around the valves. This has stopped valve warping. From 200 to 300 hours may be expected without regrinding valves. A new device makes engine timing an easy operation.



FROM now on all WRIGHT engines will have this nameplate on the hub. This is a visible guarantee to all who fly with the engine that it was made by us in our own plant. This plate certifies that every ounce of material was critically examined, then machined by our own experienced men to exact gauge and carefully assembled. The nameplate guarantees the engine has passed our exacting running test requirements. While we are building aircraft engines this vigilance will never be relaxed.

*The seven absolute requirements for aircraft engines are fulfilled in the two models of Wright engines now in production and being sold.*

#### ENGINE REQUIREMENTS

1. Lightness per horsepower
2. High power
3. Low fuel consumption
4. Short overall length
5. Interchangeable parts
6. Longevity
7. Reliability

#### RESULT IN PLANE OPERATION

Greater useful load, increased performance.  
Speed, climb, power reserve.  
Economy, long travel radius, increased useful load.  
Increased manoeuvrability, compact installation.  
No long repair periods, economy, safety.  
Many WRIGHT engines built four years ago are still flying. Many have flown 1,000 hours and over. With the E-2 and H-2 engines incorporating changes based on actual experience from hundreds of our own engines, we advise commercial flyers to figure on ultimate life of 2,000 hours.  
The reliable WRIGHT engines safeguard the life of the flyers thru exacting quality and test requirements. Skill, experience and unrelaxing vigilance make these engines the most reliable in the world.

*Compare the characteristics of these stock engines now in production with any engine built—foreign or domestic.*

	WRIGHT E-2	WRIGHT H-2
Power at 2000 R. P. M. . . . .	220 H. P.	358 H. P.
" " 1800 " . . . . .	200 H. P.	326 H. P.
Weight, dry with hub . . . . .	485 lbs.	620 lbs.
Gas per H. P. hour . . . . .	.48 lbs.	.5 lbs.
Overall length, including hub and mag. . . . .	4'-1 1/8"	4'-3 23/32"

NOTE:—The power given is the mean rated power, many individual engines give higher power and lower consumption.

WRIGHT AERONAUTICAL CORPORATION  
PATERSON, N. J.

# WRIGHT

## AERONAUTICAL ENGINES

STANDARD MOTIVE POWER FOR ALL AIRCRAFT

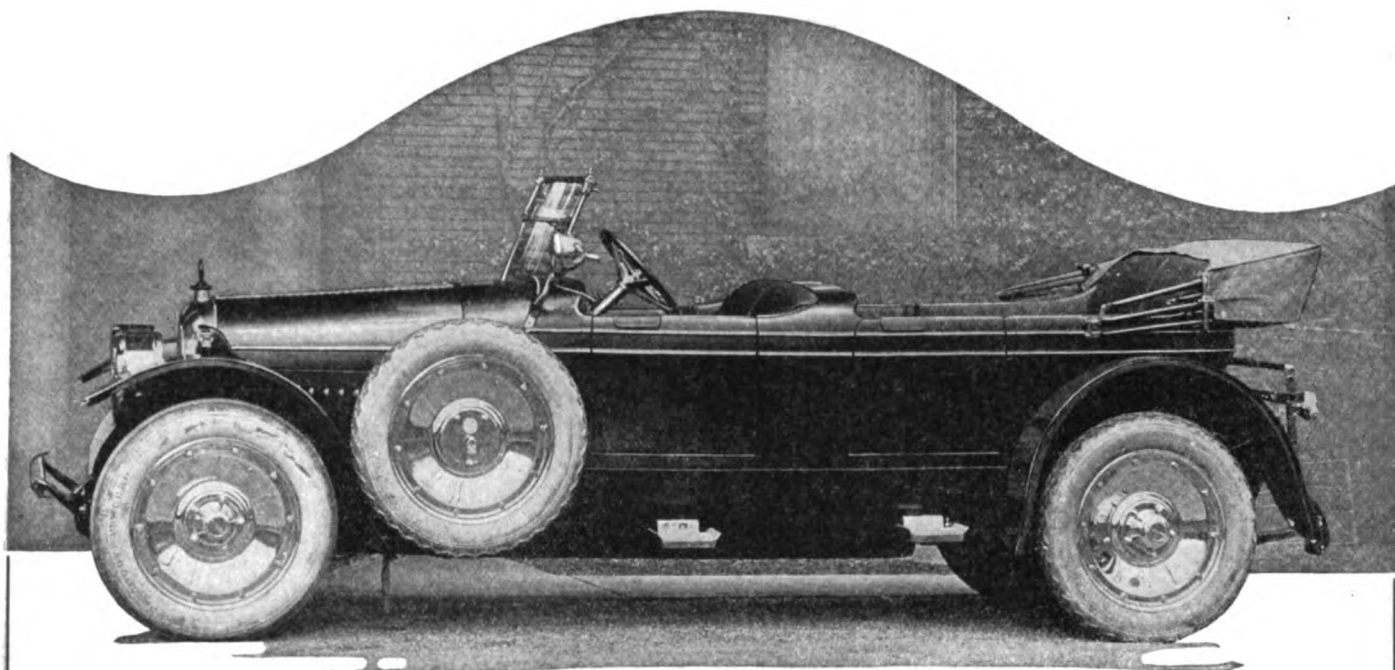
**FORGINGS**  
**AND**  
**CASTINGS**  
**OF**  
**VANADIUM**  
(The Master Alloy)  
**STEEL**

**HAVE**  
**UNSURPASSED**  
**STRENGTH**  
**TOUGHNESS**  
**RESISTANCE TO SHOCK AND FATIGUE**

*Let our Metallurgical Department help you solve your steel problems*

**VANADIUM CORPORATION OF AMERICA**  
**120 BROADWAY** **NEW YORK**





*Yes, it's on the "Cunningham"*

The Cuno Cigar Lighter is ever increasing in popularity with motorists who smoke, and as seven out of ten car owners do smoke, car manufacturers recognize the value of this convenient accessory, and are using it on the 1922 models.

It is easy to install.  
Automatic action.  
Always works.

Get back of a Cuno

*Write for Book of Cuno Products to*

**THE CUNO ENGINEERING CORPORATION**

*Makers of High Grade Automotive Equipment*

Meriden

Connecticut



**Auto Cigar  
Lighter**



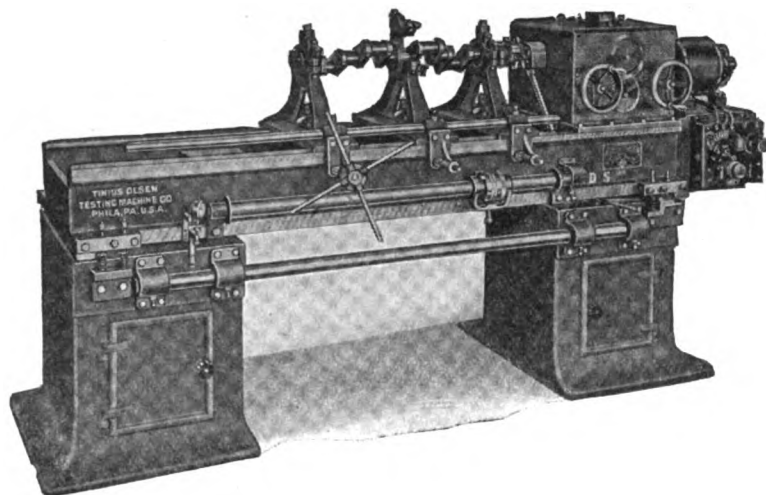
For Dash



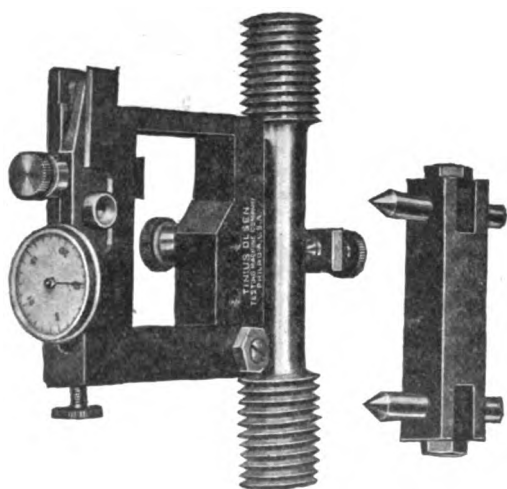
Smoking Set with  
ash receiver



**Eliminate Vibration**  
**Secure Perfect Balance With Speed and Economy**  
 USE THE  
**Olsen-Carwen Static-Dynamic Balancing Machine**



The last word in balancing is expressed in the Olsen-Carwen as it is the precision machine for balancing all rotating parts with the greatest of accuracy and reliability and at the same time on a production basis; the cost of balancing, once you have an Olsen-Carwen is only a few cents per part on a production basis, so the actual cost of balancing per part is negligible, while the value received from such a correct balance can hardly be computed as the entire success of your motor or car is dependent on it and thus the good will of the user at large.



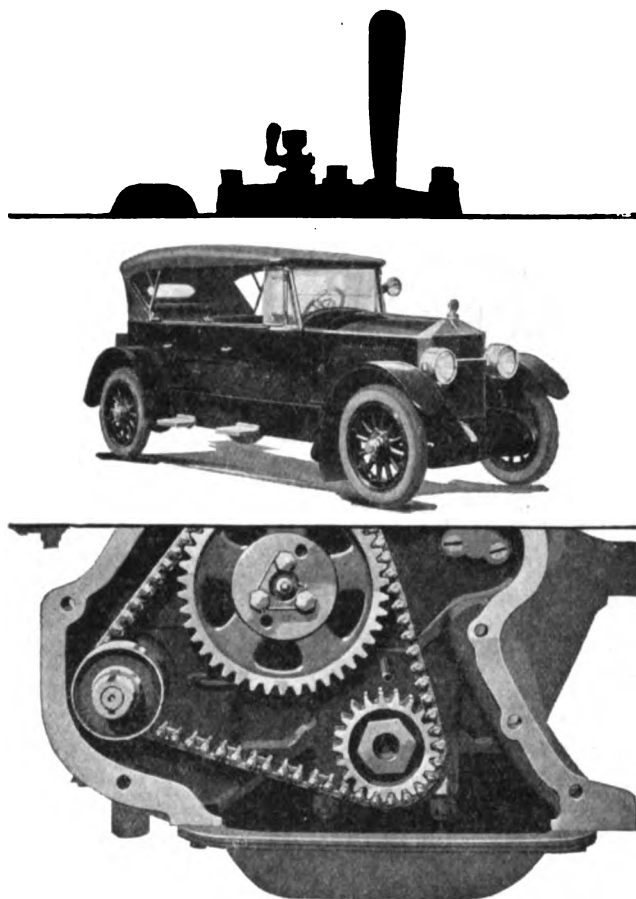
**Olsen Testing  
Machines**

Have you seen the Olsen Special Strain Gage? It is the last word in an instrument for determining the fiber stress in any member? How about your chassis designs? Have you correctly proportioned web and flange sections? This instrument will show you just where you stand by indicating the fiber stress in these elements.

Manufactured by

**TINIUS OLSEN TESTING MACHINE COMPANY**  
**500 NORTH 12TH STREET** **PHILADELPHIA, PA., U. S. A.**

Foreign Representatives: Edward G. Herbert, Ltd., Manchester, England; Andrews & George Company, Tokyo, Japan; Messrs. R. S. Stokvis & Fils, Paris, France; Brussels, Belgium; Rotterdam and Amsterdam, Holland.



*The Ambassador*, for those fully able to appreciate the intimate details of refinement and mechanical achievement.

Built by the Yellow Cab Company, whose engineers are keen to observe better performance and realize advancement in such details as produce lasting quality and trouble-free operation, the Ambassador includes only tested and proved equipment.

Genuine Morse Chain for driving the cam and accessory shafts was chosen because it offers the only real lasting solution for its important function. It operates with sustained quietness and efficiency.

---

#### MORSE CHAIN COMPANY

Main Office and Works      Sales and Engineering Office  
ITHACA, NEW YORK      DETROIT, MICHIGAN

# MORSE

---

GENUINE      SILENT      CHAINS

---



# ARE You machining from solid stock when you could stamp or draw to size more economically?

Lots of folks who have done this in the past are now using metal stampings made on "BLISS" Presses.

We do *not* make stampings but we can tell you who does and—better still—we can give you the names of just the firms best fitted by experience and equipment to do exactly the thing you need.

**Ask us—but don't forget to include a sketch and description of the article or parts**



1857  
LONDON

## E. W. BLISS COMPANY

Main Offices: BROOKLYN, N. Y., U. S. A.  
American Factories: BROOKLYN, N. Y., and HASTINGS, MICH.



1921  
ST. OVEN

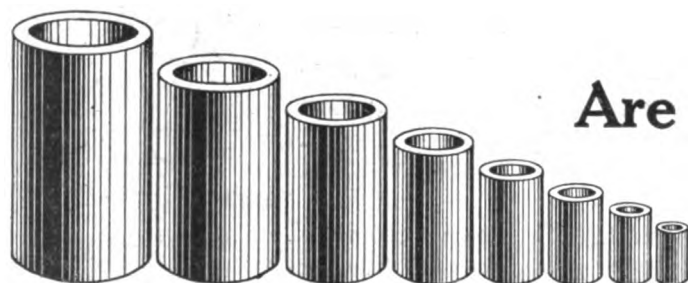
### SALES OFFICES

CHICAGO, People's Gas Bldg. DETROIT, Dime Bank Bldg. CLEVELAND, Union Bank Bldg.  
CINCINNATI, Union Trust Bldg. BUFFALO, Marine Bank Bldg. ST. LOUIS, Boatmen's Bank Bldg.  
PITTSBURGH, Keenan Bldg. NEW HAVEN, Second Nat'l Bank Bldg.

### FOREIGN SALES OFFICES and FACTORIES

LONDON, ENGLAND, Pocock Street, Blackfriars Road, S. E.

PARIS, FRANCE, 100 Boulevard Victor-Hugo, St. Ouen



## Are You Interested

in a plan by which you can cut your cost on Bronze Bushings, have ample stocks with a heavy inventory, get the goods the instant you want them, however suddenly the need arises? If so, let us tell you about Stock List "Y".

## Bronze Bushings and Bearings, Babbitt-lined Bearings

Cored Bronze Bars in 16 stock sizes. A big factory and five branches always at your service. Write, 'phone or call.

## THE BUNTING BRASS & BRONZE CO.

752 Spencer Street

Toledo, O.

Chicago  
722 S. Michigan Ave.  
Wabash 9153

New York  
Grand Central Palace  
Vanderbilt 7300

San Francisco  
198 Second St., Cor. Howard  
Douglas 6245

Cleveland  
1362 E. 6th St.  
Bell-Main 5991

Boston  
36 Oliver St.  
Main 1875





## G & E Gear Hobbing Machines

can be adapted for automatically generating single or multiple thread worms by a new hobbing process recently developed by us.

The rate of production is considerably greater than that attained by any other method; at the same time, a higher degree of accuracy is assured in the finished worms.

You will be well repaid for investigating this improved worm hobbing process.

Submit your blue prints for an accurate analysis of costs.



### DOMESTIC AGENTS:

Motch & Merryweather Machinery Co., Cleveland, Pittsburgh, Detroit and Cincinnati; Henry Prentiss & Co., New York, Boston, Buffalo, Syracuse, Rochester, and Hartford, Conn.; Marshall & Huschart Machinery Co., Chicago, Ill.; Marshall & Huschart Machinery Co. of Indiana, Indianapolis, Indiana; Dewar & Machine Tool Co., Birmingham, Alabama; Eccles & Smith Co., Los Angeles, San Francisco,

and Portland, Oregon; Elliott & Stephens Machinery Co., St. Louis, Mo.; Hallidie Machinery Co., Seattle, Wash.; Kemp Machinery Co., Baltimore, Md.; Robinson, Cary & Sando Co., St. Paul, Duluth, Minn.; Salt Lake Hardware Co., Salt Lake City, Utah; Seeger Machine Tool Co., Atlanta, Ga.; W. B. Empley Machinery Co., Philadelphia, Penna.; Oliver H. Van Horn Co., Inc., New Orleans, La.

### CANADIAN AGENTS:

A. R. Williams Machinery Co.—St. John, Winnipeg, Montreal, and Halifax. F. P. Barber Machinery Co.—Toronto and Hamilton.

# DROP FORGINGS STILLSON WRENCHES TOOL KIT EQUIPMENT

Our equipment of over one hundred hammers and two complete plants enables us to take care of unlimited production.

Moore forgings are furnished to specifications which means the greatest possible machine shop economy.

We specialize in heat treating where desired.



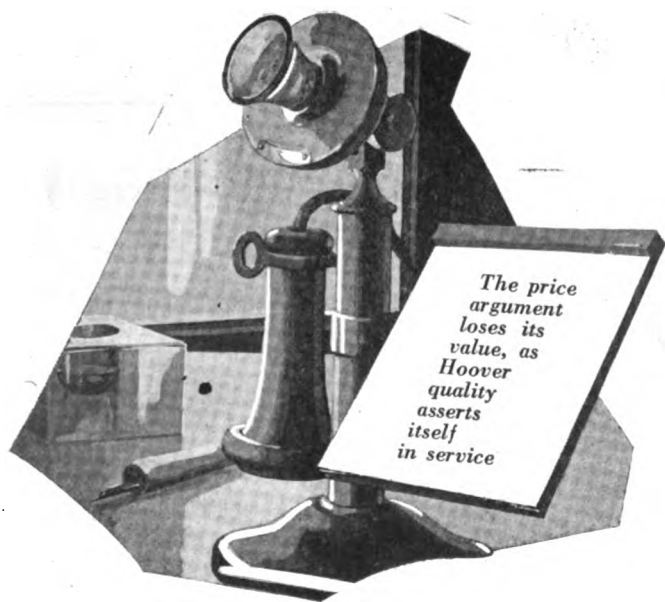
MOORE DROP FORGING COMPANY  
SPRINGFIELD, MASS. U.S.A.

# "Quotations"

There is no assurance of satisfaction or economy in quotations—regardless of how appealing they may be.

Materials and workmanship, and not attractive prices should guide the discriminating purchasing executive, for his activities are as important to the finished product as those of the engineers and production officials.

Close adherence to self-imposed standards seldom encountered in parts of this kind, has resulted in the growth of the Hoover plant to a point where it now supplies the largest number of balls purchased by the industries of the United States.



## HOOVER STEEL BALL CO. ANN ARBOR, MICHIGAN

Manufacturers of:  
STEEL—BRASS—BRONZE—MONEL  
ALUMINUM—HOLLOW BALLS

### BRANCHES

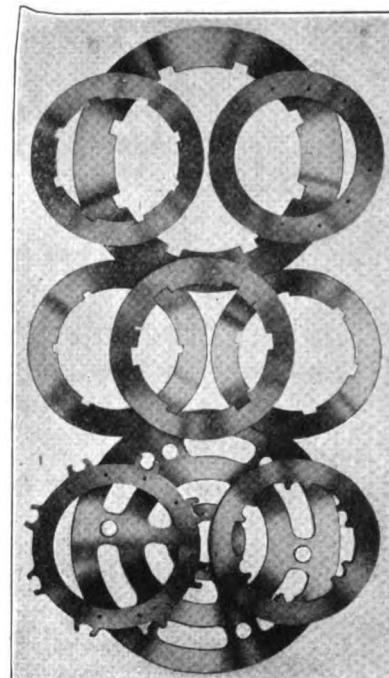
Chicago.....180 N. Market St.  
Philadelphia.....259 Middle City Bldg.  
Cleveland.....3124 Edgehill Road  
Chattanooga.....Sanford Brothers

## ATKINS CLUTCH PLATES

Our facilities for manufacturing "Silver Steel Saws" enable us to make Hand Hammered Clutch Plates and Discs, superior to all others.

Furnished, plain or slotted, unfinished or ground and polished, tempered or untempered, any size.

Get our prices before you buy.

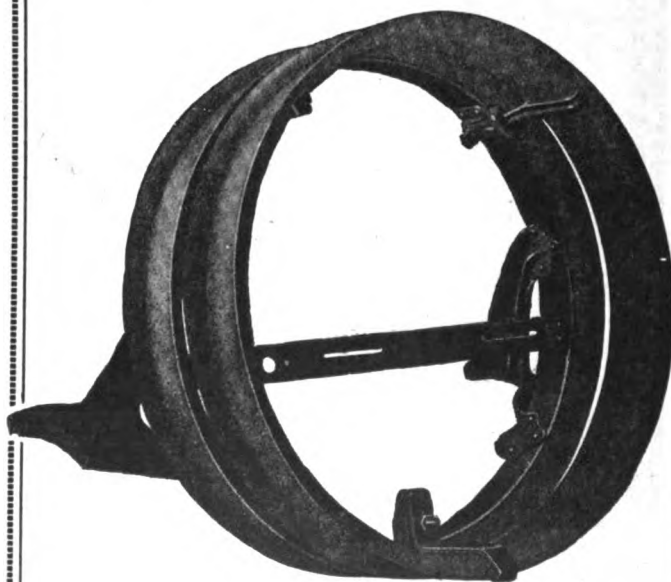


"A Perfect Plate for Every Purpose"

**E. C. ATKINS & COMPANY**

Established 1857. "The Silver Steel Saw People."  
Indianapolis, Indiana

## DETROIT TIRE CARRIER



**DETROIT CARRIER & MFG. CO.**

DETROIT, U. S. A.



# Specify— LEATHER

**M**ANY new effects in the present day economical leather upholstery will be displayed at both automobile shows.

- Striking effects—obtainable only in leather—interesting now because leather is relatively the cheapest basic commodity in the country.

But price alone never dominates leather's specifications—car owners want it, that's all.

They like the feel of leather—its soft-

**It costs no more than other upholsteries — preferred by all**

ness—its never-changing elegant appearance. Keeps clothes clean—is odorless—scuff and peel proof, of course.

Get the facts about leather upholstery's economy at our booth on the **FOURTH FLOOR** of the **GRAND CENTRAL PALACE** at **NEW YORK** and the **BASEMENT** of the **COLISEUM** at **Chicago**—see the display.

**TANNERS' COUNCIL**  
at Park Row, New York City

**THERE IS NOTHING LIKE LEATHER; THERE NEVER HAS BEEN AND PROBABLY NEVER WILL BE**



**"You Can Always Rely on EMPIRE Bolts and Nuts"**

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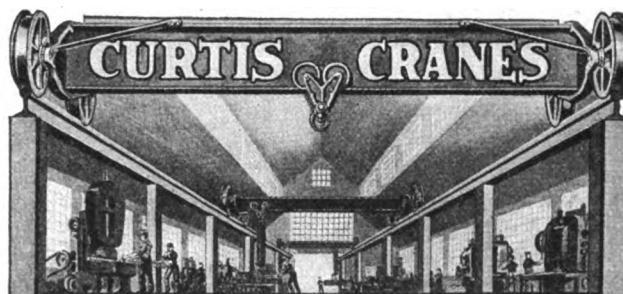
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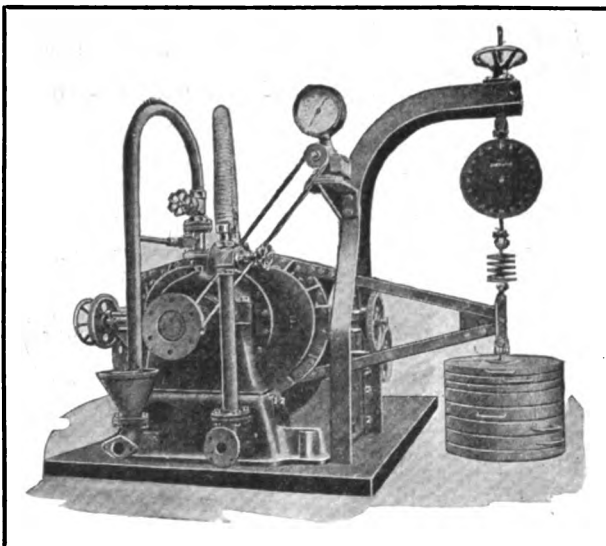
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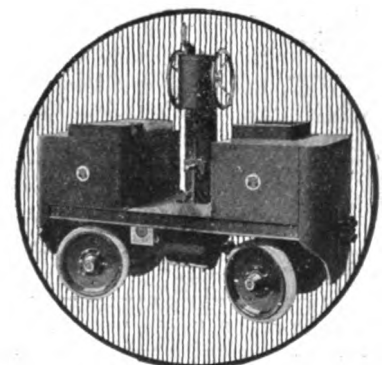
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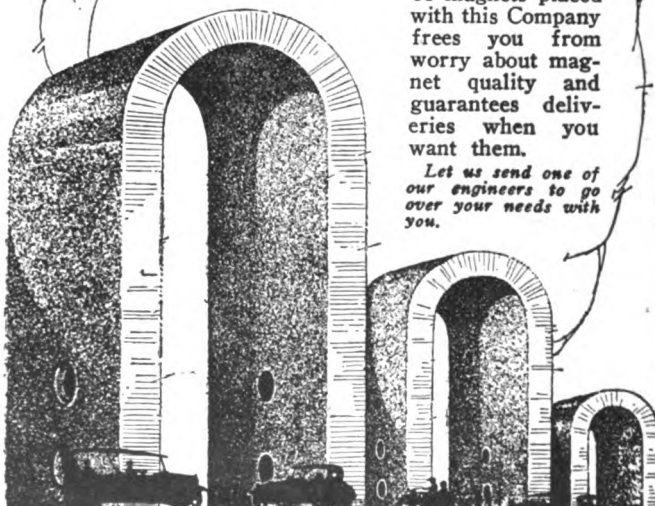


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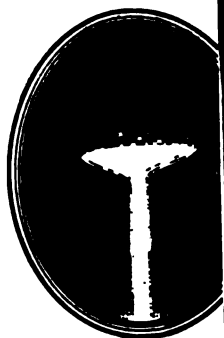
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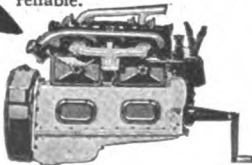
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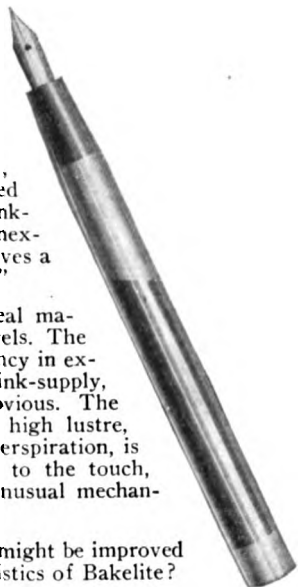
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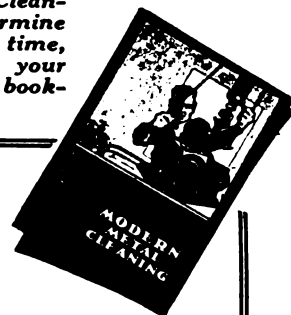
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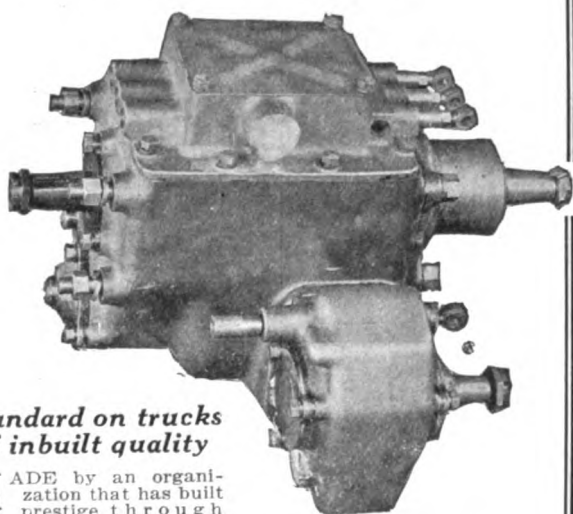
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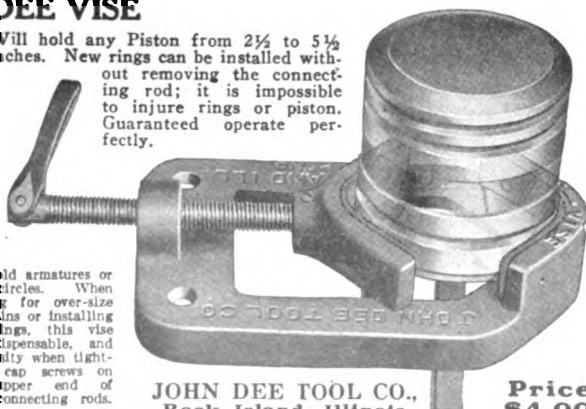
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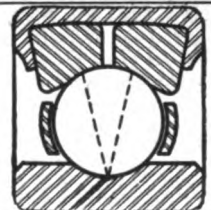
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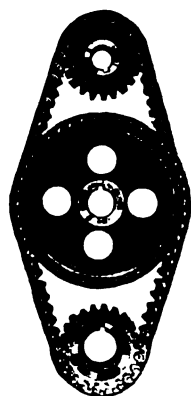
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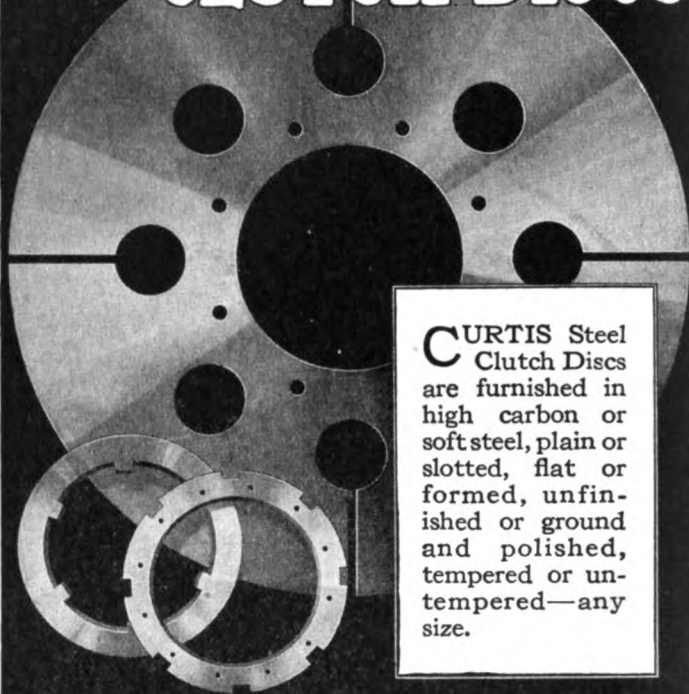
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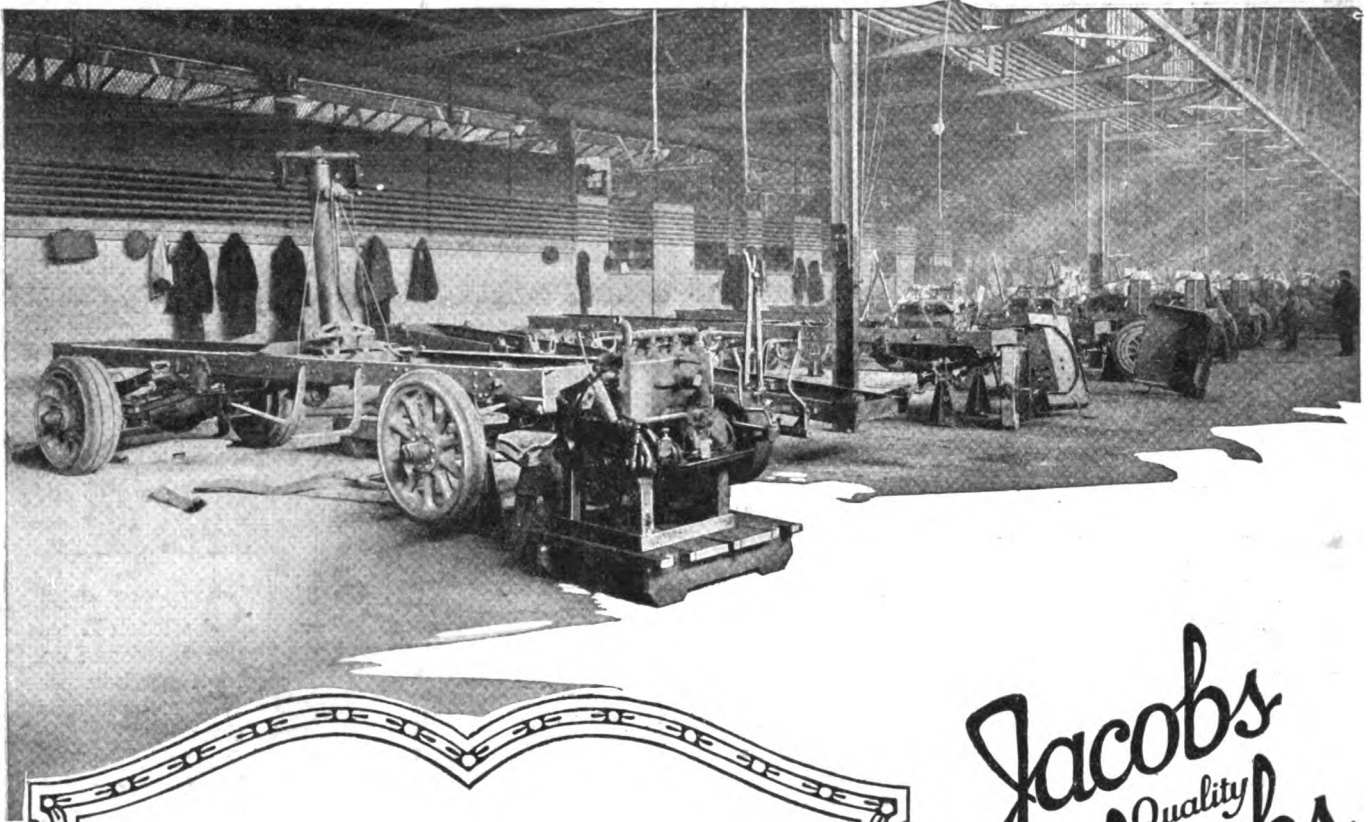
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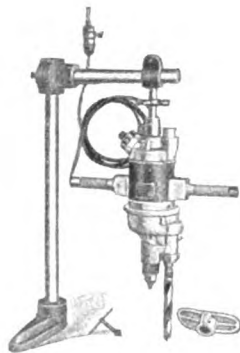
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